

Version 4.0



A Mission for the 21st Century:  
Building Leadership for Tomorrow  
on a Foundation of Academic Excellence

Office of Academic Affairs  
The University of Michigan

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## Introduction

Academic institutions have traditionally framed their missions around the trinity of teaching, research, and service. In this spirit, the University of Michigan has sought to achieve distinction through the quality of education provided to its students; through the scholarly activities of its faculty as they seek to create, refine, preserve, and disseminate knowledge; and through the service it provides to society through the application of this knowledge.

As the University prepares to move into the 21st Century, we propose that it refine this traditional mission by focusing on the development and achievement of leadership, both as an institution and through the personal development of its students, faculty, and staff. More specifically, we suggest that the University should select as its primary theme *the building of leadership for tomorrow on a foundation of academic excellence*.

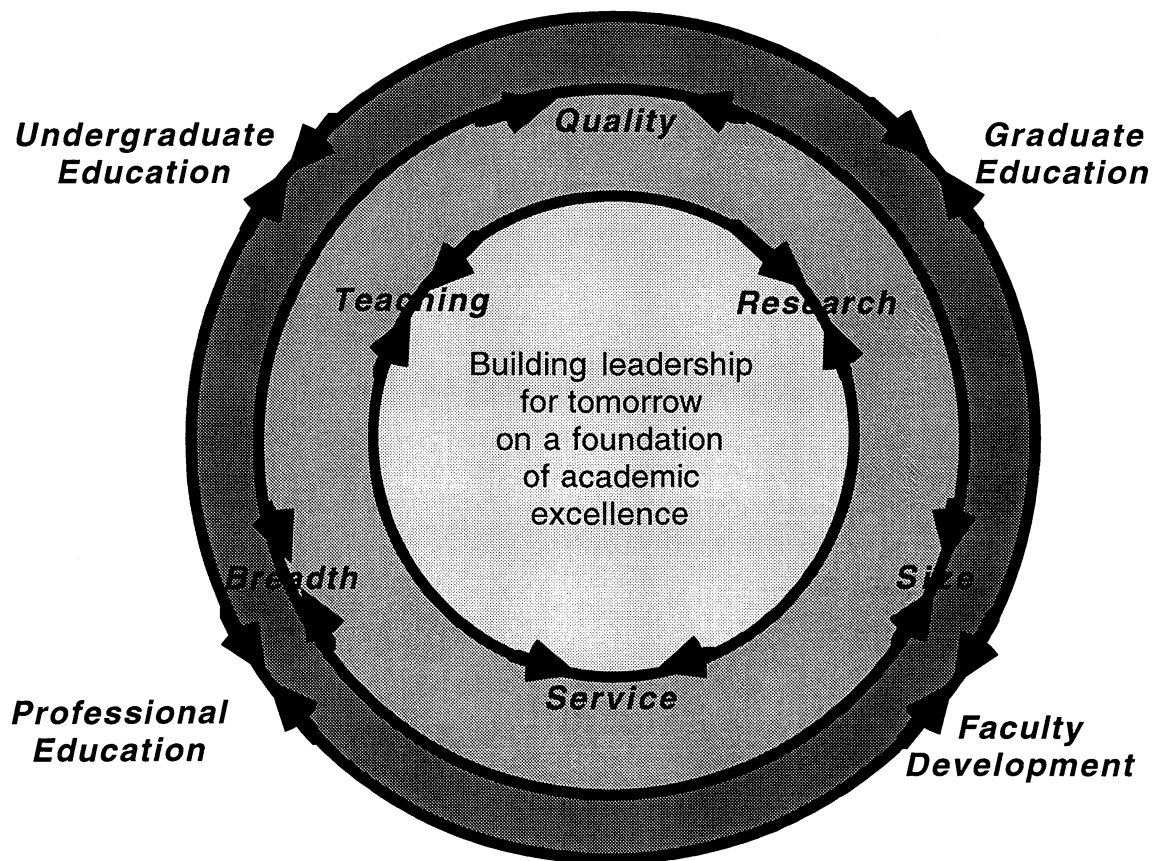
Of course, throughout its history the University has been viewed as the flagship of public higher education, a leader among public universities. Its graduates, faculty, and staff have assumed leadership roles across a broad array of societal endeavors throughout the state, the nation, and the world.

We suggest, however, that the University build on this heritage by placing even greater emphasis on the development of leadership through the education of its students and the intellectual development and contributions of its faculty and staff. The exceptional quality of the students and faculty currently attracted to the University, the rich diversity and comprehensiveness of its academic programs, and the outstanding environment it can provide for teaching and research offer a unique opportunity to focus on the mission of leadership. Such a role would not only enhance the University's social impact, in a manner consistent with its responsibilities as a public institution; it would lay the foundation for the long term strength and distinction of the institution through the achievements, contributions, and influence of its graduates, faculty, and staff.

We propose that the University's focus on the development and achievement of leadership be based upon an unrelenting commitment to *academic excellence*, to education, scholarship, and research of the highest quality. This foundation for the leadership theme seems particular appropriate since the central task of a university is to create an environment where the quality of mind and its performance is always the primary concern. By stressing academic excellence, we seek to develop those intellectual qualities most critical to leadership: a disciplined use of reason, enlivened by daring and the courage to experiment, tempered by respect for what one can

learn from others.

The objective of developing leaders among our students and faculty will provide a unique character to our traditional endeavors of teaching, research, and service, linking them in a highly interdependent fashion. Furthermore, the leadership theme demands that the University achieve a balance in the quality, breadth, and scale of its programs -- albeit with the primary stress on excellence -- since an emphasis on all three characteristics is necessary to provide a suitable environment for the development of leaders across the broad spectrum of societal roles. This theme would also serve to couple undergraduate, graduate, and professional education with faculty and staff development. Furthermore, it would rebuild a greater sense of common purpose, of shared community values, at a time when the strong commitments to the disciplines have pulled faculty apart.



The theme we propose for the years ahead, building leadership for tomorrow on a foundation of academic excellence, responds to the unusual opportunities, responsibilities, and challenges before the University today, just as it resonates with our long tradition of excellence. The focus on

leadership provides an exciting and appropriate direction for the University as it prepares to move into the 21st Century.

## **A Time of Opportunity, Responsibility, and Challenge**

The University of Michigan faces a period of unusual opportunity, responsibility, and challenge in the years ahead.

Today, it can be argued that the University faces *opportunities* matched by few institutions in this nation. Its reputation as the flagship of public higher education -- indeed, as a "public Ivy" -- has allowed it to attract a student body and faculty of unprecedented quality. While the relative level of state support is not as strong as it once was, the University still benefits from its location in one of the nation's most prosperous regions. The roughly \$200 million it receives each year in direct state funding is equivalent to the income from a \$4 billion endowment! Furthermore, in recent years the University has learned to compete more effectively for federal research support and to attract strong private support from its alumni, friends, foundations, and industry.

Beyond these human and financial resources, the University has benefited over the years from the almost unique independence it has been granted by the State of Michigan, an autonomy established through the original constitutional action which created the institution. This independence allows the University to set its own goals, to chart its own course. It has been key in achieving and sustaining Michigan's leadership among public universities over the years. Indeed, in a sense, the University enjoys the best of both public and private higher education: the independence of a private institution to set unusually high standards for academic achievement, and the strong support of a public institution to allow the achievement of unusual scale and breadth in its activities.

With opportunity also comes *responsibility*. Of course, the public nature of the University demands that we accept important responsibilities to serve our state and our nation. However, beyond this traditional role, the fact that today we are presently enrolling the most outstanding student body in our history carries with it the responsibility to provide an education of unmatched quality. So too does our ability to attract the most talented junior faculty entail additional responsibilities for their professional development. In a very real sense, through its students and faculty, the University has been entrusted with the most valuable resource of our society. We must be effective stewards by taking actions aimed at developing this talent to the

fullest.

To seize the opportunities before us, to meet our responsibilities, the University must respond to several *challenges*. It is customary to think first of the challenges posed by external factors, of responding to declining public support or changing demographics. However we suggest instead that the most important challenges before the University today are those having to do with what this institution is and what we wish it to become in the years ahead. We believe these to be *challenges of excellence*:

1. First, we suggest that the University must pick up the pace a bit by intensifying its commitment to excellence. Like it or not, the University competes with other institutions not simply for its reputation, but for outstanding students and faculty and for financial resources from both the public and private sector. To sustain our expectations for achievement, we must maintain the margin of excellence that sets us apart from others, that provides the visibility necessary to attract the human and financial resources essential for leadership. Other institutions are accelerating rapidly, and Michigan must do likewise just to remain ahead of the those closing in behind us.
2. Key to our efforts to achieve excellence will be our willingness to take decisive internal actions designed to focus resources on areas of particularly high quality and critical importance. The time when continually growing state support allowed us to place equal emphasis on quality, breadth, and capacity have long since passed. We can no longer afford to be all things to all people. We must chose carefully those areas in which we can be outstanding, and then make the commitments of resources to achieve excellence. The quality of our activities must dominate their breadth and capacity.
3. In focusing our resources to achieve excellence, we must choose *academic* excellence -- education, scholarship, and research of the highest quality -- as our highest priority. We are convinced that achievement in these areas must be the foundation upon which the distinction of the University will be built.

A time of opportunity, responsibility, and challenge, to be sure -- but a time of *excitement* as well. We believe that the University today faces one of those critical crossroads in its history. If we chose our course wisely, with courage, conviction, and commitment, we can meet the challenges of excellence and seize the opportunities before us to build new levels of

distinction for the institution.

It is in this spirit that we suggest both a direction and a strategy capable of guiding the University of Michigan into the 21st Century. The mission is deceptively simple: to choose as the University's primary goal the building of leadership for tomorrow on a foundation of academic excellence. But the challenge of leadership requires both a theme and a plan if we are to be successful, and it is to these elements that we now turn our attention.

### **The Mission of Leadership**

Why do we recommend that the University focus on a leadership theme at this point in its history? From its origins in medieval Europe, one of the greatest achievements of the university in western culture has been the training and development of leaders through the disciplines of the mind. Individual university graduates have exercised intellectual and professional leadership in all western societies, just as certain universities are themselves widely acknowledged as educational leaders.

In the United States today, everyone recognizes that a small subset of institutions has achieved a level of intellectual distinction which sets them apart from the rest. Such universities have certain characteristics in common. They have sustained, through their faculty and students, a commitment to the primacy of academic values, of high intellectual standards, and of the disciplined but unprejudiced pursuit of critical inquiry. They enjoy a recognized tradition of quality which becomes self-generating and encourages new ventures.

These institutions enjoy extraordinary resources, human and material: students, faculty and staff; libraries, laboratories and museums; physical facilities, grounds and buildings -- resources that are not easily created at any one time, but the presence of which leads to the regular expectation that there can and will be still more. They have, in periods of exceptional greatness, benefited from fruitful relationships with larger communities outside the university: in early times with religious organizations and their sense of mission; with blossoming regional cultures, in New England, the Midwest, or California; with the development of major cities like New York or Chicago; with government, and its programs, objectives, needs and expenditures; with the professions, with businesses and with industries which have special needs. And, of course, these institutions have attracted outstanding men and women to their institutions, who, as leaders in education as a whole or in various fields of study, have placed their stamp upon the institution in ways

that affected major disciplines, and sometimes entire universities, across the land.

The University of Michigan clearly qualifies for inclusion in the group of institutional leaders in higher education. Under Presidents Tappan and Angell, Michigan was among the first American Universities to adopt the European models of rigorous seminars and advanced scholarship; subsequently, the tradition of high intellectual standards in the Arts and Sciences has been maintained and strengthened. Michigan was also among the first universities to develop strong professional schools (the Medical School, for example, had established its distinction even before the Civil War); in many of the professions, the University is clearly among the national leaders today. But perhaps most significant of all is the one particular characteristic, often noted, which makes Michigan both distinctive and distinguished: it was the first public university to match in quality the private institutions which it exceeded in the diversity and comprehensiveness of its academic mission.

Hence, the leadership theme is not only appropriate within the historical tradition of great universities, but it is also a natural continuation of both the heritage and traditional mission of the University of Michigan. By placing greater emphasis on preparing our students for leadership roles in society, we will be stimulated to improve the quality of the educational experience provided in our instructional programs at all levels: undergraduate, graduate, and professional. To achieve leadership in scholarship and research, we must provide our faculty and students with the resources, encouragement, incentives, and opportunities to achieve excellence in these areas. The leadership mission will also enhance the University's ability to address the needs of society, in a manner consistent with our responsibilities as a public institution. And, of course, success in the mission of leadership would lay the foundation for the long term strength and distinction of the institution through the achievements, contributions, and influence of its graduates, faculty, and staff.

The mission of leadership aligns particularly well with both the traditional strengths and present status of the University. Throughout its history, the University of Michigan has been the prototype of the large, comprehensive, public research university. It combined strong public support with an unusually strong commitment to excellence in scholarship to build academic disciplines and professional programs of truly incredible breadth and richness. Indeed, one might well argue that the University today offers the most comprehensive array of distinguished programs of any institution in the nation.

Other characteristics of the University seem similarly well-suited to the leadership theme. We have traditionally relied on building our faculty through the development of junior scholars rather than hiring established scholars into senior tenured ranks. Our role as a public institution provides an unusual opportunity to develop the service activities so necessary for the development of leaders. This public role is accentuated by the strong interactions with societal institutions that many of our professional programs have developed. The long tradition of a mature, activist student body and faculty, coupled with our commitment to equal access which provides a diverse peer environment, also are important factors in creating the experiences necessary for the development of leaders.

There are also several unusual opportunities presently facing the University which suggest the appropriateness of the leadership theme at this point in our history. Most significant among these is the extraordinary quality of the human resources, students and faculty, now attracted to the University.

This is particularly true for the University's undergraduate student body. It is probably accurate to state that Michigan today enrolls more outstanding students than any other university in the nation. In a sense, we are currently riding a surging wave of student quality quite unique in our history. We can either respond passively to this good fortune by bobbing up and down with the wave as it sweeps by, or we can develop an aggressive agenda to catch the wave, to ride at its crest and maintain and perhaps enhance this exceptional quality into the future.

Similarly, in many fields we are now attracting the most outstanding junior faculty in the nation. Once again, by introducing strong initiatives to develop this extraordinary human resource, we are making long term investments in the quality and strength of the institution.

Yet, there is still another reason why we cannot simply continue with business as usual in the face of this extraordinary human talent. As a public institution, we have a particular stewardship to develop human resources entrusted to us by society. Hence, we not only face the challenge of how to utilize this pool of talent to build and sustain the excellence of the University, but beyond that we must acknowledge a special responsibility to develop these human resources to their fullest potential.

In summary, then, it is our belief that the mission of leadership will maximize the impact of the University -- on the development of its students and faculty, just as it will enhance our service to society and ensure the long



term strength of the institution. Indeed, we contend that the future strength and distinction of the University will depend on the impact of our graduates and faculty. By taking advantage of the unusual quality of the human resources now attracted to the University, by stressing the development of leadership, we are laying the foundation for the very long term strength of the institution over the careers of these individuals and beyond.

## **Implications of the Leadership Theme**

While the leadership theme is consistent with the traditional mission of the University, it differs in the degree to which it focuses resources on a key objective: the development and achievement of leadership through academic excellence. Furthermore, while we have always had a commitment to excellence in the quality of experiences we provide to undergraduates, graduate and professional students, we have never interrelated these in the intimate manner proposed under the leadership theme. Nor have we -- at least in recent times -- placed the degree of emphasis on the quality of the undergraduate experience proposed for this new mission.

To illustrate the nature of the leadership theme, below we discuss several of its implications:

### **1. The Link Between Quality, Breadth, and Scale**

The leadership theme binds together the sometimes conflicting objectives of quality, breadth, and scale. The mission of developing leadership requires that all three must be regarded as important objectives, albeit with some difference in emphasis.

The quality of our activities is the most critical determinant of our ability both to develop and achieve leadership. It was for this reason that we clearly identified our commitment to academic excellence as the foundation of our efforts. However, it should be stressed that the leadership theme also requires some commitment to sustaining the breadth and scale of our activities. A comprehensive and diverse array of intellectual, social, and cultural experiences is important for the development of leaders. Furthermore, the scale of our programs not only contributes to the richness and quality of the University -- e.g., the size and quality of central resources such as libraries, computing networks, and athletic facilities -- but it also is a factor in determining our impact on society.

Rather than viewing the quality, breadth, and scale of the University as

competing objectives -- or possibly even as constraints on what we can accomplish within a world of limited resources -- we suggest instead that these characteristics, when linked together satisfactorily, provide an usual opportunity to define a unique mission for the institution. By building leadership in an environment that demands commitment to all three characteristics, although with a particular stress on academic excellence, we can distinguish the University from other institutions which tend to focus on one of these factors to an extreme.

For example, highly selective private institutions sometimes tend to sacrifice breadth and size in an effort to achieve absolute excellence in a small number of fields. This results in institutions which are highly focused in an intellectual sense, which while certainly distinguished, are nevertheless unable to provide the rich array of opportunities and diverse experiences of "multiversities" such as Michigan.

On the other hand, the University can also set itself apart from other large, comprehensive, research universities by the degree to which it chooses to focus its resources. By insisting on the achievement of sharp spires of academic excellence across a broad array of activities, we can distinguish ourselves from those institutions which strive for more uniform quality across all programs.

## 2. Spires of Excellence

While the breadth and capacity of our programs will continue to be of concern, we believe that the University's primary emphasis in the decade ahead should be on program quality. Moreover, we believe that the development of leaders will require us to build "spires" of excellence in key fields, rather than try to achieve a uniform level of lesser quality across all of our activities. Only by attempting to be the best in key fields can we develop in our students, faculty, and staff the intensity and commitment to excellence required for true leadership. Furthermore, only by competing with the best can we establish appropriate levels of expectation and achievement.

It must be stressed here that we do not propose a goal of focusing the resources of the University to build a few isolated spires of excellence, in the manner of a small liberal arts college, for example. Nor do we accept models which distribute resources to achieve a uniform level of necessarily lower quality across all programs.

Rather, we believe that within each of our academic units -- our schools, departments, centers, and institutes -- we should seek to build a

number of spires of focused excellence. In other words, the general level of excellence in each of our academic units will be achieved through the development of a series of sharply focused peaks of excellence within the units. Thus even for those programs to which we are unable to provide the resources to be absolutely first rate, we would expect to achieve some peaks of extraordinary excellence through the focusing of resources in selected areas. We should continue to make every effort to avoid mediocrity; but constrained resources imply that we will have some areas that are very good as opposed to excellent.

The particular mission of leadership we have proposed for the University can be viewed as positioning Michigan as the complement to other more focused ("spire- dominated") private institutions. Indeed, this viewpoint suggests that Michigan might selectively develop key relationships with several of these institutions to provide our students and faculty with access to their highly-focused peaks of excellence. Conversely, we may well be able to provide their students and faculty with access to the rich diversity and comprehensiveness of our programs, as well as to unique resources we are able to develop because of our scale.

### 3. The Intellectual Character of Teaching, Research, and Service

The theme of leadership influences both the intellectual nature of and the emphasis within our traditional endeavors of education, scholarship, and service. For example, it suggests that the University must become even more committed to the concept of a liberal education for its students. The objective of developing leaders among our students demands challenging intellectual experiences, both in formal instruction and in the extracurricular environment. It places strong emphasis on student- faculty and peer relationships, as well as upon an array of activities both on and off campus to provide leadership experiences.

The mission of developing leaders among our faculty suggests that at least some fraction of our scholarship should be shifted to venturesome intellectual activities that are at the cutting edge of inquiry. Some of our faculty should be encouraged to work in seminal, cross-disciplinary areas where extraordinary insight and intellectual breadth can lead to the creation of entirely new fields of knowledge.

The University will continue to have important service roles. Leadership will require that such activities be justified as important experiences for our students and faculty, as models to be propagated to other institutions, and as sources of important questions for basic investigation. In

a sense, the leadership goal will drive and determine the nature of our service activities.

#### 4. The Environment for Developing Leadership

There are other derivative goals which follow from the mission of leadership. The quality of the environment for developing leaders will be determined by a number of factors, including the quality of instruction and scholar of backgrounds among those comprising the University community; student/faculty relationships; and social, cultural, political, and athletic experiences. Once again we find that the goal of leadership links the three traditional missions of the University -- teaching, research, and service -- in a natural manner. Moreover, it also relates these to other features of the University, such as the quality and diversity of the University community and the "extra- academic" environment.

Breadth, diversity, and comprehensiveness can similarly be decomposed into a number of factors such as the intellectual nature of our activities; the cultural experiences we provide; the nature of our students, faculty, and staff; and the range of political issues and beliefs on the campus. We need a rich, diverse, and comprehensive environment to stimulate the development of leadership. This extends beyond our academic programs to all aspects of the University environment and the community which it sustains. Indeed, it will extend to the relationships the University develops with its external environment as well.

The theme of leadership will also have many other implications for the institution in a student and faculty governance, student services, and external relationships. Several of these will be suggested later in this document. Others will become apparent only after we have moved further toward the leadership goal.

#### 5. Undergraduate, Graduate, and Professional Education

If we are to focus on the development of leadership through the education of our students, then it is apparent that the University must consider carefully the quality of the experience it provides at all levels: undergraduate, graduate, and professional.

Of particular importance in this regard is a major effort to better understand and improve the undergraduate experience at the University. Not only is this task appropriate within the context of the leadership theme we have proposed. It is also demanded by the extraordinary quality of the

students now enrolling in the institution. Furthermore, we suggest that a University-wide focus on the quality of the undergraduate experience may have the potential for recalling faculty to our common mission:

"Colleges...have their indispensable office, -- to teach elements. But they can only highly serve us when they aim not to drill but to create; when they gather from far every ray of various genius to their hospitable halls, and by the concentrated fires, set the hearts of their youth on flame."

Emerson, 1837

We live in an increasingly complex, changing, and fragmented world. Undergraduates have been channeling their energies into pre-professional and more narrowly vocational directions. High level commissions and government officials are increasingly critical of our system of higher education. Today's challenge is to cultivate among undergraduates a greater willingness to explore and to discover; to assist undergraduates to develop critical, disciplined and inquiring minds, tempered by broad human sympathies and strong moral values.

For Michigan, the challenge is greater. On the one hand, the strength of our professional schools, and the strong research and scholarly orientation of our faculties, must not be compromised. But on the other hand, we need to generate a fresh commitment to cultivating a spirit of liberal learning among our undergraduates, and, among our faculties, to encouraging major efforts to improve the quality of teaching and learning. The University must provide resources to ensure that these efforts go forward in an atmosphere of continuous experimentation, and of intelligent trial and error. Broad faculty participation will be essential, and the unprejudiced testing of alternative ideas can be expected to generate vigorous debate. This is as it should be, since the stakes are high: the preparation of our undergraduates not merely to function in our complex society, but, as leaders, to shape that society's future directions. The development of leadership, in the context of undergraduate education, means the development of the individual minds and spirits of the men and women in the student body.

Similarly, the leadership theme suggests the appropriateness of a major effort to re-examine the role of graduate studies and professional education within the University. We need to understand better how these programs respond to the needs of both students and society and how they relate to our undergraduate instruction.

## Goals, Priorities, and Objectives

To illustrate the planning process in more detail, let us suggest a series of goals, priorities, and objectives which might follow from the leadership theme. That is, let us accept for the moment that the University's mission is the development of leadership through the education of its students and the intellectual development and contributions of its faculty and staff, facilitated by an unusual commitment to academic excellence.

There are several obvious "pre-conditions" for the achievement of this leadership goal:

1. We must attempt to attract the most outstanding students and faculty to the University. This implies both a high degree of selectivity as well as diversity. In this sense, it implies both a strong commitment to quality as well as to a broad representation among students and faculty from all segments of society.
2. We also view as a precondition an acceptance of and commitment to the need to focus resources to achieve excellence. Not only does this imply a recognition of the fact that in a world of limited resources, we must focus to achieve quality, but as well an understanding of the importance of the visibility created by such excellence in attracting the external resources necessary to sustain quality. It also suggests we must establish appropriate levels of expectation and achievement by creating an environment within the University characterized by the necessary intensity and commitment to excellence.

Specific objectives associated with the leadership theme can be associated with each of the major areas of human resource development:

3. The leadership theme demands that we emphasize the quality of the undergraduate experience, both from the aspect of traditional academic objectives as well as more broadly from the perspective of developing leaders of society. While this will require a critical re-examination of the undergraduation curriculum and a re-commitment to the importance of a liberal education, it also suggests more is needed. For example, we might seek leadership experiences for our students by developing special research and teaching assistantships for talented undergraduates. Faculty/student relationships will play a critical role, as will student organizations and the involvement of students in University affairs. The extra-academic environment, including social, cultural, athletic, and residential activities become important

components of the undergraduate experience.

4. Similarly, our graduate and professional programs should be carefully re-examined to identify actions to enhance their quality. Here one must examine not only formal instruction, but also research and clinical experiences. Financial aid will obviously be a critical factor for study, as will the link to the undergraduate programs of the University.
5. The leadership theme also suggests that we place more emphasis on the quality of the environment we provide for the intellectual development of our faculty. Certainly this includes vigorous efforts to provide them with the freedom and absence of constraints to do exciting work. However it demands more effort to encourage and support venturesome scholarship, particularly in interdisciplinary areas. Faculty development is closely related to the quality of the student body. It will also be important that in these efforts we strike an appropriate balance between individual achievement and collegiality, that we strive to integrate junior faculty more effectively into the University community of scholars.

Finally, we believe the leadership theme suggests objectives related to the "Michigan culture" itself:

6. To provide an environment for the development of individual leadership, the institution itself must achieve and sustain a leadership role. To this end, we believe that we must rededicate ourselves to the achievement of excellence, to being the best. In the past Michigan has all too often been characterized by a sense of "5th-ism", that is, striving to be very good but usually falling short of the top. We believe that leadership will demand a new level of expectation for both individual and institutional achievement. Furthermore, it will demand more of a change-oriented, risk-taking culture that encourages students and faculty to push to the limits of their own ability and creativity. And, key in this effort, will be a need to strengthen the sense of community and collegiality on the campus.

## **Leadership: A Mission for the 21st Century**

We believe the mission of leadership provides both an exciting and appropriate direction for the University as it prepares to move into the 21st Century. This theme would reinforce our continuing commitment to Michigan's special distinctiveness and strength: the power of focused quality, which it shares with the most selective private institutions, and the diversity, openness, and breadth of academic offerings which it shares with the best large public universities.

Second, such a mission clarifies the types of leadership -- personal and institutional -- to which Michigan aspires. At a personal level, this statement of mission recognizes that the central task of the University, a task which separates it from all other social institutions, is the creation of an environment where the quality of mind and of its performance is always the central concern. It recognizes that the spirit which is most likely to develop leaders is a disciplined use of reason, enlivened by daring and the courage to experiment, and tempered by respect for what we can learn from others. At an institution level, our mission is to further distinguish ourselves, among publically assisted universities, as genuine innovators and pioneers, challenging ourselves with an educational agenda appropriate to our capacities, strengths, and resources.

Given the quality, size, and scale of the University of Michigan, it is wholly unreasonable to expect the President, the Provost, or other officers to attempt to redirect or reorder the priorities of the institution in the manner suggested in this document. Rather, institutional leadership will focus upon helping to generate the debate and to providing the resources for continuous experimentation. The achievement of the mission will require communal effort; it will rest with faculty groups in and across the schools and colleges, with students inside and outside their formal organizations, and with professional and non-professional personnel throughout the academic and administrative units of the University. What may result is a closer integration of academic disciplines, the professions, and the arts into a more self-confident intellectual community, a community in which the human mind is brought boldly to bear on the largest and most enduring questions that confront us. Building this kind of leadership for tomorrow, upon a foundation of intellectual excellence, may lead to a new way of viewing the traditional functions of teaching, research, and service: as integrated activities of an inquiring and responsible community.



## ITIC: The Integrated Technology Instructional Center

- ...The Key Library-Classroom Facility for the UM North Campus
- ...A Cornerstone for Michigan's Economic Future
- ...A Model for the University of the 21st Century

### What Is the Integrated Technology Instructional Center?

Today there are over 10,000 students on the North Campus of the University of Michigan enrolled in the academic programs of its colleges of Engineering, Music, Art, and Architecture and Urban Planning. Yet this campus, itself larger than most universities in this state, still does not have a library or central classroom facility. ITIC, the Integrated Technology Instructional Center, will be the core academic facility on the North Campus, providing a central library, badly needed classroom space, computer workstation areas, and design studios.

Yet ITIC is far more than simply a library-classroom facility. It will also house the command center of CAEN, the Computer Aided Engineering Network, perhaps the most sophisticated computer network on any college campus in America today, linking UM Engineering, its faculty and students, to industry and government through the state, the nation, and the world. In fact, the Integrated Technology Instructional Center, perhaps more than any other academic facility on any campus in our state, represents both the key to the economic future of Michigan and perhaps to the future of higher education itself.

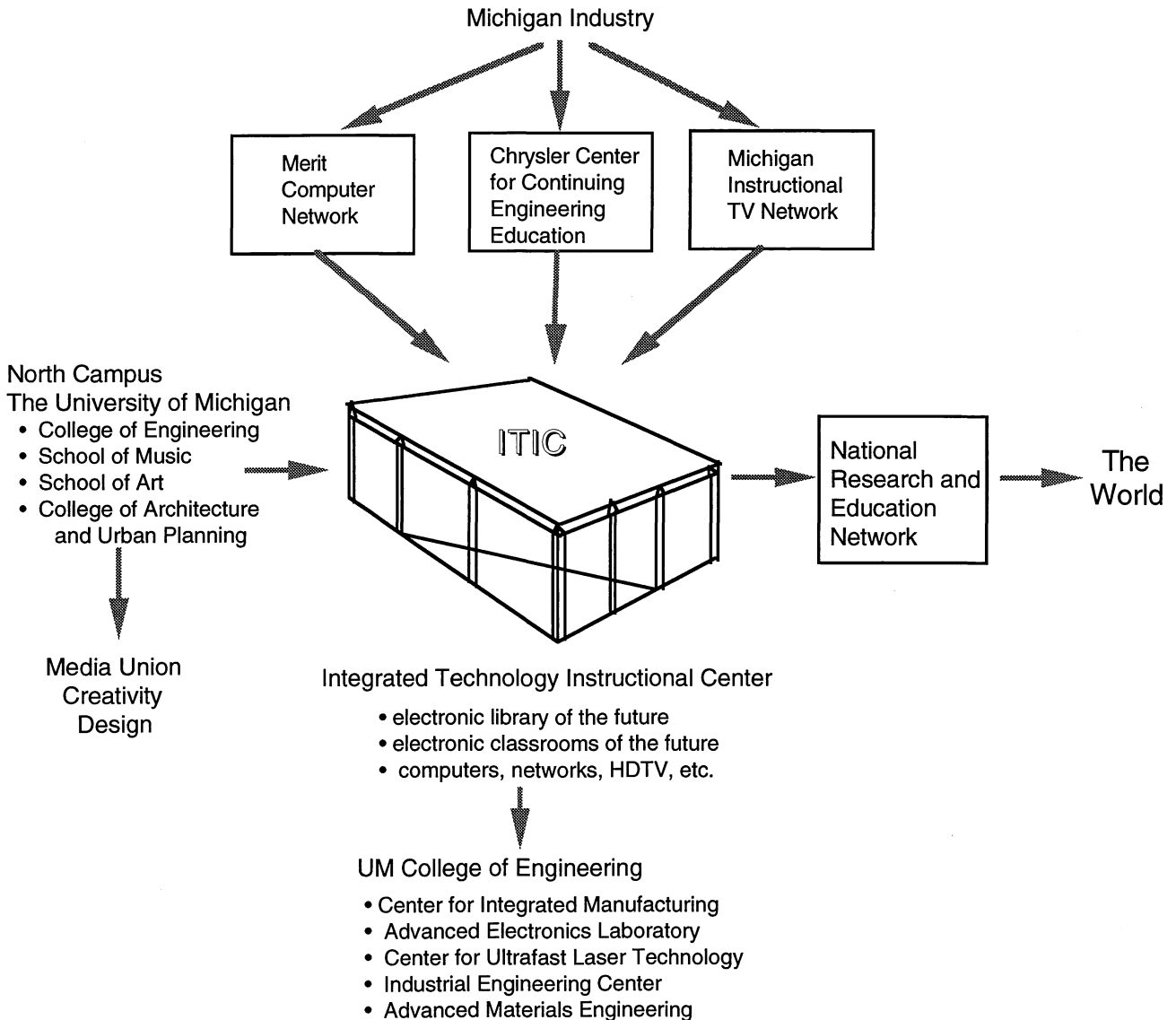
### A Key to Michigan's Future

The Integrated Technology Instructional Center will be a facility that uses information technology--computers, networks, HDTV, multimedia, virtual reality, knowbots, ubiquitous computing--to redesign the very nature of engineering education and integrate it with the needs of the society it serves. In a very real sense, ITIC will contain:

- the electronic library of the future
- the electronic classrooms of the future
- the design and development studios of the future

Beyond this, it will be a model of the "electronic university" of the 21st Century, containing an integrated set of libraries, classrooms, computer workstation clusters, design studios, all linked together both internally and to the world outside with robust computer networks.

ITIC will use information technology to integrate together the extraordinary capabilities of UM's College of Engineering, ranked as one of the top engineering schools in the nation, to provide the new forms of engineering education so critical to Michigan's established and rapidly evolving industrial base. It will integrate together the creative professions on the University's North Campus--engineering, architecture, art, and music--to teach and nurture the far-reaching type of creativity so desperately needed by Michigan industry. ITIC will provide Michigan with leadership in educating its citizens to use the tools of the information age: computers, networks, and communication technology.



ITIC will also serve as a gateway, providing access to the great resources of UM's College of Engineering to industry in this state. The facility has been sited adjacent to UM Engineering's Chrysler Center for Continuing Engineering Education to better integrate offcampus instructional activities with oncampus programs. But beyond this, ITIC has also been sited adjacent to the headquarters

and for the statewide Merit Computer Network, thereby providing direct access to every company--indeed, every home--in the state. Further, ITIC is sited adjacent to the headquarters and command center for the National Education and Research Network (NREN), the nationwide network linking together all corporate, university, and government research laboratories in America and worldwide, managed by the University of Michigan and Merit. In a very real sense, therefore, ITIC will provide Michigan industry not only a gateway to the resources of the University, but indeed with access to the technical knowledge of the world itself!

But the Integrated Technology Instructional Center is even more than the core academic facility for the UM's North Campus. It is even more than a model of the electronic university of the 21st Century. ITIC is Michigan's economic future!

## The Challenge of Change

We are living in the most extraordinary of times. Who would have predicted a few years ago the collapse of communism, the end of the Cold War, the reunification of Europe, the redefinition of the world economic order that is currently occurring. Yet all of these events have happened, and the pace of change continues to accelerate. Indeed, many believe that our civilization is going through a period of transformation just as profound as those that occurred in earlier times such as the Renaissance or the Industrial Revolution, except while these earlier transformations took centuries to occur, those characterizing our times will occur in a decade or less.

Some portray the 1990s as a countdown toward a new millennium, as we find ourselves swept toward the new century by these incredible forces of change. But the events of the past several years suggest that the 21st century is already upon us, a decade early.

Needless to say, this time of change has posed great challenges to our state. The America of the 20th Century that we have known was a nation characterized by a rather homogeneous, domestic, industrialized society. But that is already an America of the past. Our children will inherit a far different nation, a highly pluralistic knowledge-intensive world nation that will be America of the 21st Century.

The impact of these changes are already painfully apparent to Michigan's workers and industries. In fact, it is here in Michigan, in the heart of the "rust belt", that the impact of these extraordinary changes are most clearly seen. We all know that the past decade was a period of great difficulty for our state. Industries of great economic importance to our nation, such as steel and automobiles, fell victim to intense competition from abroad. The plants have closed. We still have many people chronically unemployed or underemployed.

Recently we have had still further evidence of this changing economic order with the news that General Motors has just announced the elimination of another 9,000 jobs in my state, including the closing of perhaps the greatest symbol of American industrial might, the Willow Run Assembly Plant. This is the plant that half a century ago helped to win World War II by producing Liberator bombers, yet today it has lost the capacity to compete effectively in the production of Chevrolets.

While some may still look at the midwest as a relic of America's industrial past, let me suggest that in many ways it can also be viewed as America's future. It is clear that the rust belt is in the midst of a profound transition from an industrial economy based upon the abundance of natural resources and skilled labor--and to some degree constrained and slowly moving domestic markets--to a knowledge-based economy, characterized by intensely competitive world markets, rapid technological change, and most important of all, educated people and their ideas.

This last point is very important for today we are seeing a dramatic shift in the fundamental structure, nature, and perspective of our society. We are evolving rapidly to a new post-industrial, knowledge-based society, just as a century ago our agrarian society evolved through the Industrial Revolution. Key in this transformation is the emergence of knowledge as a strategic commodity, as important as natural resources or low-skilled labor were at earlier times. This new critical commodity knows no boundaries. It is generated and shared wherever educated, innovative, and creative people come together; and as we have learned, it spreads very quickly. Indeed, the "age of knowledge" in which we now find ourselves is accompanied by a fundamental transformation in our economy that is reshaping virtually every product, every service, and every job throughout our country and indeed the world.

## A Communications-Driven Society

In Michigan we have a unique vantage point from which to view the a particularly important feature of these changes. If there was one sector that most strongly determined the progress of the 20th century, it was *transportation* and its related industries--cars, planes, trains, oil, space. Transportation determined prosperity, national security, even our culture--with the growth of the suburbs, international commerce, and so on. During this period Michigan's automobile industry had no equal, and the state rapidly became one of the most prosperous and powerful industrial regions on earth.

Today things are very different for Michigan. We have entered a new era in which the engine of progress is not transportation but rather *communication*, enabled by the profound advances we are now seeing in computers, networks, satellites, fiber optics, and related technologies. We now face a world in which

hundreds of millions of computers easily can plug into a global information infrastructure. Jacques Attali in his profound essay, *Millennium*, suggested that the impact of information technology will be even more radical than that of the harnessing of steam and electricity in the 19th century. He suggested it would be rather more akin to the discovery of fire by early ancestors, since it will prepare the way for a revolutionary leap into a new age that will profoundly transform human culture.

The result of this shift leaves Michigan's traditional transportatio-focused industries less competitive and at the risk of marginalization. In the face of this brave new world of change that Michigan cannot afford to live in the past. We must commit ourselves to using information technology to move quickly and fully into the age of knowledge. The key here will be to build new partnerships between the public and private sector, between state government and federal agencies, and between universities and industry.

On the University's North Campus is a large glass building, filled with computers, that in many ways represents just such a future for our state. This is the command center of the National Research and Education Network, a massive network operated by the University in collaboration with IBM and MCI that links together the computers on university campuses, industry, and government laboratories throughout the world. In fact, today the network already links together over four million users worldwide and is doubling in size and scope every six months. Already NREN links together over 650 colleges and universities, encompassing more than 80% of the nation's student population and 90% of the nation's federally sponsored research. It further connects more than 1,000 high schools and several hundred libraries. And NREN connects together as well over 5,000 networks worldwide. Through connections with NREN one can not collaborate with scientists and engineers in 39 countries on 7 continents. In a very real sense, the University is playing a lead role in building an interstate highway system of information flow--except in this case the system is worldwide.

NREN is a component of the nation's High Performance Computing and Communications Program, an effort designed to dramatically expand and enhance the U.S. portion of the existing worldwide infrastructure of interconnected computer networks. NREN is designed not only to address broad networking activity but also to provide the basis for necessary higher level capabilities and services to scientists and educators. As such, it includes a program of research into very high-speedcommunications technology.

But NREN is also envisioned as the linkage between the nation's education infrastructure and its knowledge and information centers. In this system, elementary schools, high schools, two and four-year colleges, and universities will be linked together with research centers and laboratories so that all may share access to resources such as libraries, data bases, and diverse

scientific instruments such as supercomputers, telescopes, and particle accelerators. Furthermore, NREN would provide valuable experience necessary for the successful development of a broader, privately operated national information infrastructure. This latter infrastructure would allow consumers, businesses, schools, and governments at all levels to share quality information when and where they want it at reasonable costs.

It is clear that information technology on which our knowledge-intensive society is increasingly dependent continues to evolve very rapidly. In the next several years we will see yet another 1,000-fold increase in the power of computers and networks. In the same time frame, massively parallel computation servers will offer tera-operations per second, while the price performance ratio of workstations will continue to improve. Within several years, widely available international networks capable of point-to-point multimedia (including video) will be available. Wide-area networks in the gigabit-per-second range will be in routine use, although still well short of the 25,000 gigabit potential of third generation fiber optic technology. Wireless communication will support remote computing and communication.

It seems clear that the United States government will soon commit itself to a massive effort to build the National Information Infrastructure, the "interstate highway system" for the information age, that will give all of our citizens access to this incredible future. This high-speed data highway will carry the freight of knowledge and information that will be the foundation for national prosperity. When it is recognized that advanced nations such as Japan, France, and Germany along with other nations throughout Europe and Asia are moving ahead to install such advanced systems, such efforts assume paramount importance in strengthening our nation's economic competitiveness. Like the interstate highway system, once this network is complete, the demand for its use will skyrocket; and its benefits will be felt across all parts of the economy and society.

Michigan through its management of NREN has given America the knowledge and experience we need to begin to build the National Information Infrastructure, and it can continue to lead the way through research and advanced experimentation. ITIC will be a critical component of this strategy to place Michigan in a leadership role as we evolve to a communications-driven economy.

## Implications for Higher Education

Another area where original thinking is needed lies in the implications for existing social structures of information technology. It is clear that although information technology will provide a wealth of opportunities for the future, we must take great care not only to extrapolate the past but to examine the full range of possibilities for the future.

But here we face a particular dilemma: both the pace and nature of the changes occurring in our world today have become so rapid and so profound that our present social structures--in government, education, the private sector--are having increasing difficulty in even sensing the changes (although they certainly feel the consequences), much less understanding them sufficiently to allow institutions to respond and adapt. There are increasing concerns that our present institutions, such as universities and government agencies, which have been the traditional structures for intellectual pursuits, may turn out to be as obsolete and irrelevant to our future as the American corporation in the 1950s. There is a need to explore new social structures capable of sensing and understanding the change, as well as capable of engaging in the strategic processes necessary to adapt or control change.

Universities themselves provide an excellent example of these challenges. Since the business of the university is knowledge, the impact that the extraordinary advances in information technology could have--likely will have--profound implications. Technology such as computers, networks, HDTV, ubiquitous computing, knowbots, and other technologies may well invalidate most of the current assumptions and thinking about the future nature of the university.

Will a "university of the 21st century" be localized in space and time, or will it be a "metastructure," involving people throughout their lives wherever they may be on this planet--or beyond?

Is the concept of the specialist really necessary--or even relevant--in a future in which the most interesting and significant problems will require "big think," rather than "small think?" Will intelligent software agents roam far and wide through robust networks containing the knowledge of the world and instantly and effortlessly extract whatever a person wishes to know?

Will lifestyles in the academy (and elsewhere) become increasingly nomadic, with people living and traveling where they wish, taking their work and their social relationships with them?

In the spirit of these questions, perhaps we should pay far more attention to evolving new structures more appropriate for the evolving information technology. One example would be the "collaboratory" concept, first proposed in the NSF workshop in 1989 by Joshua Lederberg and colleagues. The collaboratory is envisioned as an advanced, distributed infrastructure which would use multimedia information technology to relax the constraints on distance, time, and even reality. It would support and enhance intellectual teamwork in science and engineering. In fact, there is a growing consensus that the next major paradigm shift in computing is in the direction of the collaboratory and that not only research but a vast array of human team activities in commerce, education, and the arts would be supported by variants of this

vision. Perhaps some form of the collaboratory is the appropriate infrastructure ("tooling") for the "learning organization" becoming popular in the business world; perhaps it is the basis for the world universities in the next century. It could well become the generic infrastructure on which to build the work place of the emerging information age.

It is none too early to consider an overarching agenda to develop deeper understanding of the interplay between advanced information technology and social systems. In some future we may have the knowledge to synthesize both in an integrated way as a total system. And the Integrated Technology Instructional Center will provide an important platform for this activity.

## Concluding Remarks

It is clear that Michigan is in the midst of a profound transition. This has not been, and will not be, an easy transition for our state to make. Further, the truth is that the outcome is still very much in doubt: whether we will emerge from this transition as a world economic leader once again, with a strong, prosperous, albeit new, economy--producing jobs and improving the quality of life--or whether we will fail to heed the warnings to make the necessary investments and sacrifices today necessary for strength and prosperity tomorrow and become an economic backwater in the century ahead. It is clear that we face a fork in the road ahead.

Clearly education, broadly defined, will be the pivotal issue in determining which of these two alternative futures will be Michigan's--and America's. Indeed, it is already evident that the dominant issue of the 1990s will be the development of our human resources.

Previous economic transformations were closely associated with major public investment in infrastructure such as railroads, canals, electrical networks, and highways. In the economic transition to an age of knowledge that is already upon us, the necessary public investments must be in the education of our people and in the information technology infrastructure necessary to link them together and to the world.

The Integrated Technology Instructional Center represents just such an investment, critical to the future of this state and its people. It will provide Michigan with the leadership so critical for economic prosperity and social well-being in the intensely competitive and rapidly changing global economy that will characterize the century ahead.