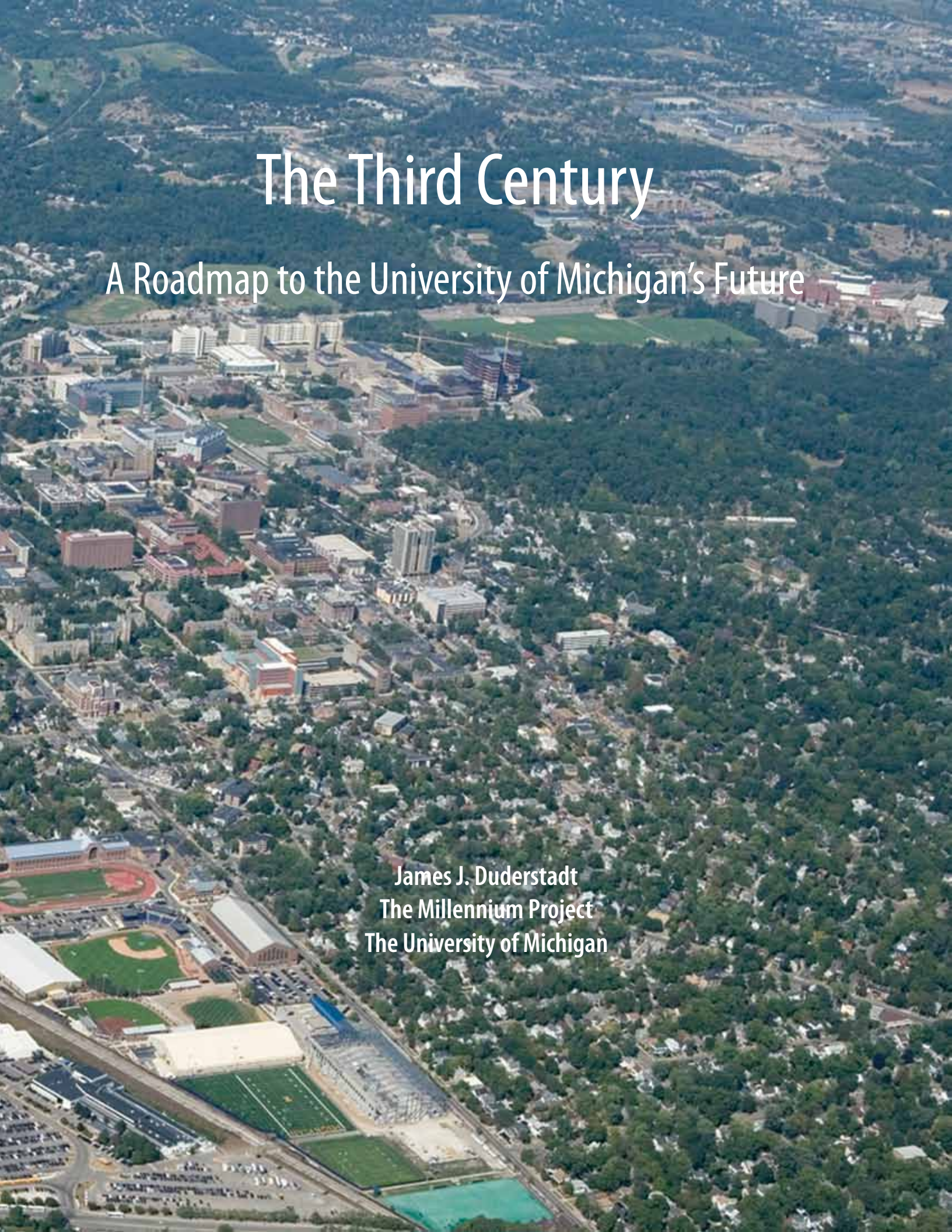

The Third Century

A Roadmap to the University of Michigan's Future

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Executive Summary

Today the University of Michigan approaches a singular moment in its history, its bicentennial year in 2017, which will provide an important occasion to recall, understand, and honor its rich history. But this milestone will also provide a remarkable opportunity to learn from the University's past, to assess the challenges and opportunities it faces at the present, and to chart a course for its future. Indeed, since Michigan's greatest impact has resulted in part from its capacity to capture and sustain the important elements of its history while developing bold visions for the future, the 2017 bicentennial should be viewed as a compelling challenge to develop a new vision for Michigan's third century and a plan to achieve that vision.

The Challenge of Change

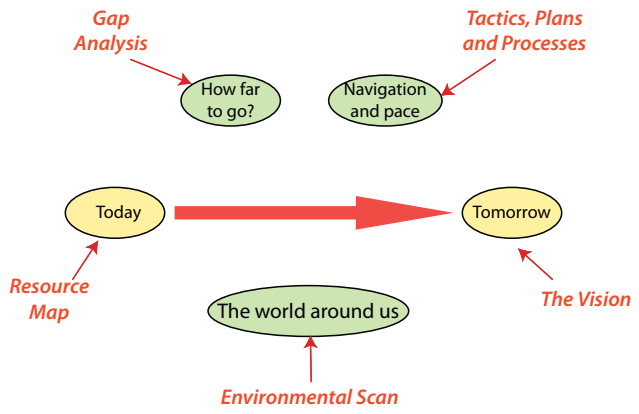
The recurrent theme of this report, and, indeed, throughout the history of the University of Michigan, is the need for change in higher education if our colleges and universities are to serve a rapidly changing world. Of course the university as a social institution has always been quite remarkable in its capacity to change and adapt to serve society. Yet the forces of change upon the contemporary university, driven by profound social change, economic imperatives, and rapidly evolving technology, may be far beyond the adaptive capacity of our current educational paradigms. We may be approaching a point of crisis in higher education when it is necessary to reconstruct the paradigm of learning institutions from its most fundamental elements, perhaps even to reinvent the university itself.

This capacity for change, for renewal, is the key objective that the University of Michigan must strive to achieve in the years ahead—a capacity that will allow it to transform itself once again as it has done so many times in the past, to serve a changing society and a changing world.

The leadership of the University of Michigan has frequently depended upon its unusual combination of quality, size, breadth, innovation, and pioneering spirit. Michigan has long served as a *pathfinder* by identifying new directions for higher education and society, as a *trailblazer* marking these new pathways for others to explore, and as a *pioneer* building the roads that others might follow (although rarely has Michigan prospered as a *settler* by simply attempting to follow the paths of others.) Through academic innovation, social responsiveness, and its willingness to challenge the status quo, Michigan's history reveals time and time again this pathfinding character. It is this unique heritage that should shape the University's mission, vision, goals, and actions as it approaches its third century.

Strategic Roadmapping

Key to the University of Michigan's leadership has been its capacity throughout its history to set bold, compelling visions for the future of the institution and then engage the University community in joining together to develop and execute creative plans, policies, and processes to achieve these visions. Of course, planning for such complex, rapidly changing, and unpredictable futures requires a highly disciplined approach. In this report, we have adapted a planning technique commonly used in those sectors of industry and the federal government characterized by extremely rapid and unpredictable change: *strategic roadmapping*. This approach begins by using panels of experts to propose goals or visions for the organization, then to construct a map of existing resources and perform an analysis to determine the gap between what currently exists and what is needed, and finally to develop a plan or roadmap of possible routes from here to there, from now to



The strategic roadmapping process

the future. Although sometimes confused with jargon such as environmental scans, resource maps, and gap analysis, in reality the roadmapping process is quite simple. It begins by asking where we are today, then where we wish to be tomorrow, followed by an assessment of how far we have to go, and finally concludes by developing a roadmap to get from here to there. The roadmap itself usually consists of a series of recommendations aimed at navigating toward the vision, augmented by more detailed goals, plans, processes, and tactics designed to enable institutional change.

A Vision for the Third Century

To develop a suitable vision for this planning effort we have begun with the most important values of the institution, for example, quality, academic priority, leadership, liberal learning, diversity, critical and rational inquiry, caring, commitment, and community. We have also kept in mind the key characteristics of the University over its history, as framed by descriptors such as "the leaders and best", "an uncommon education for the common man", "a broad and liberal spirit", "diverse, yet united in a commitment to academic excellence and public service", "a center of critical inquiry and learning", "an independent critic and servant of society", "a relish for innovation and excitement", "control of our own destiny comparable to private universities", and "freedom with responsibility for students and faculty". Furthermore we have extensively surveyed the powerful forces driving change in our world and higher education and evaluated the position of the University of Michigan within this framework for the decades ahead.

From this process, we have arrived at the following themes that comprise a vision for the University within three different timeframes:

The Vision for Today: *Reflection*

For the near term, from now until the Bicentennial Year 2017, we suggest the University of Michigan would benefit from a period of *reflection* upon its remarkable history and accomplishments. The University community should not simply prepare to celebrate two centuries of leadership in higher education, but it first should strive to understand and secure those values and characteristics that have played such an important role throughout its history:

Academic Quality: The reputation of Michigan as one of the world's great universities has been based primarily on the quality of its academic programs.

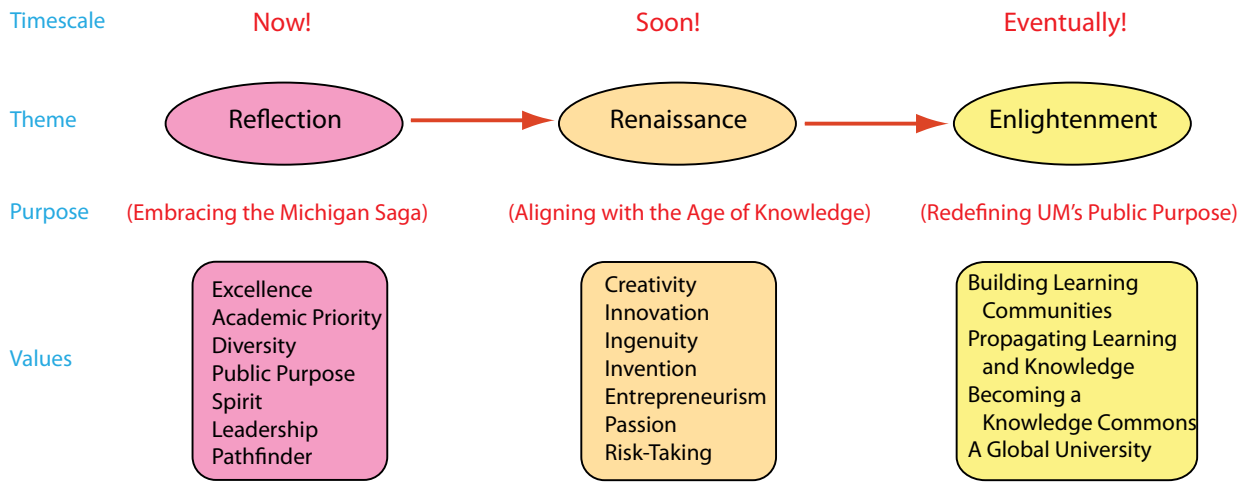
Academic Priority: Sometimes in the face of the substantial assets and growth characterizing auxiliary activities of the University (e.g., hospitals, housing, athletics), it is all to easy to forget that Michigan's impact on the state, nation, and world is determined primarily by the quality of its academic programs and the achievements of its faculties, students, and staff. Establishing and sustaining the academic core of the University must always be its highest priority.

Diversity: The University has long been distinguished by its strong and sustained commitment to providing educational opportunities to underrepresented populations. Despite the challenges it faces, the University simply must renew its commitment to regain this leadership. Failure is not an option.

Public Purpose: So too, the University's long-standing commitment to providing "an uncommon education for the common man" demands that it provide educational opportunities for students from all economic circumstances.

Spirit: Michigan's "broad and liberal spirit" has long been an important characteristic of our students, faculty, and staff. This spirit must always be not only respected and tolerated but furthermore encouraged by the University community.

Leadership: The University of Michigan takes pride



The trilogy of timefames and visions for the University of Michigan's Third Century

in its "leaders and best" heritage, seeking both leadership and excellence in its achievements. Key in establishing and sustaining this element of our character is the setting of bold goals where the University not only aspires to excellence but can have great impact on society, i.e., where it can change the world!

The Michigan Saga: Finally, the role of the University in serving as both a pathfinder and trailblazer for all of higher education remains one of its most important roles. To sustain this role requires attracting to the University students, faculty, staff, and leadership of unusual initiative, creativity, and determination.

Renewing our effort (or restoring our commitment if necessary) to achieve these characteristics may seem obvious, particularly as we prepare for the University's bicentennial by reviewing its history and honoring its heritage and saga. Yet it is nevertheless an important challenge and vision for the University today.

The Vision for the Near Term: *Renaissance*

The world is changing rapidly, driven by the role played by educated people, new knowledge, innovation, and entrepreneurial skill. While these forces challenge us and our social institutions, they also contain the elements of what could become a renaissance in the 21st century. Since universities will play a critical role as the source of these assets of the age of knowledge, our vision for the early 21st century involves stressing the following characteristics among our people and our programs: creativity, innovation, ingenuity, invention, and entrepreneurial zeal.

Perhaps the university of the 21st century will also need to shift its intellectual focus and priority from the preservation or transmission of knowledge to the process of creativity itself. But herein lies a great challenge. While we are experienced in teaching the skills of analysis, we have far less understanding of the intellectual activities associated with creativity. In fact, the current disciplinary culture of our campuses sometimes discriminates against those who are truly creative, those who do not fit well into our stereotypes of students and faculty. The university may need to reorganize itself quite differently, stressing forms of pedagogy and extracurricular experiences to nurture and teach the art and skill of creativity. This would probably imply a shift away from highly specialized disciplines and degree programs to programs placing more emphasis on integrating knowledge.

The Vision for the Third Century: *Enlightenment*

We suggest that the vision for the University's third century should be to assume the role of a forerunner of an emerging civilization characterized by extraordinary connectivity, access to knowledge, and ubiquitous learning opportunities, all enabled by rapidly evolving information and communications technologies. No longer constrained by space, time, monopoly, or archaic laws, the University of Michigan should embrace a vision to address the knowledge and learning needs of a

global society as its new public purpose.

In a sense, this vision for the third century of the University combines three themes that might characterize the university of the future: a "*Universitas Magistrorum et Scholarium* in cyberspace", a learning ecology, and the university as a vanguard of an emergent global, knowledge-and-learning dependent, and profoundly connected civilization. Much as the Enlightenment of the 18th century swept aside the divine authority of kings by distributing learning and knowledge to empower citizens, today's knowledge-driven global society is increasingly dependent upon the creating of new knowledge and educating those who can apply it to meet the needs of society. But while the Enlightenment of the 18th century was concerned with "celebrating the luminosity of knowledge shining through the written word", today knowledge comes in many forms–words, images, algorithms, immersive environments, etc. And learning communities are no longer constrained by space and time but rather expand rapidly by exponentially evolving technologies (e.g., cyberinfrastructure) and practices (e.g., open source, open knowledge). Today the educational institution most capable of launching a new "age of Enlightenment" is the university, with its dual missions of creating "unions" of scholars and learners and providing "universal" access to knowledge.

Our vision of the University of Michigan's third century vision builds both upon the institution's past and present. Michigan has played a particularly important role in the history of the American university, not only as one of the nation's first experiments in public higher education but, in fact, as the first attempt to build a true "university" in the European sense in the New World. Michigan's guiding themes, "to provide an uncommon education for the common man" and to "create a community of scholars across the full range of disciplines" has continued throughout its history, most recently culminating in the building and management of the Internet, the technology that today enables not only access to knowledge but supports communities throughput the world, and Michigan's leadership of the open knowledge movement through the Google Books project and the HathiTrust, with the goal of eventually providing universal access to the knowledge accumulated and produced by our civilization.

Today the University of Michigan is well positioned to participate in a contemporary version of the Enlightenment, spreading knowledge and learning throughout the world.

The Roadmap to the Vision for the University of Michigan's Third Century

We begin the process of developing a strategy to achieve this vision with four simply-stated goals:

Goal 1: *People*: To attract, retain, support, and empower exceptional students, faculty, and staff.

Goal 2: *Resources*: To provide these people with the resources and environment necessary to push to the limits of their abilities and their dreams.

Goal 3: *Culture*: To build a University culture and spirit that values adventure, creativity, excitement, risk-taking, leadership, excellence, diversity, caring, concern, and community.

Goal 4: *The Capacity for Chang*e: To develop the wisdom, the courage, and the capacity to embrace the changes necessary to serve a changing society and a changing world.

These four concrete goals have profound implications, and each will be deceptively challenging to achieve. While Michigan has always sought to attract high-quality students and faculty to the University, it tends to recruit those who conform to more conventional measures of excellence. If the University is to seek "paradigm breakers," then other criteria such as creativity, intellectual span, and the ability to lead become important.

The University needs to acquire as well the resources to sustain excellence, a challenge at a time when public support is dwindling. Yet this goal also suggests that the need to focus resources on the University's most creative people and programs. Michigan will also need to acquire greater flexibility in resource allocation to respond to new opportunities and initiatives.

While most people and institutions would agree with the values set out in the third goal of cultural

change, many would not have assigned such a high priority to striving for adventure, excitement, and risk-taking. However, if the University is to sustain its saga as a pathfinder and trailblazer in defining the nature of higher education in the century ahead, this type of culture will be essential.

Developing the capacity for change, while an obvious goal, will also be both challenging and controversial. The University will need to discard the status quo as a viable option, challenge existing premises, policies, and mindsets, and empower its best people to drive the evolution—or revolution—of the institution.

These general goals provide the foundation for the specific roadmaps we suggest for each timeframe of the vision for the University of Michigan's third century: *Reflection, Renaissance, and Enlightenment*.

The Roadmap to Reflection

To move toward the Reflection vision, the following actions have been recommended:

Preparing for the University's bicentennial in 2017 by using the next few years prior to 2017 to build resources that capture the University of Michigan's remarkable history and more firmly establish the key elements of the University's institutional saga to those on the campus (students, faculty, staff) and beyond.

Restoring the University's commitment to its founding purpose of providing "an uncommon education to the common man".

Restoring the University's commitment to diversity.

Building a greater sense of pride in, respect for, excitement about, and loyalty to the University

Re-igniting the Michigan "broad and liberal" spirit.

Reaffirming the Michigan Saga as a pathfinder and trailblazer.

The Roadmap to Renaissance

The second phase of the roadmap process is aimed at the Renaissance vision:

Recruiting and educating students with exceptional ability and creativity.

Recruit paradigm-breaking faculty.

Enabling intellectual change

Lowering disciplinary boundaries

Educating "T" Graduates, capable of both depth in a particular discipline as well as intellectual breadth

Restructuring the PhD to address both structure problems such as attrition rate and time to degree as well as intellectual themes such as disciplinary convergence

Giving high priority in both student and faculty recruiting and resource allocation to areas with the potential for truly transformative learning and scholarship, i.e., breaking the current university paradigms.

Building organizations and programs capable of translational research, i.e., linking fundamental scientific discovery with the use-inspired innovation to serve society.

Building strategic alliances with other universities and knowledge-based institutions in the public and private sector.

Stimulating a greater sense of adventure, excitement, and risk-taking.

Selecting and recruiting next-generation leadership with bold visions, energy, and a sense of adventure.

Developing a more coherent academic program (a "University College") for all undergraduates, reducing the amount of specialization offered in degree programs, and striving to provide instead a more general liberal learning experience.

Establishing "a New University" structure to serve as a laboratory to explore future paradigms for higher education.

Launching major new cross-disciplinary efforts such as a "Renaissance Campus" (reconfiguring the pedagogy of the North Campus to stress the intellectual activity of "creating" and "doing") and the Da Vinci Project (the integration of discovery, creativity, innovation, and design).

The Roadmap to Enlightenment

The roadmap for the Enlightenment stage of the Third Century vision is designed to lay the foundation for a new public purpose for the University: to spread the light of knowledge and learning to the world, taking advantage of exponentially evolving technologies (information, communications, bio- and nano-tech-

nology). The roadmap is based upon three compelling themes:

The emergence of a universitas magistrorum et scholarium in cyberspace.

The power of network architectures in distributing knowledge and learning

The perspective of learning organizations as ecologies that evolve and mutate into new forms

The university as the prototype of an emergent global civilization

The elements of this roadmap include:

Continuing to provide leadership in capturing and distributing knowledge to the world, building on its successful roles in helping to build the Internet; digital resources such as JSTOR, the Google Book Project, and the HathiTrust; and new academic programs such as the School of Information.

Providing leadership for the open education resources paradigm.

Providing leadership in both the development and application of advanced cyberinfrastructure in academic environments.

Exploring the use of advanced learning environments such as those based on social networking and immersive environments ("sim-stim").

Establishing a global footprint both through engagement in international higher education organizations and branding as a "university in and of the world".

Building the necessary foundation of scholarly activity for a global knowledge and learning enterprise.

Creating a "University of the Future" institute to explore the possible evolution and future of the university as a social institution.

Plans, Tactics, and Processes

While a vision sets a destination and a roadmap provides direction, institutions and stakeholders require a more definitive and operational strategic plan to embark on these journeys. Simply encouraging and supporting planning at the unit level, perhaps augmented by occasional initiatives, for an institution of Michigan's scale, complexity, and impact is both inadequate and dangerous indeed, both for the institution and those dependent upon it.

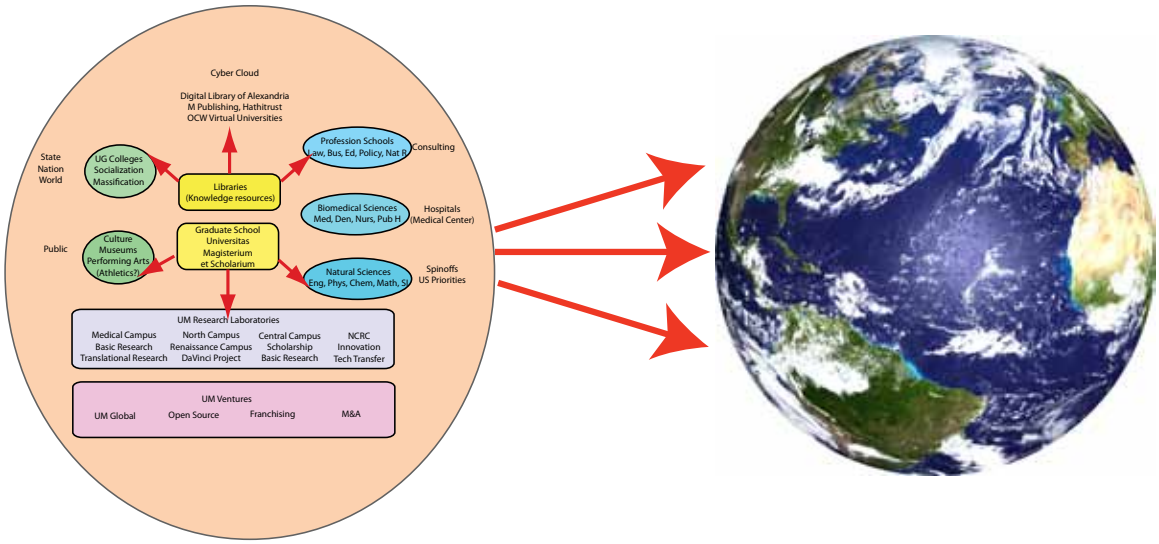
It is critical for higher education to give thoughtful attention to the design of institutional processes for planning, management, and governance. The ability of universities to adapt successfully to the profound changes occurring in our society will depend a great deal on the institution's collective ability to develop and execute appropriate strategies. Key is the recognition that in a rapidly changing environment, it is important to develop a planning process that is not only capable of adapting to changing conditions, but to some degree capable of modifying the environment in which the university will find itself in the decades ahead. The University must seek and implement a progressive, flexible, and adaptive process, capable of responding to a dynamic environment and an uncertain—indeed, unknowable—future.

In an institution of Michigan's size, breadth, and complexity, it is usually not appropriate (or possible) to manage centrally many processes or activities. One can, however, establish institutional priorities and goals and institute a process that encourages local management toward these objectives. To achieve institutional goals, processes can be launched throughout the institution aimed at strategic planning consistent with institutional goals, but with management authority residing at the local level. One seeks an approach with accurate central information support and strong strategic direction.

In addition one requires detailed tactical plans at the operational level in areas such as financial resources, organizational structures, and the launching of appropriate experiments and ventures.

Finally, it is important to recognize that progress to such bold visions will demand substantial institutional transformation. The challenge, as is so often the case, is neither financial nor organizational. Rather it is the degree of cultural change required. The University must transform a set of rigid habits of thought and organization that are incapable of responding to change rapidly or radically enough.

True faculty participation in the design and implementation of the necessary change process is essential, because the transformation of faculty culture is the biggest challenge of all. Both the creativity and the commitment of the faculty are essential to success. Policies



A Public Purpose for the Third Century: Providing the light of knowledge and learning to the world!

come and go without perturbing the institution; change happens in the trenches where faculty and students are engaged in the primary activities of the university, teaching and research, learning and scholarship.

The Challenge and Opportunity

Institutions all too frequently chose a timid course of incremental, reactive evolution because they view a more strategically-driven transformation process as too risky. They are worried about making a mistake, about heading in the wrong direction or failing. While they are aware that this incremental approach can occasionally miss an opportunity, many mature organizations such as universities would prefer the risk of missed opportunity to the danger of heading into the unknown.

But, today, incremental change based on traditional, well-understood paradigms may be the most dangerous course of all, because those paradigms may simply not be adequate to adapt to a future of change. If the status quo is no longer an option, if the existing paradigms are no longer viable, then transformation becomes the wisest course.

The forces driving change in higher education, both from within and without, are far more powerful than most realize. The pace and nature of change affecting the higher education enterprise both in America and worldwide are likely to be considerably beyond that which could be accommodated by business-as-usual evolution. While there is certainly a good deal of exaggeration and hype about the changes in higher education over the short term—meaning a decade or less—it is difficult to stress too strongly the profound nature of the changes likely to occur in most of our institutions and in our enterprise over the longer term.

The University of Michigan has a responsibility to help show the way to change, not to react to and follow it. Its voice must be loud, clear, and unified in the public forum. At the same time it must encourage vigorous debate and experimentation within academia, put aside narrow self-interest, and accept without fear the challenges posed by this extraordinary time in its history.

We contend that as the University approaches its third century, it should embrace once again its heritage as a pathfinder for higher education, a saga established two centuries ago in the 19th century when the University of Michigan became a primary source for much of the innovation and leadership for higher education. Once again Michigan has the opportunity to influence the emergence of a new paradigm of what the university must become in our 21st Century world to respond to the changing needs of our society.

This, then, is the particular challenge and opportunity for the University of Michigan. As it has so many times in its past, the University of Michigan must embrace yet again its historic role of leadership for a future characterized by great challenges, immense responsibilities, and exciting opportunities.

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Chapter 1

A Challenge for the Bicentennial

It is hard for those of us who have spent much of our lives as academics to look inward at the university, with its traditions and obvious social value, and accept the possibility that it soon might change in dramatic ways. Although the university has existed as a social institution for almost a millennium, with each historical epoch it has been transformed in very profound ways.

The scholasticism of early medieval universities first appearing in Bologna and Paris–the *universitas magistrorum et scholarium*–slowly gave way to the humanism of the Renaissance. The graduate universities appearing in early 19th century Germany (von Humboldt's University of Berlin) were animated by the freedom of the Enlightenment–*Lehnfreiheit* and *Lernfreiheit*–and the rigor of the scientific method. The Industrial Revolution in 19th America stimulated the commitment to education of the working class and the public engagement of the land-grant universities. The impact of campus research on national security during WWII and the ensuing Cold War created the paradigm of the contemporary research university during the late 20th century.

Although the impact of these changes have been assimilated and now seem natural, at the time they involved a profound reassessment of the mission and structure of the university as an institution. This capacity for change is vividly demonstrated by the extraordinary evolution of the University of Michigan campus over the past two centuries, as shown on the following pages.

Our world is once again entering a period of dramatic social change, perhaps as profound as earlier periods such as the Renaissance and the Industrial Revolution—except, while those earlier transformations took decades, if not centuries, today's often take only a few years. We live in an era of breathtaking and accelerating change. If education was once simpler, our world was simpler too. The most predictable feature of modern society is its unpredictability. We no longer believe that tomorrow will look much like today. Universities must find ways to sustain the most cherished aspects of their core values, while at the same time finding new ways to respond vigorously to the opportunities and challenges of a rapidly evolving world.

The recurrent theme of this report, and, indeed, of the history of the University of Michigan, is the need for change in higher education if our colleges and universities are to serve a rapidly changing world. Yet Michigan's challenge is greater than simply institutional change, since throughout its history it has been one of the most progressive forces in American higher education. Michigan's unique combination of quality, size, breadth, innovation, and pioneering spirit is particularly well suited to exploring and charting a course for higher education as it evolves to serve a changing world. And soon it will have an important opportunity to embrace this mantle of leadership as a pathfinder, trailblazer, and pioneer once again.

UM 2017: The Bicentennial Year

The University of Michigan is approaching a singular moment in its history, its bicentennial year in 2017, that will provide a remarkable opportunity to consider once again the vision for the future of the university. Of course although Michigan is one of the oldest public universities in America, it is actually rather young institution when considered on a broader scale. After all, Harvard celebrated its 350th anniversary in 1986, and Cambridge has recently observed the 800th anniversary of its founding in 1209. Furthermore Michigan is an exceptionally modest institution. All too often we tend to pave over our past and build anew rather than en-

The University of Michigan campus (1855, Cropsey)

The University of Michigan campus (1910, Rummell)

The University of Michigan campus (1930)

The University of Michigan campus (1970)

The University of Michigan campus (2000)

The University of Michigan campus (2010)

shrine our heritage, as do universities such as Harvard, Cambridge, and Bologna. As a consequence, Michigan is all too frequently seen (and portrayed) only within the limited public perspectives of conventional colleges and universities, e.g., in terms of young students, old faculties, and winning football teams.

Yet this is unfortunate, since in many ways the University of Michigan has not only provided the leadership for American higher education, but its impact frequently has extended far beyond the campus to have world-wide implications. Several examples illustrate the degree to which it has changed the world.

One can make a strong case that the University of Michigan was the first attempt to build a true university in the New World. At a time when the colonial colleges were using the classical curriculum to "transform savages into gentlemen", much as the British public school, Michigan's first president, Henry Tappan brought to Ann Arbor in 1852 a vision of building a true university in the European sense, which would not only conduct instruction and advanced scholarship, but also respond to popular needs. He aimed to develop "an institution that would cultivate the originality and genius of those seeking knowledge beyond the traditional curriculum, with a graduate school in which diligent and responsible students could pursue their studies and research under the eye of learned scholars in an environment of enormous resources in books, laboratories, and museums" (Peckham, 1963). Furthermore Michigan faculty members carried this broader concept of the university with them as they moved on to leadership roles at other institutions (e.g., Andrew Dixon White at Cornell, Charles Kendall Adams at Cornell and Wisconsin, and Erastus Haven at Northwestern). (Rudolph, 1962)

The University of Michigan can also claim to be one of the first truly public universities in America, created by the Northwest Territorial government in a non-sectarian spirit 20 years before Michigan was admitted to the Union. (Technically the Universities of Georgia and North Carolina were the first state universities, but they were highly influenced by the church. (Thelin, 2004) Moreover through the efforts of Henry Frieze, Michigan stimulated the development of secondary education (high schools) throughout the Midwest.

One might also consider the University of Michigan as one of the earliest examples of the American research university, with its construction of one of the three largest telescopes in the world, the first teaching laboratory for chemistry, and the first courses in new disciplines such as bacteriology, forestry, meteorology, sociology, modern history, journalism, and American literature. In fact almost every American intellectual movement from the mid-19th century onward must include some mention of Michigan (as demonstrated by the remarkable intellectual history of the University compiled by the Bentley Library in 2010 to celebrate its 75th anniversary). Beyond its impact on the traditional literature, arts, and science, the University has led in the creation of many new disciplines such as the quantitative social sciences, biomedical disciplines, engineering sciences, and policy disciplines. (Turner, 1988)

The influence of the University on the professions has also been immense. Michigan joined with Columbia and Penn in defining the paradigm for medical practice and education by regarding the M.D. as a graduate degree, introducing scientific laboratories, and opening the first university hospital for clinical training. Decades later this model would be adopted to transform the rest of medicine through the Flexner Report of 1910. (Flexner, 1910)

Michigan has long been a pioneer in engineering, introducing new disciplines such as naval architecture, chemical engineering, aeronautical engineering, and computer engineering. It was the first university in the world to promote the peaceful uses of atomic energy with the Michigan Memorial Phoenix Project, leading to the world's first academic program in nuclear science and engineering. Michigan was a leader in space exploration and astronaut education, e.g., the entire crew of Apollo 15 lunar mission consisted of Michigan graduates. Through its Willow Run Laboratories, the University developed much of the technology of remote sensing including holography and the ruby maser.

More recently Michigan partnered with IBM and MCI to build and operate the backbone of the Internet from the mid-1980s until this role was transferred to the commercial sector in 1993. The University's role in advanced networking continued with its leadership in the founding and development of Internet2 during the 1990s. Today Michigan is pioneering in the digitization of the great libraries of the world and the provision of access to their collections through its leadership role

One of the world's largest telescopes

The nation's first chemistry laboratory

The nation's first university hospital

The world's first academic programs in atomic energy

Apollo 15, the All-Michigan mission to the moon

Michigan's leadership in developing the Internet

Michigan is one of the few universities capable of changing the world.

in digital libraries, the JSTOR project, the Google Book project, and the HathiTrust.

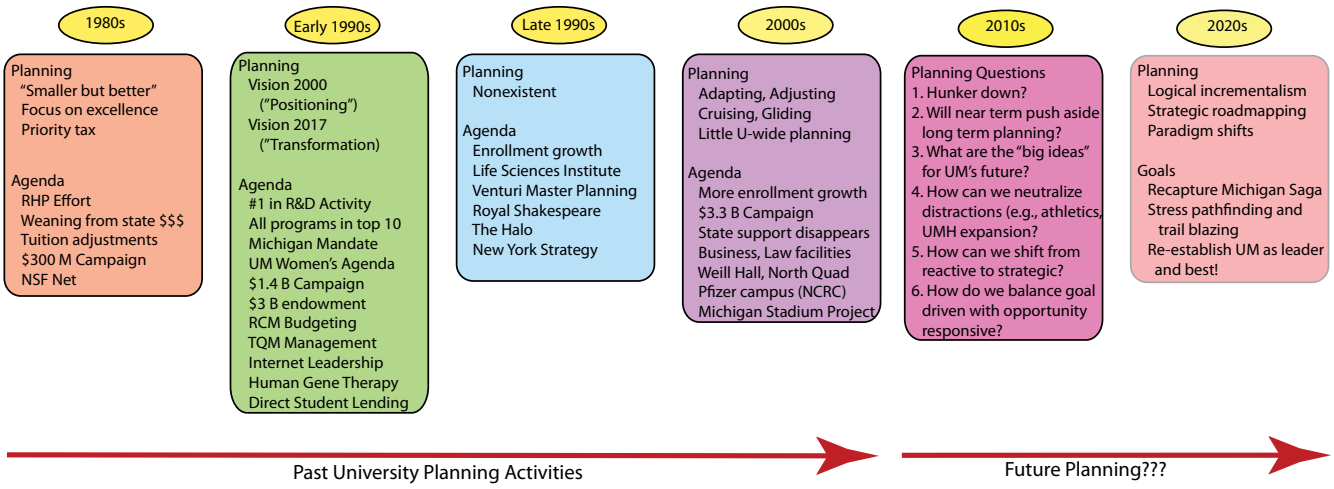
Hence the approaching bicentennial of the University of Michigan will provide an important occasion to recall, understand, and honor its remarkable history. But it will also provide a remarkable opportunity to learn from the University's past, to assess the challenges and opportunities it faces at the present, and to chart a course for its future. Indeed, since Michigan's great impact has resulted in part from its capacity to capture and sustain the important elements of its history while developing bold visions for the future, the bicentennial should be viewed as a compelling challenge to develop a new vision for Michigan's third century!

The Importance of Planning

Developing a bold and compelling vision for the future of an institution can be both a challenging and hazardous activity, particularly for a university with a long history of leadership and distinction. Yet while the status quo may be the safest course for university leadership and governance, it can also pose substantial risks to the institution. Universities that drift along, without a bold vision and leadership, can founder on rocky shoals of a changing world. Although a university may seem to be doing just fine with benign neglect from the administration building, over a longer period of time a series of short-term tactical decisions will dictate a de facto strategy that may not be in the long-range interests of the university. Leading a university during a time of great social change without some formal planning process is a bit like navigating the Titanic through an iceberg floe in the dead of night. Simply reacting to challenges and opportunities as they arise can eventually sink the ship.

Throughout its history, during times of both challenge and opportunity, the University has demonstrated the capacity to develop and execute the strategies necessary to achieve bold visions. Tappan's vision of building a true university in America was embraced by his successors who developed the strategies to achieve intellectual leadership across a wide spectrum of academic disciplines during the late 19th and early 20th century. Similar leadership and planning enabled the University of Michigan to become the prototype of the emerging American research university following World War II. Careful planning was necessary to sustain both its quality and leadership during an era of rapidly growth during the post-war years. And more recently, visionary planning and courageous actions during the last decades of the 20th century enabled the University to adjust to the loss of its state support with quality, public purpose, and leadership still intact.

This essay represents an effort to continue this long tradition of strategic planning to develop an appropriate vision for the University's third century. Of course there have been two decades of further change and transformation in our world since the last university-wide planning activities of the 1980s and 1990s. Many



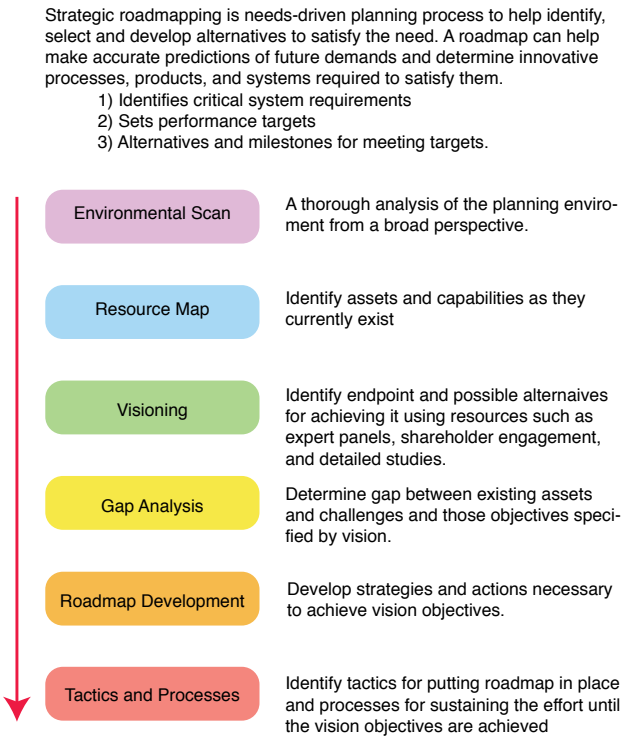
The progression of University-wide strategic planning activities

familiar challenges remain, e.g., economic, demographic, technological, and cultural. But new challenges must also be added into planning activities: global sustainability (e.g., climate change, financial stability, global poverty and health, terrorism and nuclear proliferation); rapid globalization; open knowledge resources; exponentiating technologies; and perhaps even "technological singularities". Future possibilities have become not only more diverse but more extreme and possibly even unimaginable.

Because of the unusual challenges and opportunities facing the University of Michigan in its third century, today it is imperative to develop progressive, flexible, and adaptive planning processes, capable of responding to a dynamic environment and an uncertain—indeed, unknowable—future. Planning for such a complex, rapidly changing, and unpredictable future requires a somewhat different approach. Beyond boldness and attentiveness to the University's traditions, it requires rigor, discipline, and insight to develop achievable goals, strategies, and tactics.

In this report, we have adopted and adapted a planning technique commonly used in those sectors of industry and the federal government characterized by extremely rapid and unpredictable change: *strategic roadmapping* (Garcia, 1997). This approach begins by using panels of experts to propose goals or visions for the organization. It then constructs a map of existing resources, performs an analysis to determine the gap between what currently exists and what is needed, and finally develops a plan or roadmap of possible routes from here to there, from now to the future. Although sometimes cluttered with confusing jargon such as environmental scans, resource maps, and gap analysis, in reality the roadmapping process is quite simple. It begins by asking where we are today, then where we wish to be tomorrow, followed by an assessment of how far we have to go, and finally concludes by developing a roadmap to get from here to there. The roadmap itself usually consists of a series of recommendations aimed at navigating toward the vision.

To provide an historical context for the "Third Century" planning process, we begin in Chapter 2 with a brief history of the University of Michigan, describing the role it has played in the evolution of higher education both in the United States and abroad. In particular,



The roadmapping process

we develop the concept of the University's *institutional saga*, those factors evolving over the past two centuries that have shaped its character, traditions, and roles.

In Chapter 3 we turn to a discussion of the University of Michigan today. Here we review its key characteristics, e.g., traditional missions, available resources, achievements, and including its challenges, opportunities, and responsibilities–roughly comparable to what is known in corporate strategic planning as a SWOT analysis ("strengths, weaknesses, opportunities, and threats"). We consider a longitudinal analysis over the past half-century of key metrics that characterize Michigan and higher education more generally to provide better understanding of just how the institution has evolved to its current situation.

In Chapter 4 we turn to an environmental scan of powerful forces driving change in our world, e.g., the emerging knowledge- and innovation-driven economy, globalization, changing demographics, rapidly evolving technologies, and global sustainability–and the implications for education in general and public research universities such as Michigan in particular. Although most of our analysis concerns the near term challenges and opportunities of the knowledge economy, we in-

clude some brief speculation on possible trends and surprises for the longer term, a topic we return to in more detail in the last chapter of this report.

In Chapter 5 we consider bolder visions that consider truly over-the-horizon opportunities and challenge, "game changers" such as the spontaneous emergence of new geopolitical structures or a truly global culture. Such futures would require new policies, practices, and perspectives of higher education that depart quite radically from the status quo and result in paradigm shifts in the most fundamental character of the university.

Next in Chapter 6 we suggest a vision for the University of Michigan future as it prepares to begin its third century of service to the state, the nation, and the world.

In Chapter 7, by comparing this vision with the current reality, we can identify the resource gap that exists between what the University requires today (in the broadest sense, e.g., its people, quality, finances, campus, values and spirit) and what we will need to achieve the proposed vision for Michigan's Third Century.

In Chapter 8 we conclude with the development of the Third Century Roadmap itself, a set of goals and strategies designed to move the University toward this vision of its future. We have separated the roadmap into timeframes or "event horizons" to provide a framework that recognizes the increasing uncertainty as the timeframe reaches further into the future.

In Chapter 9 we turn to the plans, tactics, and processes necessary to achieve the objectives set by the roadmap studies. Here we suggest that instead of adopting a master plan one should embrace a process of continued engagement, action, and refinement to build and sustain momentum.

Finally, in Chapter 10, we conclude with some comments on just how challenging yet important this expanded role of the University of Michigan would be to the state, the nation, and the world.

The Road Ahead

As we look to the profound changes ahead of us, it is important to keep in mind that throughout their history, universities have evolved as integral parts of their societies to meet the challenges of their changing environments. They continue to evolve today. This disposition to change is a basic characteristic and strength of university life, the result of our constant generation of new knowledge through scholarship that, in turn, changes the education we provide and influences the societies that surround us.

At the same time, this propensity of universities to change is balanced by vital continuities, especially those arising from our fundamental scholarly commitments and values and from our roots in a democratic society. While the emphasis, structure, or organization of university activity may change over time to respond to new challenges, it is these scholarly principles, values, and traditions that animate the academic enterprise and give it continuity and meaning.

Thus, an integral part of the life of the university has always been to continuously evaluate the world around us, in order to adjust our teaching, research, and service missions to serve the changing needs of our constituents while preserving basic values and commitments. Today we must once again try to anticipate the future direction of our society in order to prepare students for the world they will inherit.

This capacity for change, for renewal, is the key objective that the University of Michigan must strive to achieve in the years ahead—a capacity that will allow it to transform itself once again as it has done so many times in the past, to become an institution capable of serving a changing society and a changing world. This challenge must be approached strategically rather than reactively, with a deep understanding of the role and character of the University, its important traditions and values from the past, and a clear and compelling vision for its future.

This, then, is the particular challenge and opportunity for the University of Michigan, an institution that has long served as both the pathfinder and trailblazer for higher education not only in America but throughout the world. As it has so many times in its past, the University of Michigan must embrace yet again its heritage of leadership as it prepares for a third century characterized by great challenges, immense responsibilities, and exciting opportunities.

Chapter 2

The Michigan Saga

Developing a vision for the future of the University of Michigan is always a challenging exercise, both because of the unusual size, breadth, and complexity of the institution and because of the important leadership role it is expected to play in American higher education. During the past two centuries of its history, Michigan has responded time and time again to transform itself–and higher education more generally–in response to the changing needs of an evolving nation.

Today the University of Michigan faces yet another pivotal moment in its history, a fork in the road. Taking one path can, with dedication and commitment, preserve the University as a distinguished–indeed, a great–university, but only one among many such institutions. There is another path, a path that will require great vision, courage, and creativity in addition to dedication and commitment. By taking this second path, the University would seek not only to sustain its quality and distinction, but it would seek to achieve leadership as well, embracing its long history–its saga–as a pathfinder and trailblazer for higher education.

Of course there are always those who believe that Michigan should settle for achieving excellence and leadership within the confines of the current American research university paradigm. The University of Michigan, they argue, should take the necessary steps to preserve its options, to create flexibility, to develop the capacity to adapt to and control change, and to open up opportunities during the decades. They see our current strategies as a way to clearly identify the goals that would enable the University of Michigan to adapt to a changing world in a far more organic, evolutionary manner.

But such a laissez-faire approach to the future is not the Michigan style. The University tends to flourish when it has been enlivened and emboldened by challenging visions of its future. While acknowledging the difficulties and the risks inherent in long-range planning exercises, the University's heritage as a pathfinder and trailblazer in higher education demands the development and articulation of a bold vision for the third century. It is a fitting exercise for an institution aspiring to become "the leader and best."

Hence we contend that as the University approaches its third century, it should embrace once again its heritage as a pathfinder, a saga established two centuries ago in the late 19th century when the University of Michigan became a primary source for much of the innovation and leadership for higher education. Once again Michigan has the opportunity to influence the emergence of a new paradigm of what the university should become in our 21st Century world to respond to the changing needs of our society. But this will require bold vision, an unusual commitment to excellence, strong leadership, and a challenging and engaging strategy.

Clearly the first step in developing any plan for the future is to understand not only where we are today but from whence we came! This certainly applies to universities, which are based on long-standing traditions and continuity, evolving over many generations (in some cases, even centuries), with very particular sets of values, traditions, and practices. Burton R. Clark, a noted sociologist and scholar of higher education, introduced the concept of "organizational legend," or "*institutional saga,*" to refer to those long-standing characteristics that determine the distinctiveness of a college or university (Clark, 1970). Clark's view is that "an organizational legend (or saga), located between ideology and religion, partakes of an appealing logic on one hand and sentiments similar to the spiritual on the other"; that universities "develop over time such an intentionality about institutional life, a saga, which then results in unifying the institution and shaping its purpose."

Clark notes: "An institutional saga may be found in many forms, through mottoes, traditions, and ethos. It might consist of long-standing practices or unique roles played by an institution, or even in the images held in the minds (and hearts) of students, faculty, and alumni. Sagas can provide a sense of romance and even mystery that turn a cold organization into a beloved social institution, capturing the allegiance of its members and even defining the identity of its communities."

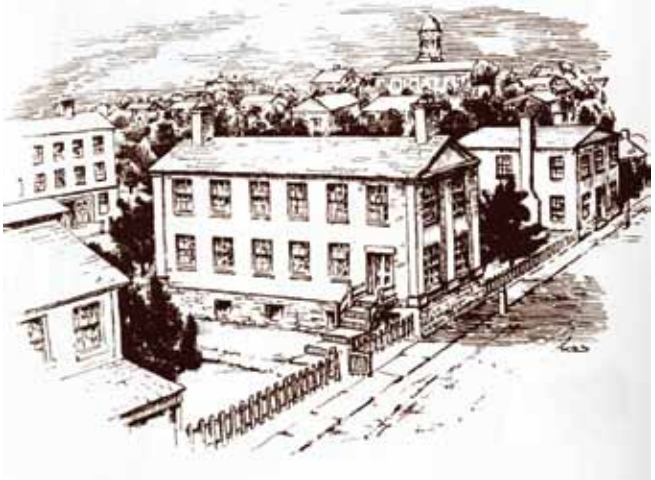
As Clark explains, all colleges and universities have a social purpose, but for some, these responsibilities and roles have actually shaped their evolution and determined their character. The appearance of a distinct institutional saga involves many elements—visionary leadership; strong faculty and student cultures; unique programs; ideologies; and, of course, the time to accumulate the events, achievements, legends, and mythology that characterize long-standing institutions.

Hence the first task in constructing an appropriate vision for the University of Michigan's third century is to understand clearly its key values, traditions, and attributes. And to do this requires us to sift through the layers of the University's history to discover and articulate its institutional saga.

A University on the Frontier

It can be argued that it was in the Midwest, in frontier towns such as Ann Arbor and Madison, that true public universities first appeared in America. By augmenting the traditional mission of educating the young with faculty scholarship and public service to society, the emerging public state universities created a uniquely American university capable of responding to the needs of a rapidly changing nation in the 19th Century and that still dominates higher education today.

The University of Michigan (or more accurately, "the Catholepistemiad or University of Michigania", a rather odd name coined by one of its early founders) was established in 1817 in the village of Detroit by an act of the Northwest Territorial government and financed through the sale of Indian lands granted by the United States Congress. (Price, 2003) Since it benefited from this territorial land grant, the new university was subject to the provisions of the Northwest Ordinance guaranteeing civil rights and religious freedom. But



The original building of the Catholepistemiad or University of Michigania in Detroit, 1817

equally significant for our purposes was the Northwest Ordinance's statement of the importance of education in the new territories: "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." (Northwest Ordinance, 1909).

The University of Michigan can be regarded as one of the first truly public universities in America. However since it was established two decades before Michigan earned statehood (in 1837), the young university was technically not a "state" university during its early years but rather a creation of the federal government.

The University of Michigan traces its early heritage to two quite different models of higher education in 18th century Europe. Actually, the first incarnation of the University of Michigan (aka "Catholepistemiad") was not a university but rather a centralized system of schools, libraries, and other cultural institutions borrowing its model from the *Universite Imperiale de France* founded by Napoleon a decade earlier. (Ruegg, 1996) It was only after the State of Michigan entered the Union in 1837 that a new plan was adopted to focus the university on higher education, establishing it as a "state" university after the Prussian system, with programs in literature, science and arts; medicine; and law–the first three academic departments of the new university.

Yet because the University had already been in existence for two decades before the State of Michigan entered the Union in 1837, and because of the frontier society's deep distrust of politics and politicians, the

new state's early constitution granted the university an unusual degree of autonomy as a "coordinate branch of state government". It delegated full powers over all university matters granted to its governing board of regents, although surprisingly enough it did not state the purpose of the university. This constitutional autonomy, together with the fact that the university traces its origins to an act of Congress rather than a state legislature, has shaped an important feature of the university's character. Throughout its history the university has regarded itself as much as a national university as a state university, as exemplified by the declaration of its early Regents, "The doors of all its Departments are open to students from Every State in the Union, upon the same terms as to those of our own State; so that it may, in some sense, with propriety, be styled a National Institution, and every State in the Union has an interest in its prosperity." Furthermore, Michigan's constitutional autonomy, periodically reaffirmed through court tests and constitutional conventions, has enabled the university to have much more control over its own destiny than most other public universities. (Peckham, 1963)

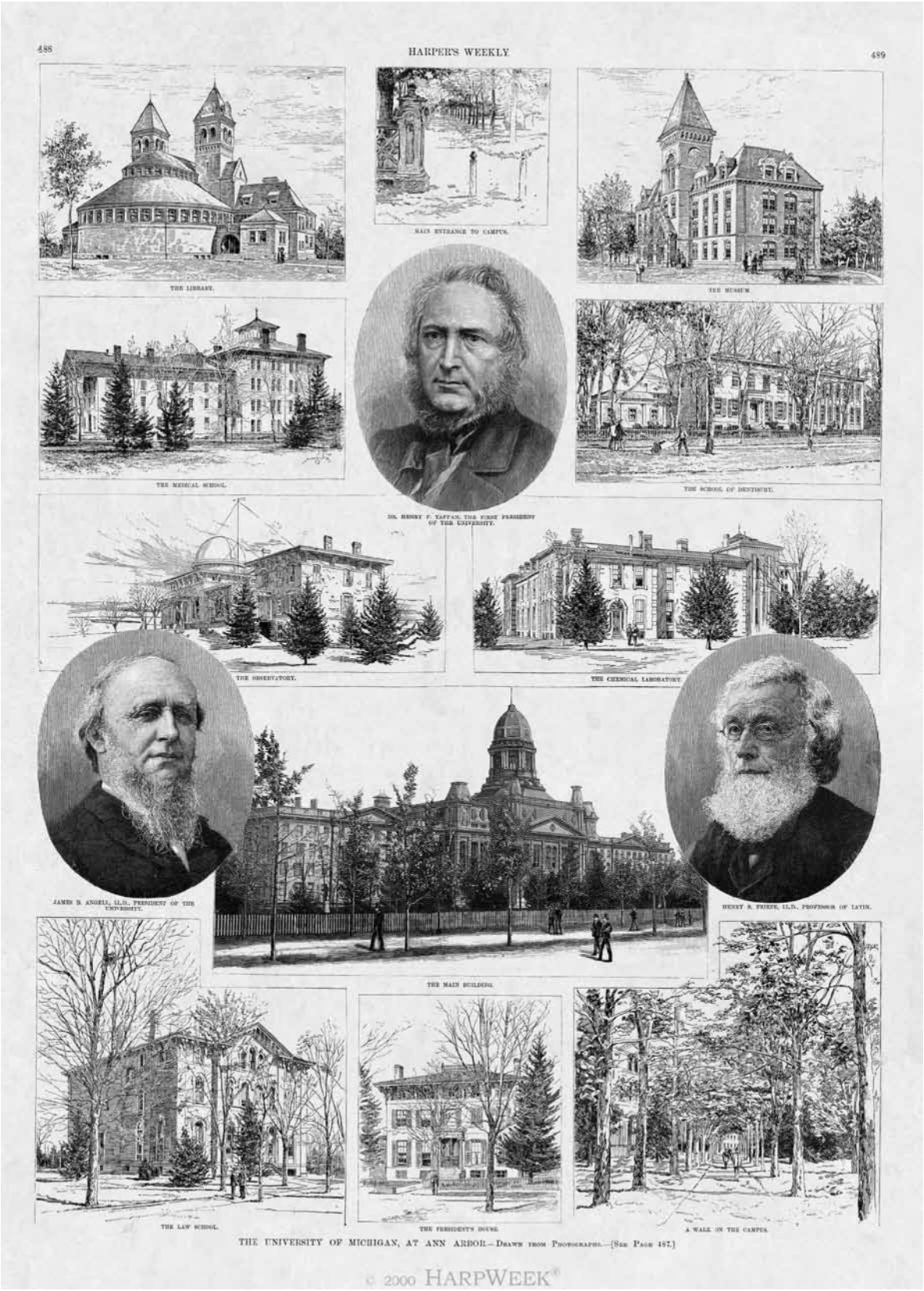
Henry Philip Tappan arrived as the first president of the University of Michigan in 1852, determined to build a university very different from those characterizing the colonial colleges of 19th century America. Tappan was strongly influenced by European leaders such as Wilhelm von Humboldt, Prussian minister of education and founder of the University of Berlin, who stressed the importance of combining specialized research with humanistic teaching to define the intellectual structure of the university. (Ruegg, 2004; Clark, 2006) Tappan articulated a vision of the university as a capstone of civilization, a repository for the accumulated knowledge of mankind, and a home for scholars dedicated to the expansion of human understanding. In his words, "a university is the highest possible form of an institution of learning. It embraces every branch of knowledge and all possible means of making new investigations and thus advancing knowledge."(Tappan, 1851)

Henry Tappan laid the foundation for defining a unique form of the American university, weaving together the classical curriculum and mental discipline of the collegiate model, the utilitarian emphasis of the newly emerging state universities, and the German university emphasis on pure scholarship. During his tenure the University of Michigan broadened the classical curriculum to include the sciences, planted the early seeds for a graduate school to distinguish postgraduate professional studies from undergraduate education, and introduced the seminar model of instruction for graduate education (Peckham, 1963).

President Henry Tappan

Although premature, Tappan's vision for Michigan in the 1850s and 1860s provided the first American model of a modern university. Hence from its founding, the University of Michigan has always been identified with the most progressive forces in American higher education. The early colonial colleges served the aristocracy of colonial society, stressing moral development over a liberal education, much as the English public schools, and based on a classical curriculum in subjects such as Greek, Latin, and rhetoric. In contrast, Michigan blended the classical curriculum with the European model that stressed faculty involvement in research and dedication to the preparation of future scholars. Michigan hired as its first professors not classicists but a zoologist and a geologist. Unlike other institutions of the time, Michigan added instruction in the sciences to the humanistic curriculum, creating a hybrid that drew on the best of both a "liberal" and a "utilitarian" education (Turner, 1988).

Michigan was the first university in the West to pursue professional education, establishing its medical school in 1850, engineering courses in 1854, and a law school in 1859. The university was among the first to introduce instruction in fields as diverse as zoology and botany, modern languages, modern history, American literature, pharmacy, dentistry, speech, journalism, teacher education, forestry, bacteriology, naval architecture, aeronautical engineering, computer engineering, and nuclear engineering. In fact almost every American intellectual movement from the mid-19th century on-



The University of Michigan in 1887, as depicted in the famous article in Harper's Weekly

ward must include some mention of Michigan.

By the late 19th Century, Michigan was recognized as, to quote *Harper's Weekly*, "an institution in whose progress not a single State alone, but the whole country as well, may claim an interest" (Harper's Weekly, 1887). The magazine went on to note: "The most striking feature of the University is the broad and liberal spirit in which it does its work. Students are allowed the widest freedom consistent with sound scholarship in pursuing the studies of their choice. Women are admitted to all departments on equal terms with men; the doors of the University are open to all applicants who are properly qualified, from whatever part of the world they may come." (Peckham, 1963)

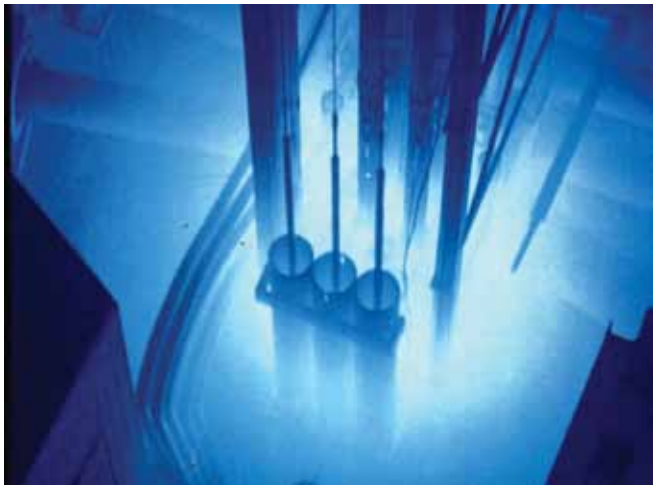
Throughout its history, the University of Michigan has also been one of the nation's largest universities, vying with the largest private universities such as Harvard and Columbia during the 19th and early 20th centuries, and then holding this position of national leadership until the emergence of the statewide public university systems (e.g., the University of California and the University of Texas) in the post-WWII years. Today its Ann Arbor campus is the largest in the nation–indeed, in the world–in facilities (30 million nsf) and budget ($5.5 billion/year). The University continues to benefit from one of the largest alumni bodies in higher education, with over 500,000 living alumni. Michigan graduates are well represented in leadership roles in both the public and private sector and in learned professions such as law, medicine, and engineering. Michigan sends more of its graduates into professional study in fields such as law, medicine, engineering, and business than any other university in the nation. The university's influence on the nation and the world has been immense through the achievements of its graduates.

Michigan students have often stimulated change in our society through their social activism and academic achievements. From the teach-ins against the Vietnam War in the 1960s to Earth Day in the 1970s to the Michigan Mandate in the 1980s, Michigan student activism has often been the catalyst for national movements. In a similar fashion, Michigan played a leadership role in public service, from John Kennedy's announcement of the Peace Corps on the steps of the Michigan Union in 1960 to the AmeriCorps in 1994. Its classrooms have often been battlegrounds over what colleges will teach,

Leadership in medical education

Leadership in engineering education

Leadership in the performing arts



The first nuclear reactor on a college campus

A leader in computer development

Kennedy's Peace Corps speech at Michigan

from challenges to the Great Books canon to more recent confrontations over political correctness. This spirit of democracy and tolerance for diverse views among its students and faculty continues today.

Nothing could be more natural to the University of Michigan than challenging the status quo. Change has always been an important part of the university's tradition. Michigan has long defined the model of the large, comprehensive, public research university, with a serious commitment to scholarship and progress. It has been distinguished by unusual breadth, a rich diversity of academic disciplines, professional schools, social and cultural activities, and intellectual pluralism. The late Clark Kerr, the president of the University of California, once referred to the University of Michigan as "the mother of state universities," noting it was the first to prove that a high-quality education could be delivered at a publicly funded institution of higher learning. (Kerr, 1963)

Interestingly enough, the university's success in achieving such quality had little to do with the generosity of state support. For the first half-century following its founding in 1817, the university was supported entirely from its federal land grant endowment and the fees derived from students. During these early years, state government both mismanaged and then misappropriated the funds from the Congressional land grants intended to support the university (Peckham, 1963). The university did not receive direct state appropriations until 1867, and for most of its history, state support has actually been quite modest relative to many other states. In fact, today (2011) less than 5% of its support comes from state appropriations, a number likely to continue to drop still further in the years ahead.

The real key to the University's quality and impact has been the very unusual autonomy granted the institution by the first state constitution. The University has always been able to set its own goals for the quality of its programs rather than allowing these to be dictated by the vicissitudes of state policy, support, or public opinion. Put another way, although the University is legally "owned" by the people of the state, it has never felt obligated to adhere to the priorities or whims of a particular generation of Michigan citizens. Rather, it viewed itself as an enduring social institution with a

duty of stewardship to commitments made by generations past and a compelling obligation to take whatever actions were necessary to build and protect its capacity to serve future generations. Even though these actions might conflict from time to time with public opinion or the prevailing political winds of state government, the university's constitutional autonomy clearly gave it the ability to set its own course. When it came to objectives such as program quality or access to educational opportunity, the University of Michigan has always viewed this as an institutional decision rather than succumbing to public or political pressures.

This unrelenting commitment to academic excellence, broad student access, and public service continues today. In virtually all national and international surveys, the university's programs rank among the very best, with most of its schools, colleges, and departments ranking in quality among the top ten nationally and with several regarded as the leading programs in the nation. Other state universities have had far more generous state support than the university of Michigan. Others have had a more favorable geographical location than "good, gray Michigan." But it was Michigan's unusual commitment to provide a college education of the highest possible quality to an increasingly diverse society–regardless of state support, policy, or politics–that might be viewed as one of the university's most important characteristics. The rapid expansion and growth of the nation during the late 19th and early 20th centuries demanded colleges and universities capable of serving all of its population rather than simply the elite as the key to a democratic society. Here Michigan led the way in both its commitment to wide access and equality and in the leadership it provided for higher education in America.

Particularly notable here was the role of Michigan President James Angell in articulating the importance of Michigan's commitment to provide "an uncommon education for the common man" while challenging the aristocratic notion of leaders of the colonial colleges such as Charles Eliot of Harvard. Angell argued that Americans should be given opportunities to develop talent and character to the fullest. He portrayed the state university as the bulwark against the aristocracy of wealth. This commitment continues today, when even in an era of severe fiscal constraints, the university still meets the full financial need of every Michigan student enrolling in its programs. (Rudolph, 1962)

The University has long placed high value on diversity.

The university has long placed high value on the diversity of its student body, both because of its commitment to serve all of society, and because of its perception that such diversity enhanced the quality of its educational programs. From its earliest years, Michigan sought to attract students from a broad range of ethnic and geographic backgrounds. By 1860, the regents referred "with partiality" to the "list of foreign students drawn thither from every section of our country." Forty-six percent of the university's students then came from other states and foreign countries. Michigan awarded the first doctorate to a Japanese citizen who later was instrumental in founding the University of Tokyo. President Angell's service in 1880-81 as United States Envoy to China established further the university's great influence in Asia.

The first African American students arrived on campus in 1868. Michigan was one of the first large universities in America to admit women in 1870. At the time, the rest of the nation looked on with a critical eye, certain that the experiment of co-education would fail. Although the first women students were true pioneers, the objects of intense scrutiny and some resentment, by 1898 the enrollment of women had increased to the point where they received 53 percent of Michigan's undergraduate degrees, roughly the same percentage they represent today.

In many ways, it was at the University of Michigan that Thomas Jefferson's enlightened dreams for the true public university were most faithfully realized. Whether characterized by gender, race, socioeconomic background, ethnicity, or nationality–not to mention academic interests or political persuasion–the university has always taken great pride in the diversity of its students, faculty, and programs. Its constitutional autonomy enabled it to defend this commitment in the face of considerable political resistance to challenging the status quo, eventually taking the battle for diversity and equality of opportunity all the way to the United States Supreme Court in the landmark cases of 2003. In more contemporary terms, it seems clear that an important facet of the institutional saga of the University of Michigan would be its achievement of excellence through diversity.

The Michigan Saga

What might be suggested for the University of Michigan institutional saga in view of the university's history, its traditions and roles, and its leadership over the years? Among the possible candidates from Michigan's history are the following characteristics:

- The Catholepistemiad or University of Michigania (the capstone of a system of public education)
- The flagship of public universities or "mother of state universities"
- A commitment to providing "an uncommon education for the common man"
- The "broad and liberal spirit" of its students and faculty
- The university's control of its own destiny, due to its constitutional autonomy providing political independence as a state university and to an unusually well-balanced portfolio of assets providing independence from the usual financial constraints on a public university
- An institution diverse in character yet unified in values
- A relish for innovation and excitement
- A center of critical inquiry and learning
- A tradition of student and faculty activism
- A heritage of leadership
- The leaders and best" (to borrow a phrase from Michigan's fight song, *The Victors*)

But one more element of the Michigan saga seems particularly appropriate during these times of challenge and change in higher education. It is certainly true that the vast wealth of several of the nation's elite private universities–e.g., Harvard, Yale, Princeton, and Stanford– can focus investments in particular academic areas far beyond anything that Michigan or almost any other university in the nation can achieve. They are capable of attracting faculty and students of extraordinary quality and supporting them with vast resources.

Yet Michigan has one asset that these universities will never be able to match: its unique combination of quality, breadth, and scale. This enables Michigan to take risks far beyond anything that could be matched by a private university. Because of their relatively modest size, most elite private universities tend to take a rather conservative approach to academic programs and appointments, since a mistake could seriously damage a small academic unit. Michigan's vast size and breadth allows it to experiment and innovate on a scale far beyond that tolerated by most institutions, as evidenced by its long history of leadership in higher education. It can easily recover from any failures it encounters on its journeys along high-risk paths. This ability to take risks, to experiment and innovate, to explore various new directions in teaching, research, and service, enables Michigan's unique role in American higher education. During a time of great change in society, Michigan's most important institutional saga is that of a pathfinder and a trailblazer, building on its tradition of leadership and relying on its unusual combination of quality, capacity, and breadth, to reinvent the university, again and again, for new times, new needs, and new worlds.

Here perhaps we should be more precise in our choice of descriptors: *Pathfinders* are those who identify new directions; *trailblazers* explore the new pathways; *pioneers* build the roads along the new paths that others can follow; and *settlers* occupy the new territory. (Cherry Pancake, 2003) Hence we suggest that Michigan should be viewed first and foremost both as a pathfinder and a trail-blazer, identifying possible paths into new territory and blazing a trail for others to follow.

Michigan has also been at times a pioneer, building roads that others could follow (e.g., the Internet).

Whether in academic innovation (e.g., the quantitative social sciences), social responsiveness (e.g., its early admission of women, minorities, and international students), or its willingness to challenge the status quo (e.g., teach-ins, Earth Day, and the Michigan Mandate), Michigan's history reveals this pathfinding and trailblazing character time and time again. Recently, when Michigan won the 2003 Supreme Court case concerning the use of race in college admissions, the general reaction of other colleges and universities was "Well, that's what we expect of Michigan. They carry the water for us on these issues." When Michigan, together with IBM and MCI, built NSFnet during the 1980s and expanded it into the Internet, this again was the type of leadership the nation expected from the university.

Continuing with the frontier analogy, while Michigan has a long history of success as a pathfinder, trailblazer, and occasional pioneer, it has usually stumbled as a settler, that is, in attempting to follow the paths blazed by others. All too often this leads to complacency and even stagnation at an institution like Michigan. The University almost never makes progress by simply trying to catch up with others.

Michigan travelers in Europe and Asia usually encounter great interest in what is happening in Ann Arbor, in part because universities around the world see the University of Michigan as a possible model for their own future. Certainly they respect—indeed, envy—distinguished private universities, such as Harvard and Stanford. But as public institutions themselves, they realize that they will never be able to amass the wealth of these elite private institutions. Instead, they see Michigan as the model of an innovative university, straddling the characteristics of leading public and private universities.

Time and time again colleagues mention the "Michigan model" or the "Michigan mystique." Of course, people mean many different things by these phrases: the university's unusually strong and successful commitment to diversity; its hybrid funding model combining the best of both public and private universities; its strong autonomy from government interference; or perhaps the unusual combination of quality, breadth, and capacity that gives Michigan the capacity to be innovative, to take risks. Of course, all these multiple perspectives illustrate particular facets of what it means to be "the leaders and best."

The institutional saga of the University of Michigan involves a combination of quality, size, breadth, innovation, and pioneering spirit. The university has never aspired to be Harvard or the University of California, although it greatly admires these institutions. Rather, Michigan possesses a unique combination of characteristics, particularly well suited to exploring and charting the course for higher education as it evolves to serve a changing world.

And it is this unique character as a pathfinder, trailblazer, and pioneer that should shape the University's mission, vision, and goals for the future. They best capture and enliven the institutional saga of the University of Michigan. And these are the traits that must be recognized, honored, and preserved as the University enters its third century.

Chapter 3

The University of Michigan Today

As we stressed in Chapter 2, long-enduring institutions such as universities need to begin with an understanding of their history, tradition, and values—their institutional saga. An institution cannot escape reckoning with its history, especially when it comes to developing a planning process. For example, we need to look at the availability and deployment of resources—human and physical, tangible and intangible—as the outcome of dynamic processes occurring over time. It is important always to consider the evolutionary path that has brought the University to its current situation. These form the initial conditions for any planning process.

Beyond this, it is important to gain an understanding of possible constraints that might restrict planning options, since these might be challenged and relaxed. In our case, a faltering Michigan economy that is no longer able to support a world-class public research university is clearly a serious concern. But so, too, are an array of demographic issues, such as the need to serve underrepresented minority communities and to embrace diversity as key to our capacity to serve an increasingly diverse state, nation, and world. Michigan's long history of international activities positions us well to address the growing trends of globalization, just as the university's leadership in developing and implementing new technologies, such as the Internet, has given us a good perspective of technological change.

The tables on the following pages, taken from recent University publications such as the 2010 Accreditation report, summarize key indicators and data characterizing the University of Michigan today. These suggest a number of key issues characterizing the institution today that should frame the development of a roadmap to its third century.

Michigan Today

In its most recent official publications (UM Accreditation Report, 2010), the University of Michigan is described as follows:

'The University of Michigan-Ann Arbor is located 40 miles (65 km) west of Detroit, along the beautiful Huron River. It consists of five major areas--Central Campus, East Campus, North Campus, Medical Center, and South Campus--that total 3,070 acres (12.4 km^2), with 483 major buildings and 1,082 family and single graduate housing units. University Housing is host to about 25% of the student body in 16 residence halls, 392 undergraduate apartments, and 1,082 family and single graduate units. Ninety-six percent of all first-year students and approximately 36% of all undergraduates live in University housing. In support of our teaching mission, which is at the heart of the University, the housing department supports ten residential academic programs known as Michigan Learning Communities. In these learning communities, as in all the University's academic programs, students learn and challenge themselves as they come into contact with people, cultures, and ideas from all over the world.

The University community has about 41,000 students in 19 schools and colleges, and more than 38,000 faculty and staff. The students at the University come from all 50 states and over 100 foreign countries, from Afghanistan to Zimbabwe. The University's faculty in both the instructional and research tracks similarly includes many internationals, and is considered among the best in the country. Looking beyond the local borders of the campus community, more than 480,000 University of Michigan alumni live and work (and cheer) all over the world.

The University's research mission had expenditures in FY10 that exceeded $1.1 billion, which is one of the largest expenditure totals among U.S. universities. Federal agencies provided the largest portion of funds at 64% (led by the Department of Health and Human Services), with the remainder coming from University funds (24%) and non-federal sources that include industry and foundations.

Among the many resources that allow the University to meet its teaching and research goals are the libraries and museums. The University Library system has 19 libraries, which include the Harlan Hatcher Graduate Library, Health Sciences Libraries, Harold T. and Vivian B. Shapiro Undergraduate Library, Shapiro Science Library, and the Art, Architecture & Engineering Library. Together the libraries hold over 8 million volumes and over 70,000 serial titles. The University is a national leader in the development of digital library resources, having digitized over 5 million books to date. Museums that are open to the public are the Detroit Observatory, Exhibit Museum of Natural History (with a planetarium), Kelsey Museum of Archaeology, Museum of Art, Sindecuse Museum of Dentistry, and the Stearns Collection of Musical Instruments. Research museums that house extensive collections include the Museum of Anthropology, Museum of Paleontology, Museum of Zoology, and the University Herbarium.

The University of Michigan is dedicated to service in the larger world. Faculty and students conduct hands-on research on a range of critical issues, including health care, energy and the environment, social interventions, education reform and improvement, and many others. By sharing their fundamental knowledge and advancing innovations in technology, scientists and engineers at the University contribute to advances that are transforming life and that contribute to building the economy of the region, state, and the nation. For their part, students participate in hundreds of community-based service and learning projects and a wide range of other service activities. In collaboration with other universities, colleges, and K-12 schools, the University conducts research and provides other services for the benefit of a variety of state, national, and private agencies.

University contributions to the state are multifaceted, and include dollars that flow into the University, as well as local goods and services purchased by the University and by its employees, students, and visitors. The Ann Arbor campus has a total annual payroll and benefits expenditure of over $3.2 billion. During the past five years the University has helped to create thousands of new jobs, while research activity has resulted in more than 1,750 invention disclosures and dozens of new start-up companies. Retail spending, athletics, and cultural events generate hundreds of millions of dollars for the local economy each year and attract more than 350,000 people to the area.

The University of Michigan's size, complexity and academic strength, its array of resources and opportunities, and the quality of its faculty, students, and staff collectively contribute to a rich environment where members of the University community engage in research and creative work, teaching and learning, and service and engagement."

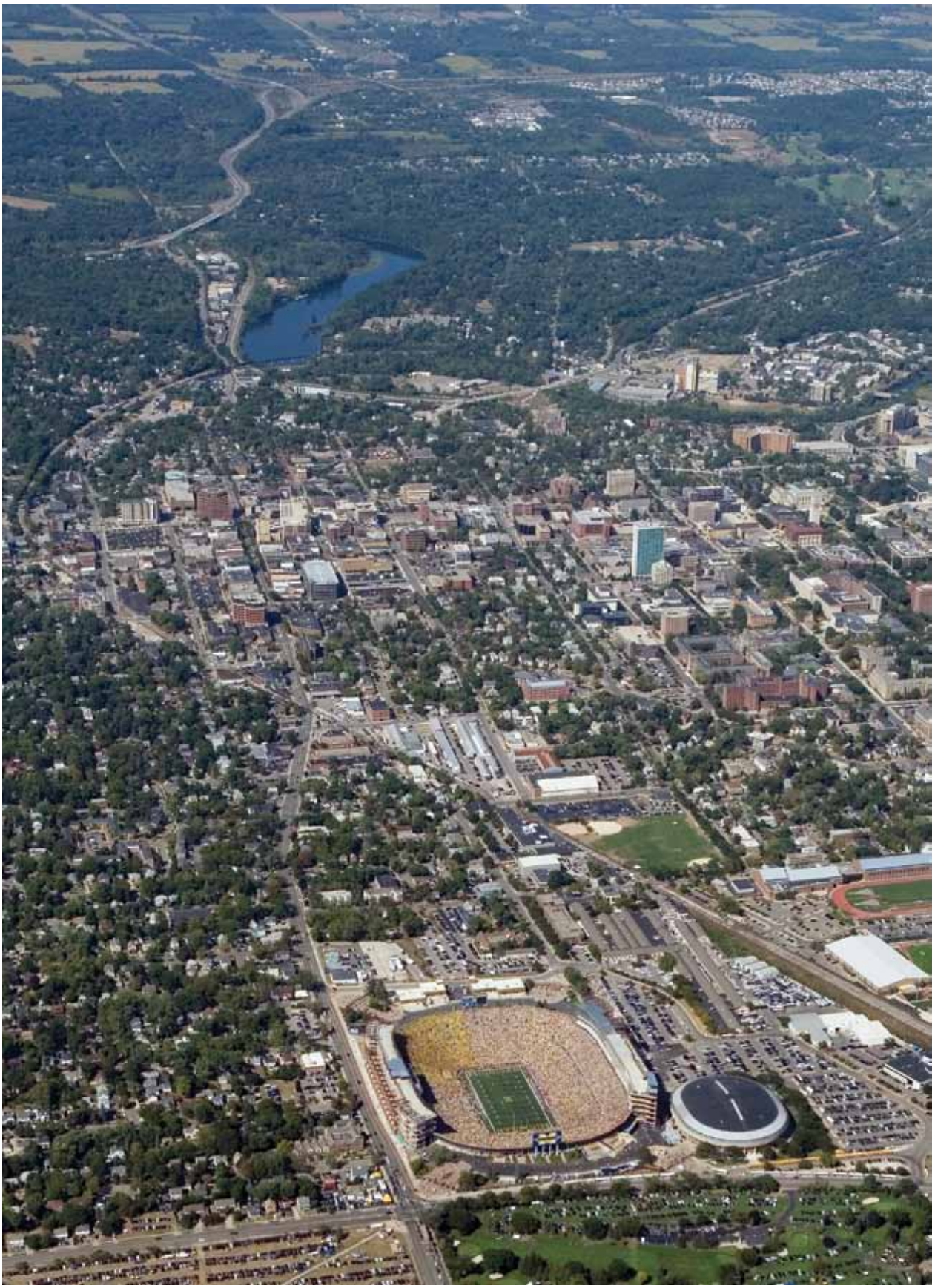
The accompanying tables provide a more quantitative description, while an aerial view of the Ann Arbor campus provides a visual perspective of the University in 2010.

Key Characteristics

The Link Between Quality, Breadth, and Scale

The quality of the University of Michigan academic programs is the most fundamental determinant of its ability to develop and maintain leadership. However, a comprehensive and diverse array of intellectual, social, and cultural experiences is also important for its leadership role in higher education. And, 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 determines its potential impact on society.

Rather than viewing the quality, breadth, and scale of the University as competing objectives--or possibly even as constraints on what it can accomplish within a world of limited resources-- instead these characteristics, when linked together creatively, can provide an unusual opportunity. By building leadership in an environment that demands commitment to all three characteristics, with a particular stress on academic excel-



As mentioned in the introduction, the University is home to 19 schools and colleges that range in size from a few hundred students to more than 18,000, and faculty full-time equivalents (FTEs) from the teens into many hundreds. A comparison data set for schools and colleges for fall 2008 is below.

Schools and Colleges Profile

(Fall 2008)	Under-graduate	Graduate	First Professional	Gen Fund FTE	Degrees Granted
Architecture and Urban Planning	244	365	0	34.4	227
Art & Design	470	25	0	32.6	95
Business	1,060	1,882	0	91.9	1,159
Dentistry	101	110	442	37.7	155
Education	206	329	0	34.9	276
Engineering	5,217	2,603	0	256.1	2,163
Graduate Studies, Rackham	0	682	0	0.0	52
Information	0	391	0	21.2	127
Kinesiology	808	49	0	19.0	239
Law	0	12	1,206	32.2	429
Literature, Science, and the Arts	16,309	1,977	0	722.5	4,454
Medicine	0	410	1,832	95.6	274
Music, Theatre & Dance	777	261	0	102.8	295
Natural Resources & Environment	0	283	0	19.5	96
Nursing	647	259	0	28.2	243
Pharmacy	51	88	247	21.5	78
Public Health	0	866	0	59.3	308
Public Policy	104	161	0	14.1	81
Social Work	0	554	0	35.4	328
Total	25,994	11,307	3,727	1,658.8	11,079

Source: Office of Budget and Planning

Key financial Indicators that reflect the University's support of its mission and goals, as well as recent trends, are shown in the table below (data for 2000, 2004 and 2008). Additional details are available on the Financial Operations' Financial Reporting site.

Financial Indicators

	2000	2004	2008	change since 2000
Total Operating Budget; TOB (millions)	3,321	4,239	4,980	50%
Specific Budgeted Revenues; SBR (millions)	1,142	1,403	1,772	55%
% SBR supported by state appropriations	34	27	21	-38%
% SBR supported by tuition	47	52	54	15%
% SBR supported by gifts and investment	11	11	16	45%
% SBR supported by indirect cost recovery and other	9	11	9	0%
Total Research Expenditures; TRE (millions)	545	753	876	61%
% TRE from U-M funds	16	16	18	13%
% TRE from federal sources	69	71	70	1%
% TRE from non-federal sources	16	13	12	-25%
Net Assets (millions)	6,834	7,730	10,755	57%

Source: Financial Operations

More complete information and further breakdowns of the various data sets are available on the Office of Budget & Planning website, on the University's College Portrait website, and posted as Snapshots of the University of Michigan under Resources.

1.2.1
Selected Indicators and Trends

The tables below show fall 2008 data and demographics of students, faculty, and staff, and of selected financial indicators. They also include comparison data for 2000 and 2004 that illustrate recent trends. Please note that financial indicators are not corrected for inflation[1]. Additional information is presented in the institutional snapshot and online.

Student enrollment and demographics (below) show that the University has enrolled more than 40,000 students in recent years, with a growing international population (non-Permanent Resident Alien).

Students	2000	2004	2008	change since 2000
Total Head Count	38,103	39,533	41,028	8%
U.S. & Permanent Resident Alien	33,720	34,900	36,038	7%
Non-Permanent Resident Alien	4,383	4,663	4,990	14%
Enrollment by Level				
Undergraduate	24,412	24,828	25,994	6%
U.S. & Permanent Resident Alien	23,354	23,600	24,626	5%
Non-Permanent Resident Alien	1,058	1,228	1,368	29%
Graduate	10,513	11,219	11,307	8%
U.S. & Permanent Resident Alien	7,301	7,926	7,859	8%
Non-Permanent Resident Alien	3,212	3,293	3,448	7%
First Professional	3,178	3,486	3,727	17%
U.S. & Permanent Resident Alien	3,065	3,374	3,553	16%
Non-Permanent Resident Alien	113	112	174	54%
Gender, Race/Ethnicity				
Men	20,068	20,457	21,341	6%
Women	18,035	19,076	19,687	9%
African American/Black	2,621	2,699	2,359	-10%
Hispanic American	1,431	1,706	1,673	17%
Native American	216	318	283	31%
Asian American	4,124	4,717	4,726	15%
European American/White	22,174	23,124	24,111	9%
Other	3,154	2,336	2,886	-8%
Degrees Awarded	9,729	10,740	11,079	14%
Bachelor	5,595	5,923	6,258	12%
Master	2,877	3,446	3,336	16%
Intermediate	6	6	2	-67%
Doctoral	651	660	753	16%
First Professional	600	705	730	22%
Undergraduate graduation rate (5yrs); %	81	85	88	9%
Cost				
Undergrad Resident Tuition & Fees (ac yr)	6,513	8,201	11,037	69%
Undergrad Non-resident Tuition & Fees (ac yr)	20,323	26,027	33,069	63%
Undergrad Resident Cost of Attendance (ac yr)	14,937	18,263	22,729	52%
Undergrad Non-resident Cost of Attendance (ac yr)	28,747	36,089	44,761	56%
Undergraduate Financial Aid (millions)	134	193	252	88%
% undergraduates receiving aid	58	66	73	15%

Source: Office of Budget and Planning

Schools and Colleges

Ann Arbor campus

	Date founded	Fall 2008 enrollment
A. Alfred Taubman College of Architecture + Urban Planning	1931	633
Art & Design	1974	539
Stephen M. Ross School of Business	1924	2,957
Dentistry	1875	662
Education	1921	557
Engineering	1854	8250
Horace H. Rackham School of Graduate Studies Intercollege Programs*	1912	641
Information	1969	416
Kinesiology	1984	866
Law	1859	1,176
Literature, Science, and the Arts	1841	18,244
Medicine	1850	2,324
Music, Theatre & Dance	1940	1,043
Nat. Resources and Environment	1927	299
Nursing	1941	924
Pharmacy	1876	398
Public Health	1941	917
Gerald R. Ford School of Public Policy	1995	293
Social Work	1951	535

*Figures for the individual schools and colleges include 15,466 students enrolled in graduate school or first professional degree programs.

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Enrollment Data Fall 2008

All campuses

Total Enrollment	58,089	
Ann Arbor	41,674	
Dearborn	8,642	
Flint	7,773	
Undergraduate	39,748	68.4%
Graduate and Graduate Professional	18,341	31.6%
Men	28,970	49.9%
Women	29,119	50.1%
New Freshmen (Ann Arbor)	5,865	

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Degrees Granted 2007–08

All campuses

Undergraduate	8,636
Graduate	5,303
Graduate Professional	734
Total	14,673
Total number of degrees granted between 1845 and June 30, 2009	713,127

Financial Operations

All funds, all campuses, including University Health System
Fiscal Year 2008–09

Total Revenue for Operating Activities:
$5,065,000,000

Sources of Revenue

Patient care revenues 44%
Government sponsored programs 15%
Student tuition and fees 16%
State appropriations 8%
Other 6%
Distributions from investments 6%
Gifts and grants 5%

Total Expenditures by Function
$5,119,300,000

Total Expenditures

Auxiliary enterprises (includes Health System) 45%
Instruction 16%
Research 12%
Institutional and academic support 10%
Depreciation and other 8%
Operations and maintenance of plant 5%
Public service 2%
Scholarships and fellowships 2%

General Fund Revenues, all campuses Budgeted Fiscal Year 2009–10

The General Fund provides funding to accomplish the University's multiple missions of teaching, research, and public service.

Student Tuition and Fees ($1,084M) 66%
State Appropriations ($363M) 22%
Indirect Cost Recovery ($181M) 11%
Other Sources ($14M) 1%

General Fund Expenditures, all campuses Budgeted Fiscal Year 2009–10

Schools & Colleges ($1,122M) 68%
Student Support Services, Business Operations, & General Administrative Support Services ($290M) 18%
Libraries & Museums ($64M) 4%
Other ($166M) 10%

lence, it can distinguish the University from other institutions that tend to focus on only one of these factors.

For example, highly selective private institutions sometimes sacrifice breadth and size in an effort to achieve absolute excellence in a small number of fields. This results in institutions highly focused in an intellectual sense, which while certainly capable of conducting distinguished academic programs, are nevertheless unable to provide the rich array of opportunities and diverse experiences of "multiversities" such as Michigan. At the other end of the spectrum, the University can also set itself apart from many other large, comprehensive public universities by the degree to which it chooses to focus its resources on academic quality.

Spires of Excellence

Michigan's character as leader through path finding and trailblazing requires it to build spires of excellence in key fields, rather than trying to achieve a uniform level of lesser quality across all of its activities. Only by attempting to be the best in these fields can we develop in our students, faculty, and staff the necessary intensity and commitment to excellence. Furthermore, only by competing with the best can it establish appropriate levels of expectation and achievement.

It must be stressed here it is not the University's goal to build a few isolated spires of excellence in the manner of smaller private universities. Rather, it seeks to achieve within each of its academic units–our schools, departments, centers, and institutes–a number of spires of focused excellence. In other words, the general level of quality in each of our academic units can be achieved through the development of a series of sharply focused peaks of excellence within the units. Thus even for those programs where the University is unable to provide the resources to be national leaders, it aspires to achieve some peaks of extraordinary excellence through the focusing of resources. It is determined to make every effort to avoid mediocrity, but constrained resources suggest that it will inevitably have some areas that were very good as opposed to excellent.

The goal: spires of excellence

The Intellectual Character of Teaching, Research, and Service

The theme of path breaking leadership influences the focus of emphasis within Michigan's traditional endeavors of education, scholarship, and service. For example, it requires that the University become even more committed to the concept of a liberal education for its students. The development of leaders among its students demands challenging intellectual experiences, both in formal instruction and in the extracurricular environment.

In order to develop leaders among its faculties, at least some fraction of its scholarship needs to be shifted to venturesome intellectual activities at the cutting edge of inquiry. Some of the University's 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 continues to have important service roles. Leadership requires that such activities be justified as important experiences for its students and faculty, as models to be propagated to other institutions, and as sources of important questions for basic investigation.

Undergraduate, Graduate, and Professional Education

Today's students will enter an increasingly complex, changing, and fragmented world. Too many undergraduates channel their energies into pre-professional and more narrowly vocational directions. The 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 even greater. On the one hand, the strength of its professional schools and the strong research and scholarly orientation of our faculties should not be compromised. On the other hand, the University needs to generate a fresh commitment to cultivating a spirit of liberal learning among its undergraduates and its faculties, to encourage major efforts to improve the quality of teaching and learning. The University attempts to provide resources to ensure that these efforts can go forward in an atmosphere of continuous experimentation--of intelligent trial and error. Broad faculty participation is 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 University aims to prepare its students not merely to function in our complex society, but to serve as leaders shaping society's future directions.

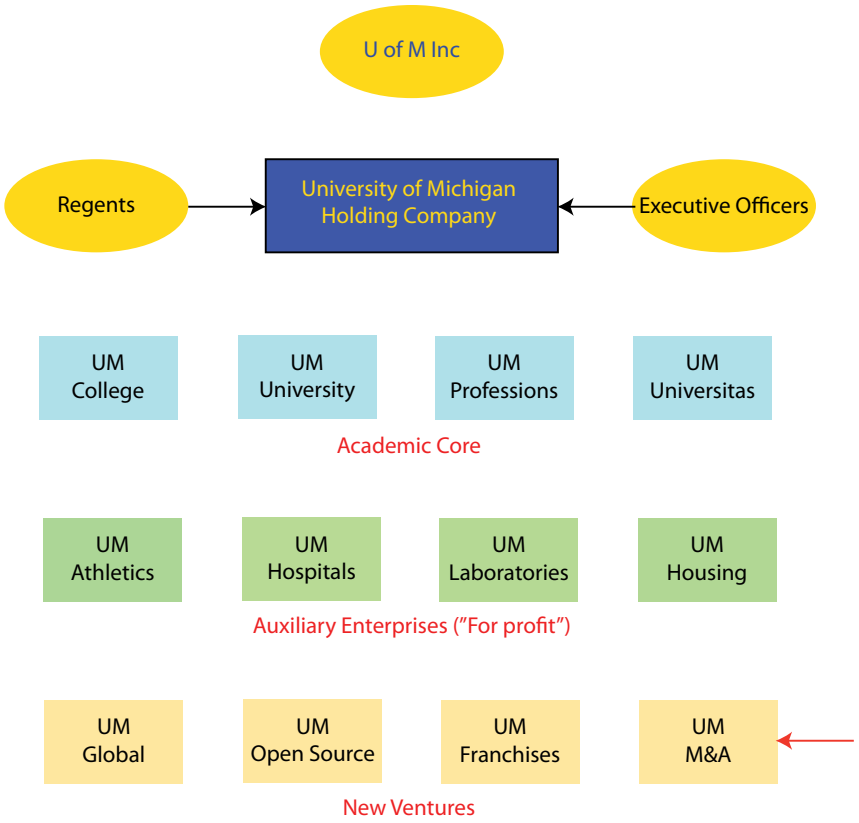
Similarly, leadership requires a major re-examination of the role of graduate studies and professional education within the University. It is important to understand better how these programs respond to the needs of both students and society and how they relate to our undergraduate instruction.

Multiversity or *Universitas*

UC President Clark Kerr once coined the term "multiversity" to describe today's comprehensive university, a loosely coupled adaptive system that mutates and evolves with ever-greater complexity to respond to the ever-greater knowledge needs and opportunities posed by society. (Kerr, 1964) One can certainly understand this viewpoint when considering the current organization of the University of Michigan. In fact, one might depict U of M, Inc., as essentially a holding company of knowledge-intensive services. This would include the traditional components of a university–undergraduate colleges, graduate and professional schools, all clustered about an intellectual core of faculty masters and advanced student scholars (in medieval terms, *a universitas magistrorum et scholarium*). But it also includes an array of auxiliary enterprises, largely operated on a self-financing basis, including sponsored research institutes, laboratories, and projects; clinical activities such as hospitals and health systems; student housing and services; and, of course, public entertainment venues such as intercollegiate athletics. Furthermore, a major university such as Michigan is always launching new ventures such as international programs, not-for-profit knowledge services such as digital libraries, and possibly even activities that draw on the "brandname" of the university to establish new institutions through franchising or mergers and acquisition.

Michigan students in search of a liberal education

Yet, even as the university continues to grow and diversify as it evolves, one must always remember that at its core are its academic programs. One might describe the academic programs of the university in terms of the flow of students, first entering the university as undergraduates at the lower division (freshman, sophomore) level with the primary early objectives of socializing young adults, providing foundational learning, and enabling students to sample an array of disciplines for possible majors. Although lower division programs comprise a primary mission of community



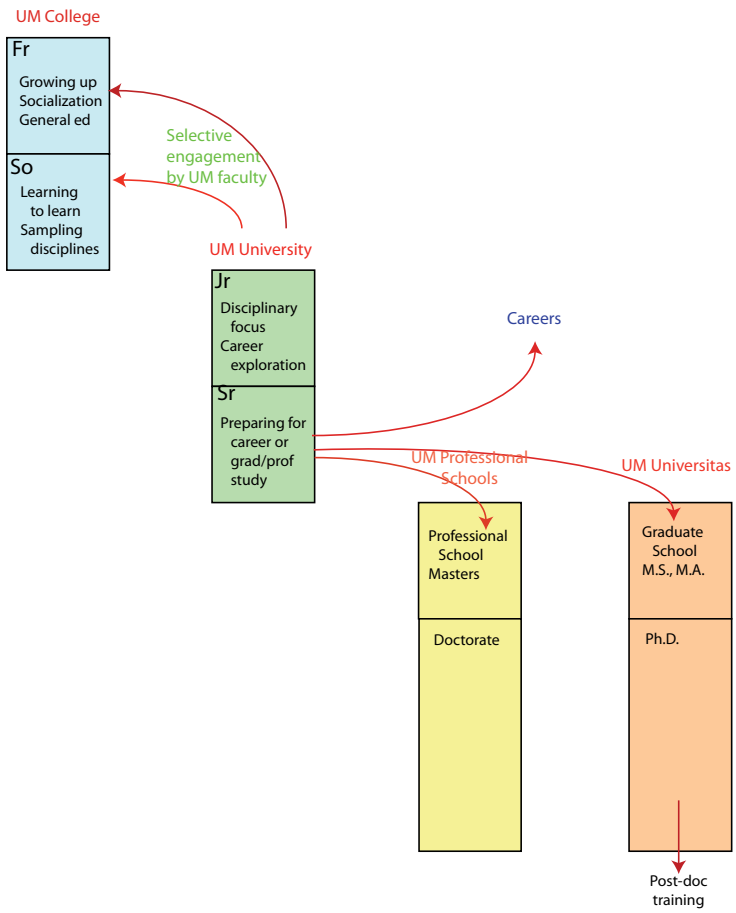
The multiversity as a "holding company"

colleges and four-year liberal arts colleges, most public research universities today assign both instruction and student counseling to non-tenure track faculty (lecturers and instructors) and professional staff, with only occasional student interaction with senior faculty in survey courses. There is a much greater involvement of senior faculty with undergraduate education at the upper division level, where students select to concentrate in an academic discipline and begin to prepare either for careers or further study at the graduate or professional level.

In fact, most students at leading research universities such as Michigan will continue their studies in professional schools at the graduate level in fields such as law, medicine, business administration, or education. These studies general lead to graduate professional degrees at the masters level (MBA, M.Arch, MAT) or doctorate level (M.D., LL.D.).

A select few undergraduates will choose instead to enter the graduate programs of the university to prepare for careers in research or as college faculty. These graduate programs of the university are the closest analog to the *universitas magistrorum et scholarium* of ancient universities since learning and scholarship occurs through unions or communities of masters (the faculty) and scholars (the students) leading to graduate degrees such as the M.S. or M.A. and the Ph.D. In fact, in many fields such as the physical and biomedical sciences, even further education at the postdoctorate level has become the norm for students wishing to enter the academy.

From a more fundamental perspective, these graduate programs (and their associated graduate schools in many universities), along with knowledge resources such as the university libraries, comprise the true academic core of the research university. They determine the intellectual vitality and reputation of the university and its various undergraduate and graduate programs. At Michigan, this academic core also has an important physical presence on the university campus, with the Rackham School of Graduate Studies and the University Library at either ends of the Ingalls Mall, about which are distributed not only the various schools and colleges but as well key cultural resources as the

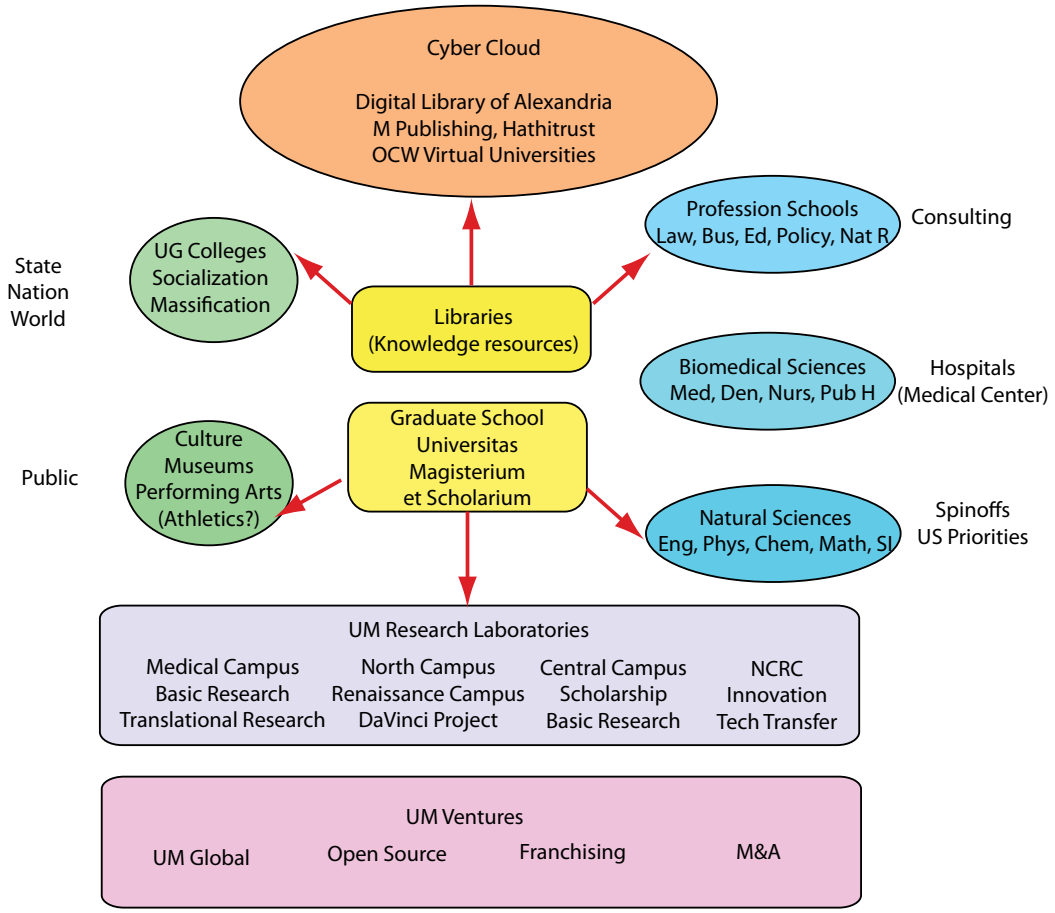


The flow of students through the academic programs of the university.

performing arts (e.g., Hill Auditorium and the Power Center) and museums (e.g., Museum of Art, Kelsey Museum, Ruthven Museum of Natural Sciences). Moving beyond this academic core, one finds first the University's many professional schools (e.g., Law, Business Administration, Education, Social Work, Public Policy), then moving still further those professional schools associated with major research and clinical activities (e.g., the health sciences and the University Hospital, the North Campus with the creative disciplines such as Art, Music, Architecture, and Engineering) and finally to the many research institutes and laboratories scattered about Ann Arbor. Many American research universities have a similar structure, with a clearly identifiable academic core surrounded by an array of schools, colleges, cultural institutions, and research activities.

Yet, as the influence of powerful forces such as the changing needs of society, globalization, and information technology reshape the activities of the university, one can expect its organization and structure to continue to evolve. Many research universities are already evolving into so-called "core in cloud" organizations in which academic departments or schools conducting elite education and basic research, are surrounded by a constellation of quasi-academic organizations—research institutes, think tanks, corporate R&D centers—that draw intellectual strength from the core university and provide important financial, human, and physical resources in return. Such a structure reflects the blurring of basic and applied research, education and training, the university and broader society.

More specifically, while the academic units at the core retain the traditional university culture of faculty appointments, tenure, and intellectual traditions, for example, disciplinary focus, those organizations evolving in the cloud can be far more flexible and adaptive. They can be multidisciplinary and project focused. They can be driven by entrepreneurial cultures and values. Unlike academic programs, they can come and go as the need and opportunity arise. And, although it is



The University of Michigan as a "core-in-cloud" structure

common to think of the cloud being situated quite close to the university core, in today's world of emerging electronic and virtual communities, there is no reason why the cloud might not be widely distributed, involving organizations located far from the campus. In fact, as virtual universities become more common, there is no reason that the core itself has to have a geographical focus.

To some degree, the core-in-cloud model revitalizes core academic programs by stimulating new ideas and interactions. It provides a bridge that allows the university to better serve society without compromising its core academic values. But, like the entrepreneurial university, it can also scatter and diffuse the activities of the university, creating a shopping mall character with little coherence. And it can create a fog that distorts the true nature of the university by the public.

Chapter 4

Setting the Context: An Environmental Scan

We live in a time of great change, an increasingly global society, knitted together by pervasive communications and transportation technologies and driven by the exponential growth of new knowledge. It is a time of challenge and contradiction, as an ever-increasing human population threatens global sustainability; a global, knowledge-driven economy places a new premium on workforce skills through phenomena such as outsourcing and off-shoring; governments place increasing confidence in market forces to reflect public priorities even as new paradigms such as open-source technologies challenge conventional free-market philosophies; and shifting geopolitical tensions driven by the great disparity in wealth and power about the globe, national security, and terrorism.

More specifically today our world has entered a period of rapid and profound economic, social, and political transformation driven by knowledge and innovation. It has become increasingly apparent that the strength, prosperity, and welfare of region or nation in a global knowledge economy will demand a highly educated citizenry enabled by development of a strong system of education at all levels. It will also require institutions with the ability to discover new knowledge, develop innovative applications of these discoveries, and transfer them into the marketplace through entrepreneurial activities.

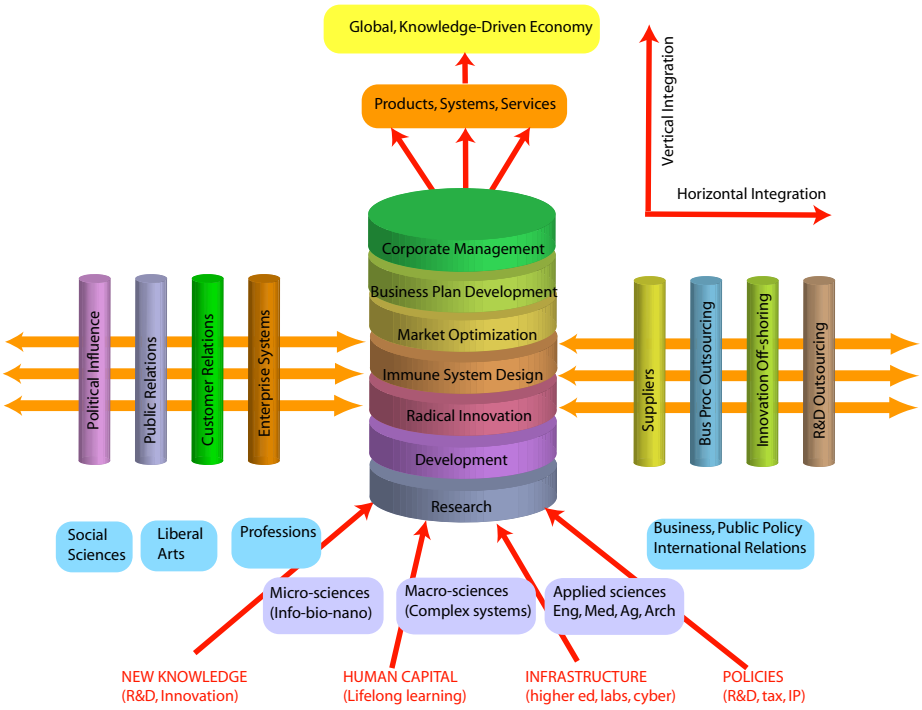
We have entered an era in which educated people, the knowledge they produce, and the innovation and entrepreneurial skills they possess have become the keys to economic prosperity, public health, national security, and social well being. To provide our citizens with the knowledge and skills to compete on the global level, the nation must broaden access to world-class educational opportunities at all levels: K-12, higher education, workplace training, and lifelong learning. It must also build and sustain world-class universities capable of conducting cutting-edge research and innovation; producing outstanding scientists, engineers, physicians, teachers, and other knowledge professionals; and building the advanced learning and research infrastructure necessary for the nation to sustain its leadership in the century ahead. Yet the traditional institutions responsible for education and research–schools, colleges, universities, research institutes–are being challenged by the powerful forces characterizing the global economy: hypercompetitive markets, demographic change, increasing ethnic and cultural diversity, rapidly evolving technologies such as computers and networking, and the growing concern about the sustainability of humankind on Planet Earth in the face of its increasingly disruptive activities.

Brave, New World

The Knowledge Economy

More specifically, today we are evolving rapidly into a post-industrial, knowledge-based society as our economies are steadily shifting from material- and labor-intensive products and processes to knowledge-intensive products and services. A radically new system for creating wealth has evolved that depends upon the creation and application of new knowledge. Economists estimate that 40 to 60 percent of economic growth each year is due to research and development activity, particularly in American universities. Another 20 percent of the increased resources each year are based upon the rising skill levels of our population. In other words, 60 to 80 percent is really dependent upon higher education in terms of research and development and skills of the labor force (Augustine, 2005).

Nations are investing heavily and restructuring their economies to create high-skill, high-pay jobs in



The way the knowledge economy works.

knowledge-intensive areas such as new technologies, financial services, trade, and professional and technical services. From Paris to San Diego, Bangalore to Shanghai, there is a growing recognition throughout the world that economic prosperity and social well being in a global knowledge-driven economy requires public investment in knowledge resources. That is, regions must create and sustain a highly educated and innovative workforce and the capacity to generate and apply new knowledge, supported through policies and investments in developing human capital, technological innovation, and entrepreneurial skill. Nations both large and small, from Finland to China, are reaping the benefits of such investments aimed at stimulating and exploiting technological innovation, creating serious competitive challenges to American industry and business both in the conventional marketplace (e.g., automobiles) and through new paradigms such as the off-shoring of knowledge-intensive services (e.g. software development).

Education is becoming a powerful political force. Just as the space race of the 1960s stimulated major investments in research and education, there are early signs that the *skills race* of the 21st Century may soon be recognized as the dominant domestic policy issue facing our nation. But there is an important difference here. The space race galvanized public concern and concentrated national attention on educating "the best and brightest," the academically elite of our society. The skills race of the 21st Century will value instead the skills and knowledge of our entire workforce as a key to economic prosperity, national security, and social well-being.

Globalization

Our economies, companies, and social institutions have become international, spanning the globe and interdependent with other nations and other peoples. Markets characterized by the instantaneous flows of knowledge, capital, and work unleashed by lowering trade barriers are creating global enterprises based upon business paradigms such as out-sourcing and off-shoring, a shift from public to private equity investment, and declining identification with or loyalty to national or regional interests. Market pressures increasingly trump public policy and hence the influence of national governments. As the recent report of the National Intelligence Council's 2020 Project has concluded, "The very magnitude and speed of change

Globalization will define our 21st century society.

resulting from a globalizing world–apart from its precise character–will be a defining feature of the world out to 2020. Globalization–growing interconnectedness reflected in the expanded flows of information, technology, capital, goods, services, and people throughout the world will become an overarching mega-trend, a force so ubiquitous that it will substantially shape all other major trends in the world of 2020." (National Intelligence Council, 2005)

As Tom Friedman stresses in his provocative book, *The World is Flat*, "The playing field is being leveled. Some three billion people who were out of the game have walked and often have run onto a level playing field, from China, India, Russia, and Central Europe, from nations with rich educational heritages. The flattening of the world is moving ahead apace, and nothing is going to stop it. What can happen is a decline in our standard of living if more Americans are not empowered and educated to participate in a world where all the knowledge centers are being connected. We have within our society all the ingredients for American individuals to thrive in such a world, but if we squander these ingredients, we will stagnate." (Friedman, 2005).

Yet, globalization implies a far deeper interconnectedness with the world–economically, politically, and culturally–that goes far beyond simply the international exchange of students, faculty, and ideas and the development of international partnerships among institutions. It requires thoughtful, globally identified, and interdependent citizens. And it requires the mastery of the powerful new communications technologies that are transforming modes of learning, collaboration and expression. The same forces of globalization that challenge our regional economies and cultures will also challenge our educational institutions–and particularly our universities.

Demographics

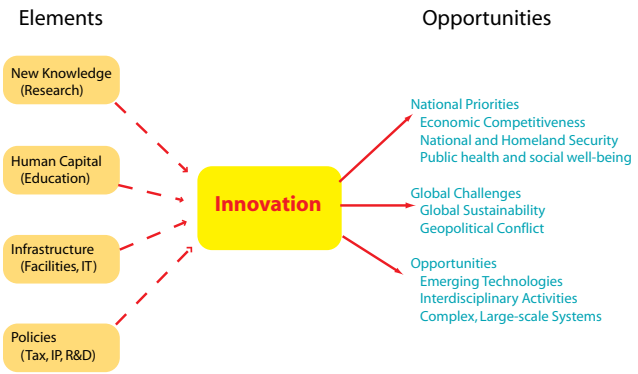
Aging populations, out-migration, and shrinking workforces are seriously challenging the productivity of developed economies throughout Europe and Asia. Yet here the United States stands apart because of another important demographic trend: immigration.

As it has been so many times in its past, America is once again becoming a highly diverse nation of immigrants, benefiting immensely from their energy, talents, and hope. In fact, over the past decade, immigration from Latin America and Asia contributed 53% of the growth in the United States population (Frey, 2010). Immigration is expected to drive continued growth in the U.S. population from 300 million today to over 450 million by 2050, augmenting our aging population and stimulating productivity with new and young workers. Such population mobility is also rapidly changing the ethnic character of our nation.

Yet even without immigration the minority population in the United States will continue to grow for decades to come, rising to 42% by 2050. Minorities now comprise 40% of the Millennial generation of students now entering our colleges (Brownstein, 2010). By any measure, we are evolving rapidly into a truly multicultural society with a remarkable cultural, racial, and ethnic diversity. This demographic revolution is taking place within the context of the continuing globalization of the world's economy and society that requires Americans to interact with people from every country of the world.

The increasing diversity of the American population with respect to race, ethnicity, and national origin is one of our greatest strengths, since such diversity contributes to our capacity to innovate and relate to a highly diverse global economy. But here American higher education faces a serious challenge, since the minorities comprising the most rapidly growing components of our population have traditionally had the lowest levels of college attainment. For example, the percentage

ORNL XTR Jaguar supercomputer



The key resources necessary for innovation

attaining baccalaureate degrees for Blacks at 19% and Hispanics at 13% lags far behind those of Whites at 33% and Asians at 52%), a consequence of inadequate K-12 preparation, poverty, and discrimination (Chronicle, 2010). Our colleges and universities will not only have to dedicate a much greater effort but also develop new paradigms capable of serving rapidly growing ethnic minorities still burdened with inadequate K-12 preparation, impoverished backgrounds, and discrimination.

Technological Change

The new technologies driving such profound changes in our world–technologies such as information technology, biotechnology, and nanotechnology–are characterized by exponential growth. For example, the information and communications technologies enabling the global knowledge economy–so-called cyberinfrastructure (the current term used to describe hardware, software, people, organizations, and policies)–double in power for a given cost every year or so, amounting to a staggering increase in capacity of 100 to 1,000 fold every decade (i.e., Moore's Law). Beyond acknowledging the extraordinary and unrelenting pace of such exponentially evolving technologies, it is equally important to recognize that they are disruptive in nature. Their impact on social institutions such as corporations, governments, and learning institutions is profound, rapid, and quite unpredictable. As Clayton Christensen explains in *The Innovator's Dilemma*, while many of these new technologies are at first inadequate to displace today's technology in existing applications, they later explosively displace the application as they enable a new way of satisfying the underlying need (Christensen, 1997). If change is gradual, there will be time to adapt gracefully, but that is not the history of disruptive technologies. Hence organizations (including governments) must work to anticipate these forces, develop appropriate strategies, and make adequate investments if they are to prosper–indeed, survive–such a period. Procrastination and inaction (not to mention ignorance and denial) are the most dangerous courses of all during a time of rapid technological change.

Innovation

In its National Innovation Initiative, the Council on Competitiveness, a group of business and university leaders, highlight innovation as the single most important factor in determining America's success throughout the 21st century. "American's challenge is to unleash its innovation capacity to drive productivity, standard of living, and leadership in global markets. At a time when macro-economic forces and financial constraints make innovation-driven growth a more urgent imperative than ever before, American businesses, government, workers, and universities face an unprecedented acceleration of global change, relentless pressure for short-term results, and fierce competition from countries that seek an innovation-driven future for themselves. For the past 25 years we have optimized our organizations for efficiency and quality. Over the next quarter century, we must optimize our entire society for innovation" (Council on Competitiveness, 2005).

Of course innovation is more than simply new technologies. It involves how business processes are integrated and managed, how services are delivered, how public policies are formulated, and how markets and

Increasing signs of global climate change.

more broadly society benefit (Lynn, 2007). However it is also the case that in a global, knowledge-driven economy, technological innovation–the transformation of new knowledge into products, processes, and services of value to society–is critical to competitiveness, long-term productivity growth, and an improved quality of life.

Global Sustainability

While history has always been characterized by periods of both change and stability–war and peace, intellectual progress and decadence, economic prosperity and contraction–today both the pace and magnitude of such changes have intensified, driven by the powerful forces of globalization, changing demographics, rapidly evolving technologies, and the expanded flows of information, technology, capital, goods, services, and people throughout the world. Modern economies are pushing the human exploitation of the Earth's environment to the limits; the military capacity of the great powers could destroy the world population many times over, business corporations have become so large that they can influence national policies, the financial sector has become so complex and unstable that it has the capacity to trigger global economic catastrophes in an instant, and corrupted regimes leading to failed states continue to appear in all parts of the world. Indeed, many believe that the impact of human activities, ever more intense, more globally distributed, and more interconnected than ever, today threaten the very sustainability of humankind on Earth, at least in terms that we currently understand and enjoy.

The world's universities have been actively involved for many years in addressing many of the important issues associated with global sustainability. The "green revolution" resulting from university programs in agricultural science lifted a substantial portion of the world's population from the ravages of extreme poverty. University scientists were the first to alert the world to the impact of human activities on the environment and climate, e.g., the impact of CFCs on atmospheric ozone depletion; the destruction of forests, wetlands, and other natural habitats by human activities leading to the extinction of millions of biological species and the loss of biodiversity; and the buildup of greenhouse gases such as carbon dioxide and their impact on global climate. Universities are also key to developing the academic programs and culture to produce a new generation of thoughtful, interdependent, and globally identified citizens. As these institutions evolve rapidly to accept their global responsibilities, becoming increasingly universities not only "in" the world, in the sense of operating in a global marketplace of people and ideas, but "of" the world, they must accept the challenge of extending their public purpose to addressing global concerns.

The Implications for Higher Education

The Educational Needs of 21st-Century Citizens

Historically, people have always looked to education as the key to prosperity and social mobility. Education in America has been particularly responsive to the changing needs of society during major periods of social transformation, e.g., the transition from a frontier to an agrarian society, then to an industrial society, through the Cold War tensions, and to today's global, knowledge-driven economy. Our schools, colleges, and universities evolved from the educational paradigms of the 18th century serving only the elite, to the public institutions of the 19th century serving the working class, and then once again to knowledge-intensive institutions of the 20th century such as the research university, critical to the economic prosperity, public health, and security of the nation. As our society changed, so too did the necessary skills and knowledge of our citizens: from growing to making, from making to serving, from serving to creating, and today from creating to inno-

The Millennial generation

vating. With each social transformation, an increasingly sophisticated world required a higher level of cognitive ability, from manual skills to knowledge management, analysis to synthesis, reductionism to the integration of knowledge, invention to research, and today innovation, and entrepreneurship.

Now more than ever, people see education as their hope for leading meaningful and fulfilling lives. The level of one's education has become a primary determinant of one's personal economic security. Just as a high school diploma became the passport to participation in the industrial age, today, a century later, a college education has become the requirement for economic security in the age of knowledge. In fact, the recent White House Task Force on the Middle Class concludes, "the most effective means of helping American families secure economic stability is increasing access and affordability to higher education" (Biden, 2010).

Learning in the Digital Age

Today's students are citizens of the digital age. They have spent their early lives surrounded by robust, visual, interactive media—not the passive broadcast media, radio and television of our youth, but rather Wii's, iPhones, Facebook, and virtual reality. They are "digital natives", comfortable learning, working, and living in the digital world, unlike those of us who are "digital immigrants" who are struggling to keep pace with digital technologies (Pensky, 2001). This is not an easy task for educators, who for the most part remain reluctant to embrace the new technologies in their teaching and hence are increasingly detached from today's students (Gura and Percy, 2005).

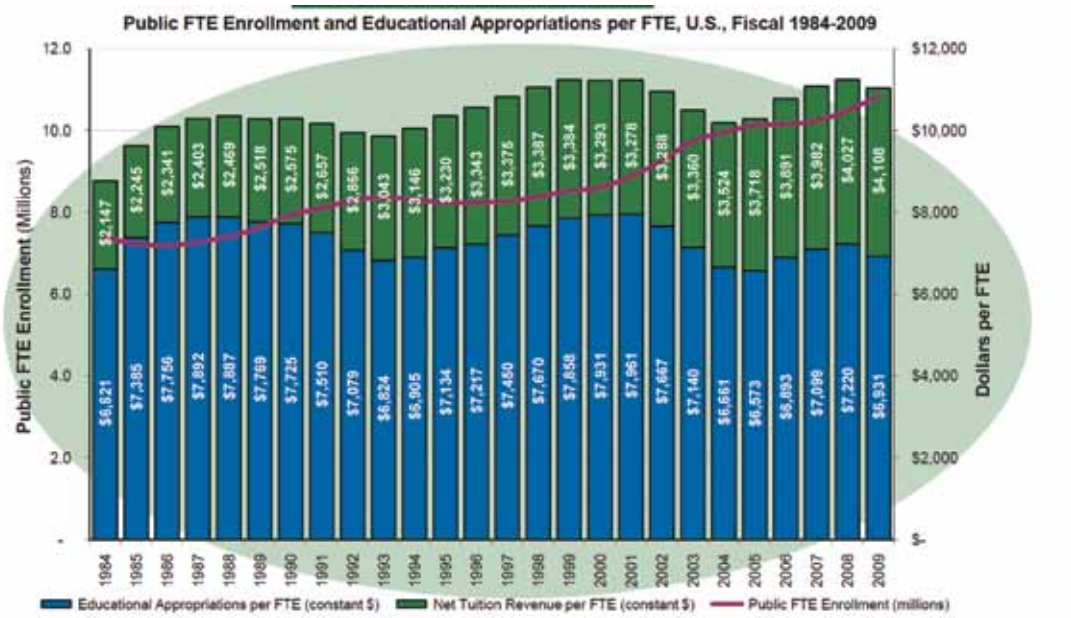
Today's students are no longer the people our current educational system was designed to teach. Rather they learn by experimentation and participation, not by listening or reading passively. They are indeed the "plug and play" generation. They embrace interactivity and demand the right to shape and participate in their learning. They are constantly interacting with one another through social networking (e.g., instant messaging, Facebook, Twitter). They are comfortable with the uncertainty that characterizes their change-driven world. These students will increasingly demand new learning paradigms more suited to their learning styles and more appropriate to prepare them for a lifetime of learning and change.

Strained Budgets

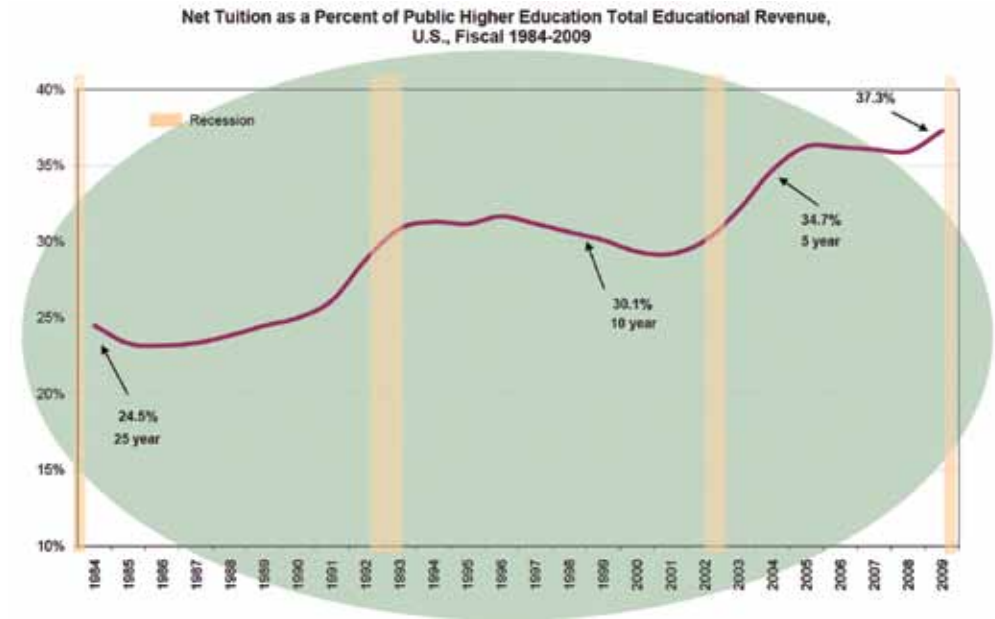
Foremost on the minds of most university leaders these days are the financial challenges associated with the Great Recession of recent years. Public universities have been hit with devastating cuts in appropriations as the states struggle to cope with crushing budget deficits. As the global recession has deepened, state after state began to project tax revenue declines and warn their public universities of deep budget cuts in the range up to 20% to 30%. This retrenchment is on top of two decades of eroding tax support of public universities as the states have struggled with the shifting priorities of aging populations.

Private higher education has also been hit hard by the recession, with major losses in endowments (up to 30% for Harvard, Yale, and other elite universities pursuing particularly high-risk endowment strategies based on high return but ill-liquid assets) and the erosion of private giving. Although the wealthiest institutions will bounce back, most private institutions will become even more dependent on the revenue from tuition and fees that are already pushing against the market ceiling.

Of course, the optimist might suggest that this is just part of the ebb and flow of economic cycles. In bad times, state governments and donors cut support, only to restore it once again in good times. But this time it may



The shift from state support of higher education (as shown by the erosion above, SHEEO, 2009))



to rising tuition in public universities demonstrates the shift from public good to individual benefit.

be different. As one state budget officer noted: "College leaders are fooling themselves if they think the end of this recession will be like all the others. What we're seeing is a systematic, careless withdrawal of concern and support for advanced education in this country at exactly the wrong time." As a nation which once viewed education as critical to national security and economic prosperity, we seem more concerned with sustaining the social benefits (and tax policies) demanded by an aging baby boomer population, a situation unlikely to change for several decades.

This reality is particularly important for the leaders of America's public universities. Today in the face of limited resources and more pressing social priorities, the century-long expansion of public support of higher education has slowed. While the needs of our society for advanced education can only intensify as we evolve into a knowledge-driven world culture, it is not evident that these needs will be met by further growth of our existing system of public universities. We now have at

least two decades of experience that would suggest that the states are simply not able—or willing—to provide the resources to sustain growth in public higher education, at least at the rate experienced in the decades following World War II. In many parts of the nation, states will be hard pressed to even sustain the present capacity and quality of their institutions.

Markets

These economic, geopolitical, demographic, and technological pressures are stimulating powerful market forces that are likely to drive a massive restructuring of the higher education enterprise, similar to that experienced by other economic sectors such as banking, transportation, communications, and energy. We are moving toward a revenue-driven, market-responsive higher education system because there is no way that our current tax system can support the degree of universal access to postsecondary education required by knowledge-driven economies in the face of other compelling social priorities (particularly the needs of the aging). This is amplified by an accelerating influence of the market on higher education and a growing willingness on the part of political leaders to use market forces as a means of restructuring higher education in order to increase the impact of the competition. Put another way, market forces are rapidly overwhelming public policy and public investment in determining the future course of higher education.

Yet the increasing dominance of market forces over public policy raises two important challenges. Whether a deliberate or involuntary response to the tightening fiscal constraints and changing priorities for public funds, the long standing recognition that higher education is a public good, benefiting all of our society, is eroding. Both the American public and its elected leaders increasingly view higher education as a private benefit that should be paid for by those who benefit most directly, namely the students. Without the constraints of public policy, earned and empowered by public investments, market forces could so dominate and reshape the higher education enterprise that many of the most important values and traditions of the university could fall by the wayside, including its public purpose.

A New Social Contract

As *The Economist* notes, the rise of the knowledge economy has driven the democratization of education, as an increasing fraction of the workforce will need to have access to postsecondary education (*The Economist*, 2005). As knowledge has replaced physical resources as the driver of economic growth, schools, colleges, and universities have become the most important engines of the knowledge economy. This is happening throughout the world, not only in developed nations in North America, Europe, and Asia, but in all regions–developed, developing, and underdeveloped–aspiring to prosperity and security in an intensely competitive global, knowledge-driven economy. And here, market competition extends far beyond traditional business and trade to include knowledge resources such as human capital, R&D, and innovation, all both key products and assets of learning institutions.

But this raises an important challenge to balance the twin demands of mass access, necessary for a competitive workforce, and world-class quality, necessary to provide the new knowledge and innovation essential for a knowledge economy. As *The Economist* notes, "We already possess a successful model of how to organize higher education: America's. That country not only has almost a monopoly on the world's best universities, but also provides access to higher education for the bulk of those who deserve it." State and federal governments play a more limited role in American higher education since almost two-thirds of the support for our colleges and universities comes from the private sector, e.g., tuition and philanthropy, rather than federal or state government. This creates a highly market-driven and diverse array of colleges and universities, evolving and adapting to serve the ever-changing and diverse needs of American society. To conclude, *The Economist* stresses: "There is no shortage of things to marvel at in America's higher education system, from its robustness in the face of external shocks to its overall excellence. However what particularly stands out is the system's flexibility and its sheer diversity."

Key in the achievements of both excellence and access in American higher education has been the public university, which today educates 80% of all college students in this country while conducting 70% of its

research. With an expanding population, a prosperous economy, and compelling needs such as national security and industrial competitiveness, the public was willing to make massive investments in higher education during the 20th century. While elite private universities have been important in setting the standards and character of higher education in America, it has been the public university that provided the capacity and diversity to meet our nation's vast needs for postsecondary education.

Today, however, in the face of limited resources and more pressing social priorities, this expansion of public support of higher education has slowed. While the needs of our society for advanced education will only intensify as we evolve into a knowledge-driven world culture, it is not evident that these needs will be met by further expansion of our existing system of public universities. The terms of the social contract that led to these institutions are changing rapidly. The principle of general tax support for public higher education as a public good and the partnership between the federal government and the universities for the conduct of basic research are both at risk, a consequence of the increasingly limited tax resources and the declining priority given higher education in the face of other social needs. (Zemsky, 2005; Newman, 2004)

Today, even as the need of our society for postsecondary education intensifies, we also find erosion in the perception of education as a public good deserving of strong societal support. States have joined the federal government by shifting priorities away from investment in the higher-education enterprise (appropriations to institutions) to investment in the marketplace for higher-education services (loans or tax benefits to students and parents). Whether a deliberate or involuntary response to the tightening constraints and changing priorities for public funds, the new message is that education has become a private good paid for by the individuals benefiting most directly–the students. This shift from the perception of higher education as a public good to an individual benefit has another implication. To the degree that higher education was a public good, benefiting all (through sustaining democratic values, providing public services), one could justify its support through taxation of the entire population. But viewed as an individual benefit, public higher education can become a highly regressive social enterprise since, in essence, the poor subsidize the education of the rich, largely at the expense of their own opportunities.

Even more fundamentally, as we enter the new millennium, there is an increasing sense that the social contract between educators and American society may need to be reconsidered and perhaps even renegotiated once again. In an age of knowledge, it has become the responsibility of democratic societies to provide their citizens with the education and training they need, throughout their lives, whenever, wherever, and however they desire it, at high quality and at an affordable cost.

The Questions before Us

Yet many questions remain unanswered. Who will be the learners served by these institutions? Who will teach them? Who will administer and govern these institutions? Who will pay for them? What will be the character of our universities? How will they function? When will they appear?

Perhaps the most profound question of all concerns the survival of the university in the face of the changes brought on by the emergence of new competitors. That is the question raised by Drucker and other futurists (Drucker, 1994). Could an institution such as the university, which has existed for a millennium, disappear in the face of such changes? As William Wulf suggests, if you have doubts, check on the state of the family farm, a social institution existing for centuries that has largely disappeared over the past three decades in our country.

Most of us, of course, believe quite strongly that the university as a social institution is simply too valuable to disappear. On the other hand, there may well be forms of the university that we would have great difficulty in recognizing from our present perspective.

Rather than debating the survival of the university, it seems more constructive to suggest a somewhat different set of questions in an effort to frame the key policy issues facing higher education:

1. How do we respond to the diverse educational needs of a knowledge-driven society? Here we must realize that while the educational needs of the young will

continue to be a priority, we will be challenged to also address the sophisticated learning needs of adults in the workplace while providing broader lifetime learning opportunities for all of our society.

2. Is higher education a public or a private good? To be sure, the benefits of the university clearly flow to society as a whole. But it is also the case that two generations of public policy have stressed instead the benefits of education to the individual student. The issues of access and diversity have largely disappeared from the broader debate about the purpose of the university.

3. How do we balance the roles of market forces and public purpose in determining the future of higher education in America? Can we control market forces through public policy and public investment so that the most valuable traditions and values of the university are preserved? Or will the competitive and commercial pressures of the marketplace sweep over our institutions, leaving behind a higher education enterprise characterized by mediocrity?

4. What should be the role of the research university within the broader context of the changes likely to occur in the higher education enterprise? Should it be a leader in change? Or should it simply strive to protect the important traditions and values of the academy during this time of change?

These are some of the issues that should frame the debate about the future of higher education in America. As social institutions, universities reflect the values, needs, and character of the society they serve. These issues of access and opportunity, equality and justice, private economic benefits and public purpose, freedom and accountability, all are part of a broader public debate about the future of our nation. They provide the context for any consideration of the future of the university in America.

Chapter 5

The University of Tomorrow

As we look even further into an unknowable future, the possibilities and uncertainties become even more challenging. Attempting to predict the future is always a hazardous activity. We generally overestimate change in the near term and underestimate it for the longer term, in part because we usually tend to extrapolate what we know today into a future that becomes increasingly beyond our imagination. It is very difficult to peer over the horizon. But there are some trends apparent today that will almost certainly influence the longer term that already raise many questions.

How will wealth be created and value added in this global, knowledge-driven economy? Will increasingly robust communications technologies (always on, always in contact, high-fidelity interaction at a distance) stimulate the evolution of new types of communities (e.g., self-organization, spontaneous emergence, collective intelligence, "hives")? Suppose info-bio-nano technologies continue to evolve at the current rate of 1,000 fold per decade. Can we really prepare today's kids for the world of several decades from now when technologies such as neural implants, AI agents ("mind children), and such may actually exist? During the 20th century, the life expectancy in developed nations essentially doubled (from 40 to 80 years). Suppose it doubles again in the 21st century?

More generally, it is clear that as the pace of change continues to accelerate, learning organizations and innovation systems will need to become highly adaptive if they are to survive. Here, we might best think of future learning and innovation environments as ecologies that not only adapt but also mutate and evolve to serve an ever-changing world.

Such future challenges call for bold initiatives. It is not enough to simply build upon the status quo. Instead, it is important that we consider more expansive visions that allow for truly over-the-horizon challenges and opportunities, *game changers* that dramatically change the environment in which our institutions must function. To this end, we conclude this roadmapping exercise both with some speculation about things that might happen–both near term with reasonable certainty and longer term with considerable uncertainty–as well as a series of bolder proposals that would act as *paradigm shifts* in the very nature of the university.

Game-Changers

Restructuring of the Higher Education Enterprise

Universities serve as the gatekeepers not only for the definition of the academic disciplines and membership in the academy, but as well controlling entry to the professions that so dominate contemporary society. While there has been competition among institutions for students, faculty, and resources—at least in the United States—the extent to which institutions control the awarding of degrees has led to a tightly controlled competitive market. Furthermore, most colleges and universities serve primarily local or regional areas, where they have particularly strong market positions. As with most monopoly organizations, today's university is provider-centered, essentially functioning to serve the needs and desires of the faculty rather than the students they teach or the broader society that supports them.

Today this monopoly character is being strongly challenged, however. No university can control the growth of knowledge or the educational needs of a society. Information technology is rapidly eliminating the barriers of space and time that have largely shielded campus activities from competition. As the need for

advanced education becomes more intense, there are already signs that some institutions are responding to market forces and moving far beyond their traditional geographical areas to compete for students and resources. There are hundreds of colleges and universities that increasingly view themselves as competing in a national or even international marketplace. Even within regions such as local communities, colleges and universities that used to enjoy a geographical monopoly now find that other institutions are establishing beachheads through extension services, distance learning, or even branch campuses. With advances in communication, transportation, and global commerce, several universities in the United States and abroad increasingly view themselves as international institutions, competing in the global marketplace.

Beyond competition among colleges and universities, there are new educational providers entering the marketplace. Sophisticated for-profit entities such as the Apollo Group (i.e., University of Phoenix) and Laureate are moving into markets throughout the United States, Europe, and Asia. Already hundreds of Internet-based institutions are listed in college directories with over two million students enrolled in their programs, including major efforts such as the Western Governors University. It has been estimated that today there are over one thousand corporate training schools in the United States providing both education and training to employees at the college level. Industry currently spends over $200 billion per year on corporate training. And, of course, the OpenCourseWare movement and resources such as iTunes U are providing free access to Internet-based courses to millions around the world.

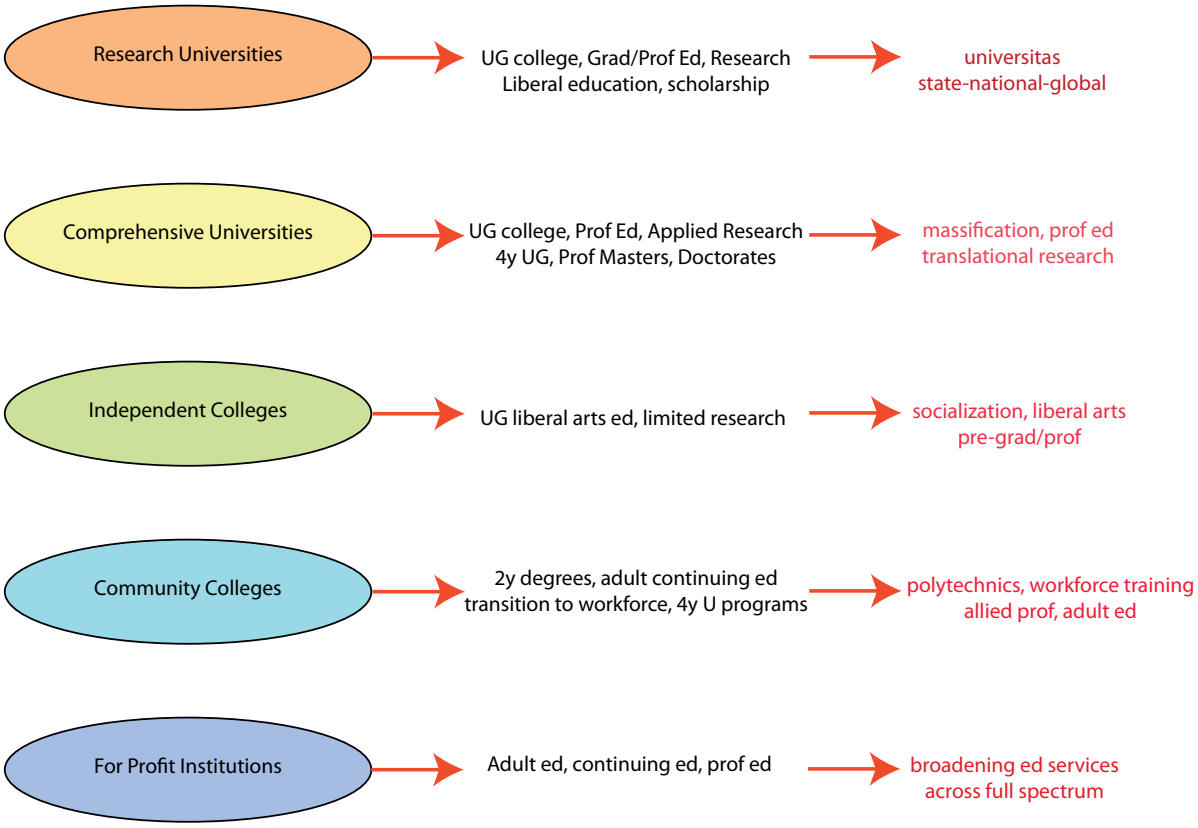
Although traditional colleges and universities enjoy competitive advantages based upon long-standing reputations and control of accreditation and credentialing, these could be eroded quite rapidly by the vast resources from capital markets that the industrial sector is capable of focusing on these efforts. Furthermore, the higher comfort level of industry with technology, intensely competitive marketplaces, strategic alliances, and rapid decision making could prove to be decisive advantages. Finally, with access to the vast resources of capital markets and unhindered by other social commitments or public governance, for-profit providers could cherry pick the best faculty and most attractive products (learning software, courses, or programs) from traditional educational institutions. The competitive threat is very real.

The faculty has long been accustomed to dictating what it wishes to teach, how it will teach it, and where and when the learning will occur. Students must travel to the campus to learn. They must work their way through the bureaucracy of university admissions, counseling, scheduling, and residential living. And they must pay for the privilege, with little of the power of traditional consumers. If they navigate through the maze of requirements, they are finally awarded a certificate to recognize their experience—a college degree. This process is sustained by accrediting associations, professional societies, and state and federal governments.

This carefully regulated and controlled enterprise could be eroded by several factors. First, the great demand for advanced education and training cannot be met by such a carefully rationed and controlled enterprise. Second, the expanding marketplace will attract new competitors, exploiting new learning paradigms, and increasingly threatening traditional providers. And perhaps most important of all, newly emerging information technology has not only eliminated the constraints of space and time, but it is also transforming students into learners and consumers. Open education resources are providing learners with choice in the marketplace—access to learning opportunities, knowledge-rich networks and digital libraries, collections of scholars and expert consultants, and other mechanisms for the delivery of learning.

The evolution from faculty-centered and -controlled teaching and credentialing institutions to distributed, open learning environments is already happening. The new learning services are increasingly available among many providers, learning agents, and intermediary organizations. Such an open, network-based learning enterprise certainly seems more capable of responding to the staggering demand for advanced education, learning, and knowledge. It also seems certain not only to provide learners with far more choices but also to create far more competition for the provision of knowledge and learning services.

As a result, higher education is likely to evolve from a loosely federated system of colleges and universities



Evolution of current institutional forms

serving traditional students from local communities to, in effect, a *global knowledge and learning industry*. With the emergence of new competitive forces and the weakening influence of traditional regulations, education is evolving like other "deregulated" industries, for example, health care, or communications, or energy. Yet, in contrast to these other industries that have been restructured as government regulation has disappeared, the global knowledge industry will be unleashed by emerging information technology as it releases education from the constraints of space, time, and the credentialing monopoly. And, as our society becomes ever more dependent upon new knowledge and educated people, upon knowledge workers, this global knowledge business will represent one of the most active growth industries of our times.[3]

Many in the academy undoubtedly view with derision or alarm the depiction of the higher education enterprise as an "industry" or "business." After all, higher education is a social institution with broader civic purpose and not traditionally driven by concerns about workforce training and economic development. Furthermore, the perspective of higher education as an industry raises concerns that short-term economic and political demands will dominate broader societal responsibilities and investment. Yet, in an age of knowledge, the ability of the university to respond to social, economic, and technological change will likely require a new paradigm for how we think about postsecondary education. No one, no government, is in control of the emerging knowledge and learning industry; instead it responds to forces in the marketplace. Universities will have to learn to cope with the competitive pressures of this marketplace while preserving the most important of their traditional values and character.

Lifelong Learning

The needs for lifelong learning opportunities in a knowledge society are manifold. The shelf life of education early in one's life, whether K-12 or higher education, is shrinking rapidly in face of the explosion of

knowledge in many fields. Today's students and tomorrow's graduates are likely to value access to lifelong learning opportunities more highly than job security, which will be elusive in any event. They understand that in the turbulent world of a knowledge economy, characterized by outsourcing and off-shoring to a global workforce, employees are only one paycheck away from the unemployment line unless they commit to continuous learning and re-skilling to adapt to every changing work requirements. Furthermore, longer life expectancies and lengthening working careers create additional needs to refresh one's knowledge and skills from time to time. And, just as students increasingly understand that in a knowledge economy there is no wiser personal investment than education, many nations now accept that the development of their human capital through education must become a higher priority than other social priorities, since this is the only sure path toward prosperity, security, and social well-being in a global knowledge economy.

Just as in earlier critical moments in our nation's history when federal initiatives expanded the role of education, e.g. the Land Grant Acts in the 19th century to provide higher education to the working class, universal access to secondary education in the early 20th century, and the G. I. Bill enabling the college education of the returning veterans of World War II, today a major expansion of educational opportunity could have extraordinary impact on the future of the nation. It is time for the United States to take bold action, completing in a sense the series of these earlier federal education initiatives, by providing all American citizens with *universal access to lifelong learning opportunities*, thereby enabling participation in the world's most advanced knowledge society.

Of course, establishing as a national goal the universal access to lifelong learning would require not only a very considerable transformation and expansion of the existing postsecondary education enterprise, but it would also require entirely new paradigms for the conduct, organization, financing, leadership, and governance of higher education in America. For example, most of today's colleges and universities are primarily designed to serve the young–either as recent high school graduates or young adults early in their careers. Yet achieving the objective of universal access to lifelong learning would expand enormously the population of adult learners of all ages. Traditional university characteristics such as residential campuses designed primarily to socialize the young with resources such as residence halls, student unions, recreational facilities, and varsity athletics would have marginal value to adult learners with career and family priorities. Such universal lifelong learning could change dramatically the higher education marketplace, providing for-profit institutions already experienced in adult education with significant advantages. Furthermore it seems likely that the only way that such ubiquitous access can be provided to lifelong learning to adults with career and family responsibilities will be through technology-mediated distance learning.

Globalization

There is a strong sense that higher education, long international in participation, may now be in the early stages of globalization, through the efforts of an increasing number of established universities to compete in the global marketplace for students, faculty, and resources; through the rapid growth in international partnerships among universities; and through for-profit organizations (e.g., Apollo, Laureate) that seek to expand through acquisition into global enterprises. New types of universities may appear that increasingly define their purpose beyond regional or national priorities to address global needs such as health, environmental sustainability, and international development.

As a new world culture forms, a number of universities will evolve into learning institutions serving the world, albeit within the context of a particular geographical area (e.g., North America). Many of our leading universities have evolved over time from regional or state universities to, in effect, national universities. Because of their service role in areas such as agriculture and economic development, some universities have gone even beyond this to develop a decidedly international character. Furthermore, the American research university dominates much of the world's scholarship and research, currently enrolling over 450,000 international students and attracting faculty from throughout the world. In view of this global character, some of our institutions may evolve into a new paradigm, the world

Higher education is evolving rapidly around the world.

university.

While universities must be responsive to the imperatives of a global economy and attendant to their local responsibilities, they must also become responsible members of the global community. Many of challenges facing our world such as poverty, health, conflict, and sustainability continue to become more serious through the impact of the human species–global climate change being foremost among them. The global knowledge economy requires thoughtful, interdependent and globally identified citizens. Institutional and pedagogical innovations are needed to confront these challenges and insure that the canonical activities of universities – research, teaching and engagement – remain rich, relevant and accessible.

Cyberinfrastructure

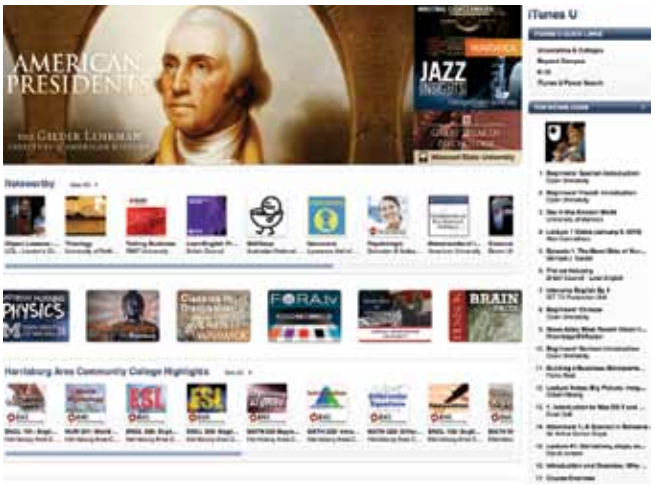
The information and communications technologies enabling the global knowledge economy–so-called *cyberinfrastructure*, the current term used in the United States to describe ICT hardware, software, people, organizations, and policies (Europe calls this e-science)–evolve exponentially, doubling in power every year or so and amounting to a staggering increase in capacity of 100 to 1,000 fold every decade. (Atkins, 2003) It is becoming increasingly clear that we are approaching an inflection point in the potential of these technologies to radically transform knowledge work. To quote Arden Bement, Director of the U.S. National Science Foundation, "We are entering a second revolution in information technology, one that may well usher in a new technological age that will dwarf, in sheer transformational scope and power, anything we have yet experienced in the current information age" (Bement, 2007). Many leaders, both inside and beyond the academy, believe that these forces of change will so transform our educational institutions–schools, colleges, universities, learning networks–over the next generation as to make them unrecognizable within our current understandings and perspectives.

Consider, for example, the changing nature of communication. When we think of digitally mediated human interactions, we generally think of the awkwardness of e-mail or televideo conferences. But as William Wulf suggests, "Don't think about today's teleconference technology, but one whose fidelity is photographic and 3-D. Don't think about the awkward way we access information on the network, but about a system in which the entire world's library is as accessible as a cell-phone." It is only a matter of a decade or so before exponentially evolving information and communications technology will allow human interaction with essentially any degree of fidelity we wish, perhaps even totally immersive in all of our senses as in the "simstim" (simulated stimulus) technologies envisioned by science fiction writers (Gibson, 1984).

To illustrate with an extreme example, if information technology continues to evolve at its present rate, by the year 2030, the thousand-dollar notebook computer will have a data processing speed and memory capacity roughly comparable to the human brain (Kurzweil, 1999). Furthermore, it will be so tiny as to be almost invisible, and it will communicate with billions of other computers through wireless technology.

For planning purposes, we can assume that by the end of the next decade we will have available infinite bandwidth and infinite processing power (at least compared to current capabilities). We will denominate the number of computer servers in the billions, digital sensors in the tens of billions, and software agents in the trillions. The number of people linked together by digital technology will grow from millions to billions. We

MIT's OpenCourseware Project



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will evolve from "e-commerce" and "e-government" and "e-learning" to "e-everything," since digital devices will increasingly become predominant interfaces not only with our environment but with other people, groups, and social institutions.

Open Educational Resources

Ironically, while we generally think in terms of this in terms such as terabit/sec networks and petaflop supercomputers, the most profound changes in our institutions may be driven not by the technology itself but rather the philosophy of openness and access it enables– indeed, imposes–on its users. Of particular importance are efforts to adopt the philosophy of open source software development to create new opportunities for learning and scholarship for the world by putting previously restricted knowledge into the public domain and inviting others to join in both its use and development. MIT led the way with its OpenCourseWare (OCW) initiative, placing the digital assets supporting almost 2,000 courses into the public domain on the Internet for the world to use (Vest, 2006). Today, over 1,000 universities have adopted the OCW paradigm to distribute their own learning assets to the world, with over 15,000 courses now available online. New resources such as Apple's iTunes U are providing access to such open educational resources, with over 300 million downloads over the past three years.

Furthermore, a number of universities and corporations have joined together to develop open-source middleware to support the instructional and scholarly activities of higher education, already used by hundreds of universities around the world (e.g. Moodle, 2007 and Sakai, 2007). Others have explored new paradigms for open learning and engagement, extending the more traditional yet highly successful models provided by open universities, such as Rice University's Connexion Project. There are increasing efforts to open up both data collection and scholarly publication by both individual institutions and university organizations, including the European University Association and the Association of American Universities. More recently major federal research agencies such as NIH and NSF have implemented new requirements that both the data and publications resulting from their research grants be placed in the public domain on a timely basis.

To this array of open educational resources should be added efforts to digitize massive quantities of printed material. For example, the Google Book project is currently working with a number of leading libraries (26 at last count in 35 languages) around the world to digitize a substantial portion of their holdings (15 million volumes in 2010, with a goal of 30 million by 2020), making these available for full-text searches using Google's powerful internet search engines. It has recently negotiated with publishers to provide full-text access (beyond full-text searches) to the vast volume of "orphan" works no longer in print.

A number of United States universities (26 thus far) have pooled their digital collections to create the Hathi Trust ("Hathi" means "elephant" in Hindi), adding

Google Books

Hathi Trust

over 400,000 books a month to form the nucleus (already at 8 million books) of what could become a 21st century analog to the ancient Library of Alexandria. While many copyright issues still need to be addressed, it is likely that these massive digitization efforts will be able to provide full text access to a significant fraction of the world's written materials to scholars and students throughout the world within a decade.

We should add into this array of ICT-based activities a few more elements: mobile communication, social computing, and immersive environments. We all know well the rapid propagation of mobile communications technology, with over 4 billion people today having cell-phone connectivity and 1.2 billion with broadband access. It is likely that within a decade the majority of the world's population will have some level of cell-phone connectivity, with many using advanced 3G and 4G technologies.

Preparing for Unknowable Futures

There are other possibilities that might be considered for the longer-term future. Balancing population growth in some parts of the world might be new pandemics, such as AIDS or an avian flu virus, that appear out of nowhere to ravage our species. The growing divide between rich and poor, the developed nations and the third world, the North and South hemispheres, could drive even more serious social unrest and terrorism, perhaps armed with even more terrifying weapons.

Then, too, the unrelenting–indeed, accelerating pace–of technology could benefit humankind, extending our lifespan and quality of life (although perhaps aggravating population growth in the process), meeting the world's needs for food and shelter and perhaps even energy, and enabling vastly new forms of communication, transportation, and social interaction. Perhaps we will rekindle our species' fundamental quest for exploration and expansion by resuming human spaceflight and eventually colonizing our solar system and beyond.

Sustained progress in the development of new technologies has been the central feature of the past century and is likely to be even more so in the century ahead. But technology will also present new challenges that almost seem taken from the pages of science fiction. Clearly if digital technology continues to evolve at its current pace for the next decade, creating machines a thousand, a million, a billion times more powerful that those which are so dominating our world today, then phenomena such as the emergence of machine consciousness and intelligence become very real possibilities during this century.

In fact some even suggest that we could encounter a "technological singularity," a point at which technology begins to accelerate so rapidly that we lose not only the ability to control but even to predict the future (Kurzweil, 2005). John von Neumann once speculated, "The ever accelerating progress of technology and changes in the mode of human life gives the appearance of approaching some essential singularity in the history

Perhaps Kubrick's "star child" in 2001 is our future.

of the race beyond which human affairs, as we know them, could not continue." For example, as digital technology continues to increase in power a thousand-fold each decade, at some point computers (or, more likely, large computer networks) might "awaken" with superhuman intelligence. Or biological science may provide the means to improve natural human intellect.

When greater-than-human intelligence drives technological evolution, that progress will accelerate rapidly, including possibly the creation of still more intelligent entities, on a still shorter timescale. To use Von Neumann's terminology, at such a technological "singularity", our old models must be discarded and a new reality appears, perhaps beyond our comprehension.

Clearly phenomena such as machine consciousness, contact by extraterrestrial intelligence, or cosmic extinction from a wandering asteroid are possibilities for our civilization, but just as clearly they should neither dominate our attention nor our near-term actions. We have the freedom to establish initial conditions, make things happen in ways that are less threatening than others. Indeed, the most effective way to prepare for such unanticipated events is to make certain that our descendants are equipped with education and skills of the highest possible quality.

Paradigm Shifts

The Common Denominators

Clearly, as knowledge and educated people become key to prosperity, security, and social well-being, the university, in all its myriad and rapidly changing forms, has become one of the most important social institutions of our times. Yet many questions remain unanswered. Who will be the learners served by these institutions? Who will teach them? Who will administer and govern these institutions? Who will pay for them? What will be the character of our universities? How will they function? When will they appear? The list goes on.

It is difficult to suggest a particular form for the university of the 21st Century. The ever-increasing diversity of American higher education makes it clear that many types of institutions will serve our society. Nonetheless, a number of themes will almost certainly characterize at least some part of the higher education enterprise:

- Universities will shift from faculty-centered to *learner-centered* institutions, joining other social institutions in the public and private sectors in the recognition that we must become more focused on those we serve.
- They will be more *affordable*, within the resources of all citizens, whether through low cost or societal subsidy.
- They will provide *lifelong learning*, requiring both a willingness to continue to learn on the part of our citizens and a commitment to provide opportunities for this lifelong learning by our institutions.
- All levels of education will be a part of a *seamless web*, as they become both interrelated and blended together.
- Universities will embrace *asynchronous learning*, breaking the constraints of time and space to make learning opportunities more compatible with lifestyles and needs, anyplace, anytime.
- We will continue to develop and practice *interactive and collaborative learning*, appropriate for the digital age, the "plug and play" generation.
- Universities will commit to *diversity* sufficient to serve an increasingly diverse population with diverse needs and goals.
- Universities will need to build learning environments that are both *adaptive and intelligent*, molding to the learning styles and needs of the students they serve.

There is one further modifier that may characterize the university of the future: *ubiquitous*. Today, knowledge has become the coin of the realm. It determines the wealth of nations. It has also become the key to

one's personal standard of living, the quality of one's life. We might well make the case that today it has become the responsibility of democratic societies to provide their citizens with the education and training they need throughout their lives, whenever, wherever, and however they desire it, at high quality, and at a cost they can afford.

Of course, this has been one of the great themes of higher education in America. Each evolutionary wave of higher education has aimed at educating a broader segment of society—the public universities, the land-grant universities, the normal and technical colleges, and the community colleges. But today we must do even more to serve an even broader segment of our society.

Learn Grant Universities

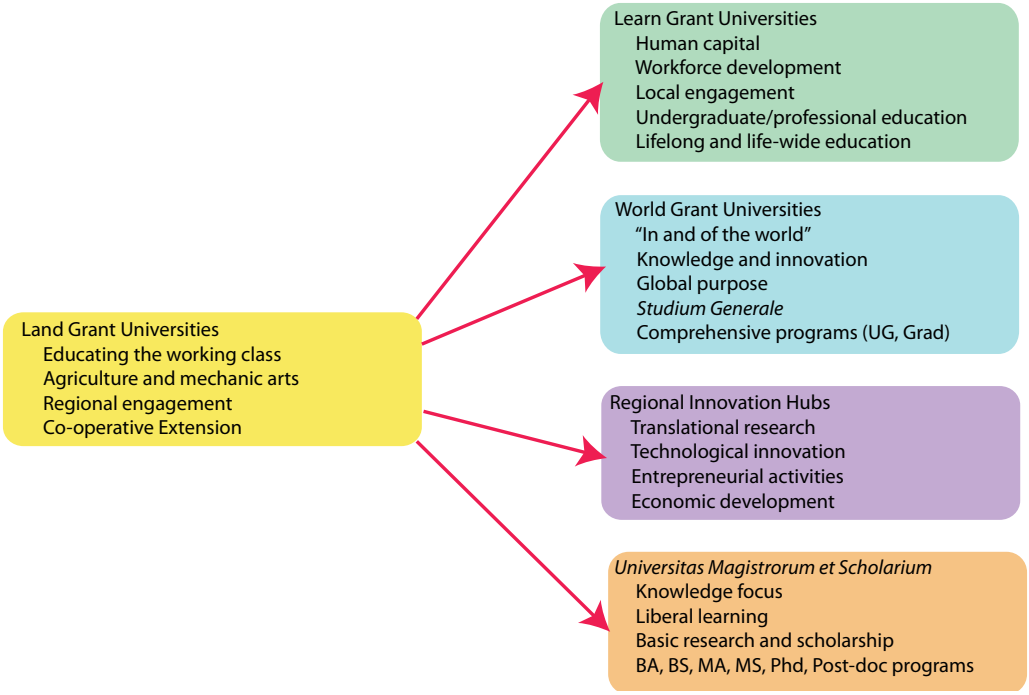
Perhaps we need new types of institutions that better address the importance of new knowledge and learning opportunities for a 21st century world. Of course our nation has done this before. The land-grant acts of the 19th and 20th centuries created new institutions focused on developing the vast natural resources of our nation to build a modern agricultural and industrial economy. Today, however, we have come to realize that our most important resources for the future will be our people, their knowledge, and their skills and innovation. At the dawn of the age of knowledge, it is clear that learning and innovation are replacing earlier assets such as natural resources, geographical location, or cheap labor as the key to economic prosperity and national security. Perhaps a new social contract based on developing and maintaining the abilities and talents of our people to their fullest extent could well transform our schools, colleges, and universities into new forms that would rival the earlier land-grant university in importance. In a sense, the 21st Century analog to the land-grant university might be a *learn-grant universit*y.

Such a university would be designed to develop our most important resource, our human resources, as its top priority, along with the infrastructure necessary to sustain a knowledge-driven society. The field stations and cooperative extension programs–perhaps now as much in cyberspace as in a physical location–could be directed to regional learning and innovation needs. While traditional academic disciplines and professional fields would continue to have major educational and service roles and responsibilities, new interdisciplinary fields such as sustainable technologies and innovation systems might be developed to provide the skills, knowledge, and innovation for a region very much in the land-grant tradition.

Other national priorities such as health care systems, environmental sustainability, globalization, and entrepreneurship might be part of an expanded mission for universities. Institutions and academic researchers would then commit to research and professional service associated with such national priorities. To attract the leadership and the long-term public support needed for a valid national public service mission, faculties would be called upon to set new priorities, collaborate across campus boundaries, and build upon their diverse capabilities. This is just one example of many. But the point seems clear. Such a social contract, linking together federal and state investment and interests with higher education and business to serve national and regional needs, could become the elements of a 21st century analog to the land-grant university.

World Grant Universities

Many of our leading universities have evolved over time from regional or state universities to, in effect, national universities. Because of their service role in areas such as agriculture and economic development, some universities (particularly land-grant institutions) have gone even beyond this to develop a decidedly international character. Furthermore, the American research university dominates much of the world's scholarship and research, currently enrolling over 450,000 international students and attracting faculty from throughout the world. In view of this global character, some suggest that we may soon see the emergence of truly global universities that not only compete in the global market place for students, faculty, and resources but are increasingly willing to define their public purpose in terms of global needs and priorities such as environmental sustainability, public health, wealth disparities, poverty, and conflict. Such "universities in the world and of the world" might form through consortia of existing institutions (e.g., the U.K.'s Open University),



Alternative forms of the land-grant philosophy

new paradigms, or perhaps even existing institutions that evolve beyond the public agenda or influence of their region or nation-state to assume a truly global character. (Weber, 2008)

Lou Anna Simon, president of Michigan State University, one of the nation's earliest land-grant universities, coins the term "world grant university" to describe an extension of the principles inherent in the land-grant tradition adapted to address the global challenges of the twenty-first century and beyond. Such institutions would not be "granted" access to the world in the sense that states were granted tracts of land by the Morrill Act as a resource to support the establishment of land-grant institutions in the United States. Rather, the "world grant" ideal recognizes that fundamental issues unfolding in one's own backyard link directly to challenges occurring throughout the nation and the world. It not only recognizes this seamless connection but also actively grants to the world a deeply ingrained commitment to access and utilization of the cutting-edge knowledge required to address these challenges.

The evolution of a world culture over the next century could lead to the establishment of several world universities (Europe, Asia, Africa, and Latin America) as the focal point for certain sorts of study of international order—political, cultural, economic, and technological. Since the genius of higher education in America is the research university, perhaps these are the institutions destined to play this role for North America.

As *The Economist* notes, "The most significant development in higher education is the emergence of a super-league of global universities. The great universities of the 20th century were shaped by nationalism; the great universities of today are being shaped by globalization. The emerging global university is set to be one of the transformative institutions of the current era. All it needs is to be allowed to flourish."

Hybrid Public/Private/State/National/Global Universities

At a time when the strength, prosperity, and welfare of a nation demand a highly educated citizenry and institutions with the ability to discover new knowledge, develop innovative applications of discoveries, and transfer them into the marketplace through entrepreneurial activities, such vital national needs are no longer top state priorities. The model of state-based support of graduate training and research made sense when university expertise was closely tied to local natural resource bases like agriculture and manufacturing. But today's university expertise has implications far be-

Aligning support (and pehaps governance) with the various patrons of the university

yond state boundaries. Highly trained and skilled labor has become more mobile and innovation more globally distributed. Many of the benefits from graduate training—like the benefits of research—are public goods that provide only limited returns to the states in which they are located. The bulk of the benefits are realized beyond state boundaries.

Hence, it should be no surprise that many states have concluded that they cannot, will not, and probably should not invest to sustain world-class quality in graduate and professional education—particularly at the expense of other priorities such as broadening access to baccalaureate education. Today, not only is state support woefully inadequate to achieve state goals, but state goals no longer accumulate to meet national needs. The declining priority that states have given to public higher education makes sense for them but is a disaster for the nation. The growing mismatch between state priorities and national needs suggests that it is time once again to realign responsibilities between the state and the nation for higher education and provide adequate resources to sustain American leadership.

We write "once again" because this is not a brand new issue. The success of university research in winning World War II—with innovations such as radar and electronics—and Vannevar Bush's seminal report, "Science, the Endless Frontier: A Report to the President on a Program for Postwar Scientific Research" (1945), convinced national leaders that university research is too important for national security, public health, and economic prosperity to allow it to be entirely dependent upon the vicissitudes of state appropriations and philanthropy. Hence, the federal government assumed the primary responsibility for the support of research, now at a level of $30 billion each year—an effort that has been estimated to have stimulated roughly half of the nation's economic growth during the latter half of the 20th century, while sustaining the nation's security and public health (Augustine, 2005).

Once more, it is time for the federal government to step in and provide the support necessary to keep our crucial graduate programs among the best in the world. Educating scientists and engineers, physicians and teachers, business leaders and entrepreneurs is vital to developing the human capital that is now key to national prosperity and security in the global, knowledge-driven economy. It cannot be left dependent on shifting state priorities and declining state support.

So how might this work? A new structure would distribute the primary responsibilities for the support of the nation's flagship public research universities among the states, the federal government, and private donors. The states, consistent with their current priorities for enhancing workforce quality, would focus their limited resources on providing access to quality education at the associate and baccalaureate levels, augmented by student tuition and private philanthropy. The federal government would become, in addition to a leader in supporting university research, the primary patron of advanced education at the graduate and pro-

fessional level. Private patrons, including foundations and individual donors, would continue to play a major role in support of the humanities, the arts, the preservation of knowledge and culture, and the university's role in serving as an informed critic of society—all roles of great importance to the nation. Those functions would also continue to receive state support, because they are essential to high-quality baccalaureate education (Courant, 2010).

How much additional federal investment will this new approach require? We suggest a magnitude roughly comparable to those of other major federal programs for the support of higher education such as university research ($30 billion per year), the Pell Grant program ($26 billion per year), or the foregone federal tax revenues associated with the beneficial tax treatment of charitable giving and endowment earnings ($22 billion per year).

Those additional resources would best be allocated to universities based on a combination of merit and impact. For example, competitive graduate traineeship programs might be used in some disciplines, while grants for other fields might be based on graduation rates or the size of graduate faculties or student enrollments. Other grants could be designed to stimulate and support newly emerging disciplines in areas of national priority, like nanotechnology or global sustainability. In all cases, the key objective would be the direct support of graduate programs through sustained block grants to universities—rather than grants to individual faculty members or students. What matters now is that, more than ever before, America needs to develop a strategy for building and sustaining a system of research universities that is the best in the world.

The "No-Frills" University

In recent years there has been growing discussion about the possibility of accelerated three-year baccalaureate programs in U.S. higher education. In part this has been stimulated by the broad adoption by European universities of the three-year degree programs associated with the Bologna Process. But it has also been proposed as a way to reduce the cost of a college education, or as Senator Lamar Alexander puts it, viewed as "the higher ed equivalent of a fuel-efficient car".

In fact, one might go even further and imagine introducing into American higher education streamlined universities more similar to those in Europe. Most European universities enroll adult students directly in three-year disciplinary majors after longer and more intense secondary educations. In contrast, American colleges and universities have inherited from their British antecedents the mission of the socialization of young students. Not only does this require a very substantial investment in supporting infrastructure such as residence halls, community facilities, and entertainment and athletic venues, but it can also distract the university from its more fundamental knowledge-based mission. Nevertheless it has become the expectation of American parents that "college is the place where we send our children to grow up". Furthermore, U.S. colleges and universities are expected to compensate for the significant weaknesses currently characterizing primary and secondary education in the United States, even if that requires providing remedial programs for many under-prepared students.

In sharp contrast European universities focus their activities on teaching and scholarship for adult students. Entering students enroll in focused three-year discipline-based baccalaureate programs without the preliminary general education experience and socialization programs characterizing American universities. Students are expected to arrange for their own living and social activities, while the university focuses on its "knowledge and learning" mission, thereby avoiding many of the costs associated with socializing young students.

There have been numerous suggestions that the United States explore the "no-frills" approach of European universities by focusing the activities of some of their universities entirely upon disciplinary teaching and scholarship for upper-division students, thereby greatly reducing costs and tuition. This would allow the universities to focus their extensive—and expensive—resources where they are most effective: on intellectually mature students who are ready to seek advanced education and training in a specific discipline or profession. It would relieve them of the responsibility of general education and parenting, roles for which many large universities are not very well suited in any event. It might also allow them to shed their activities in reme-

dial education, a rather inappropriate use of the costly resources of the research university. Focusing universities only on advanced education and training for academically mature students could actually enhance the intellectual atmosphere of the campus, thereby improving the quality of both teaching and scholarship considerably. Adult learners would be far more mature and able to benefit from the resources of these institutions.

Ironically, such a focusing of efforts might even reduce public criticism of higher education. Most students—and parents—appear quite happy with the quality of both upper-class academic majors and of professional education. Furthermore, they seem quite willing to pay the necessary tuition levels, both because they accept the higher costs of advanced education and training, and because they see more clearly the benefits of the degree to their careers, "the light at the end at the tunnel." In contrast, most of the concern and frustration expressed by students and parents with respect to quality and cost are focused on the early years of a college education, on the general education phase, since they perceive this style of pedagogy very similar to that of secondary education.

Yet the current quality and character of secondary education in the United States probably will not allow this for most students. Secondary education in Europe and much of the rest of the world is characterized by a more extended and intensive pre-college education, e.g., the German gymnasium, the British Sixth-Form, and the Canadian "college", which provide much of the general education preparation that currently comprises the first two-years of American college education. Hence a major shift to three-year baccalaureate programs or no-frills adult universities would likely require a major restructuring of secondary education in the United States more along the lines of Europe and Canada.

Open and "Open Source" Universities

For many years, the educational needs of many nations have been addressed by open universities, institutions relying on both televised or Internet-based courses and local facilitators to enable students to study and earn degrees at home. Perhaps most notable has been the British Open University, but this is only one of many such institutions that now enroll over three million students worldwide.

Most European universities are designed for upper division (adult) students (here at the Sorbonne, U. Paris).

These institutions are based upon the principle of open learning, in which technology and distance education models are used to break down barriers and provide opportunities for learning to a very broad segment of society. In these models, students become more active participants in learning activities, taking charge of their own academic program as much as possible. Most of these open universities are now embracing information technology, particularly the Internet, to provide educational opportunities to millions of students unable to attend or afford traditional residential campuses (e.g., the University of the People, which aims to provide tuition-free education to developing economies).

The motivation behind open universities involves cost, access, and flexibility. The open university paradigm is based not on the extension of the classroom but rather the one-to-one learning relationship between the tutor and the student. It relies on very high-quality learning materials, such as learning software and digital materials distributed over the Internet, augmented by facilitators at regional learning centers and by independent examiners. Using this paradigm, for example, the British Open University has been able to provide high-quality learning opportunities (currently ranked among the upper 15 percent of British universities) at only a fraction of a cost of residential education ($7,000 compared to $20,000 per student year in North America).

To date most open universities rely heavily on self-learning in the home environment, although they do make use of interactive study materials and decentralized learning facilities where students can seek academic assistance when they need it. However, with the rapid evolution of virtual distributed environments and learning communities, these institutions will soon be able to offer a mix of educational experiences.

Clearly, the open university will become an increasingly important player in higher education at the global level. The interesting question is whether these institutions might also gain a foothold in the United States. During the 1990s the British Open University attempted to establish a beachhead in the United States, but the financial model did not work. Newly emerging institutions such as the Western Governors' University and the University of Phoenix are now exploiting more effectively many of the concepts pioneered by the open university movement around the world, and their enrollments are beginning to soar.

Beyond the open university paradigm of admitting all applicants but setting firm requirements for graduation, some universities are embracing other aspects of the open philosophy in their educational activities. The explosion of online educational materials being made available through the OpenCourseWare and iTunes U paradigms, coupled with access to massive digital libraries such as the HathiTrust, is transforming the knowledge infrastructure of universities–and bringing the marketplace into the classroom, since many of these online courses compete very effectively with the instruction provided by oncampus faculty. A number of universities including the University of Michigan are playing leading roles in providing access to knowledge and learning tools through such open learning resources (e.g. MIT's OpenCourseware, Rice's Connextion Project, and Carnegie Mellon's Open Learning Initiative.) Some institutions are even preparing to explore the possible emergence of "open source" universities, committed to providing extraordinary access to knowledge and learning tools through open learning resources. In fact, some universities might decide to remove entirely the restrictions imposed by intellectual property ownership by asking all of their students and faculty members to sign a Creative Commons license for any intellectual property they develop at the University (at first copyright but eventually possibly even exploring other intellectual properties such as patents). Perhaps this would even redefine the nature of a "public" university, much in the spirit of the "public" library!

A Return to *Universitas Magistrorum et Scholarium*–in Cyberspace

It is ironic that the cyberspace paradigm of learning communities may actually return higher learning to the medieval tradition of the scholar surrounded by disciples in an intense learning relationship. The term "university" actually originated during the Middle Ages with the appearance of "unions" of students or faculty members who joined together to form communities of teachers or students. The Latin origin, universitas, meant "the totality" or "the whole" and was used by medieval jurists as a general term to designate communities or corporations such as guilds, trades, and brotherhoods. Eventually the term university was restricted to these unions of masters and scholars and given the more formal Latin title: *universitas magistrorum et scholarium*.

From time to time, educators have attempted to define university in more intellectual terms. John Henry Newman stressed instead an alternative interpretation of the word: "The university is a place of teaching universal knowledge." In fact, the earliest European universities were designated as *stadium generale* by church or state to indicate their role to provide learning of a broad, universal nature to all of the known world (enabled, of course, by the use of Latin as the universal language of the academy).

We tend to prefer a simpler synthesis of these definitions of the university:

A university is a community of masters and scholars, a school of universal learning (Newman) embracing every branch of knowledge and all possible means for making new investigations and thus advancing knowledge (Tappan).

In a sense, this recognizes that the true advantages of universities are in the educational process, in the array of social interactions, counseling, tutorial, and hands-on mentoring activities that require human interaction. In this sense, information technology will not

so much transform the purpose of higher education—at least in the early phases—as enrich the educational opportunities available to learners. In a sense, technology is enabling the most fundamental character of the medieval university to emerge once again, but this time in cyberspace!

There is an important implication here. Information technology may allow—perhaps even require—new paradigms for learning organizations that go beyond traditional structures such as research universities, federal research laboratories, research projects, centers, and institutes. If this is the case, we should place a far higher priority on moving to link together our students and educators among themselves and with the rest of the world. The necessary cyberinfrastructure would be a modest investment compared with the massive investments we have made in the institutions of the past—university campuses, transportation, and urban infrastructure. It is none too early to consider an overarching agenda to develop deeper understanding of the interplay between advanced information technology and social systems. We may soon have the knowledge to synthesize both in an integrated way as a total system.

The University as a Network

Driven by information technology, the network has become more than a web that links together learning resources. It has become the architecture of advanced learning organizations. Information, knowledge, and learning opportunities are now distributed across robust computer networks, with over 4 billion people today estimated to have cell-phone connectivity and 1.2 billion with broadband access. Such widespread access, combined with the explosion in the availability of digital information and open learning paradigms such as the OpenCourseware initiative, makes it clear that the knowledge, the learning, the cultural resources that used to be the prerogative of a privileged few are rapidly becoming available anyplace, anytime, to anyone.

To this one should add the changing way that the "net generation" is using these new technologies to build social communities–instant messaging, blogs, wiki's, virtual worlds, FaceBook, Twitter, Wikipedia. They have embraced and reshaped their lives with such highly interactive, social networking. Rather than access the vast knowledge resources provided through the open education resources movement through passive media such as books, this generation accesses knowledge and builds social communities through 3-D virtual reality environments such as Second Life, the World of Warcraft, and Croquet in which all of the senses are faithfully replicated to enable human interaction at a distance.

The impact on all social organizations has been profound. Business and industry are moving rapidly away from the hierarchy of the organizational pyramid to networked organizations of relatively autonomous components. The failed transactional culture that bankrupted General Motors should be contrasted with the highly successful relational approach of IBM to building global enterprises.

It is important to appreciate how profound this new network architecture is for learning organizations. Today's learners can learn anywhere, anytime, acquiring learning and knowledge from sources in any location. Today, learners are in command of what, how, where, and when they learn, and they will be increasingly in control of what they pay for the learning opportunity as well.

The implications of a networked learning architecture are manifold. First, it makes less and less sense for institutions to attempt to be comprehensive, to go it alone. Rather, the key will be forming alliances, sharing resources, specializing in what they can be really good at, and relying on other focused institutions to provide the rest. The fact learned through painful experience in business and industry is that only world-class, competitively priced products will succeed in a global marketplace. This does not mean that the largest, most prestigious institutions will necessarily be the most successful. Indeed, smaller, more focused, and more nimble institutions may be able to develop world-class learning services that could compete very effectively with traditional offerings.

Learning networks may also work to couple different levels of education. For example, we are already seeing evidence that many high school students are entering college with degree credit in college-level courses taken over the Internet. By the same token, many colleges must provide remedial education at the secondary school level. At the other end, adults are seeking

further educational services from higher education to respond to changing career requirements. A network architecture works best for the delivery of educational services when and where they are needed—that is, for "just in time" rather than "just in case" education. Or perhaps eventually "just for me" education, highly customized to meet the learning needs and style of the individual student. Granted this may not be the appropriate architecture for the general subjects associated with a liberal education. But it will in all likelihood increasingly dominate professional education and work-related learning.

One can imagine the learning networks evolving into a seamless continuum of educational opportunities and services–a "cloud", to use the current IT term–with which the degree becomes less and less relevant, and what a person has learned becomes far more significant. Learning communities will be more extended and diverse with a network architecture. Since they will evolve unconstrained by space and time, off-campus learners will vastly outnumber on-campus students. Beyond that, the distinction between learner, teacher, and researcher may become blurred. All will be able to make contributions to learning, teaching, and scholarship.

Learning Ecologies

John Seely Brown suggests that we might think of the contemporary university as an interconnected set of three core competencies: learning communities, knowledge resources, and the certification of knowledge skills (Brown, 2000). Social computing will empower and extend learning communities beyond the constraints of space and time. Open knowledge and education resources will clearly expand enormously the knowledge resources available to our institutions. And immersive environments will enable the mastery of not simply conventional academic knowledge but tacit knowledge. A fundamental epistemological shift in learning is occurring from individual to collective learning; from a focus on development of skills to instead dispositions, imagination, and creativity; and enabling the acquisition of both explicit and tacit knowledge.

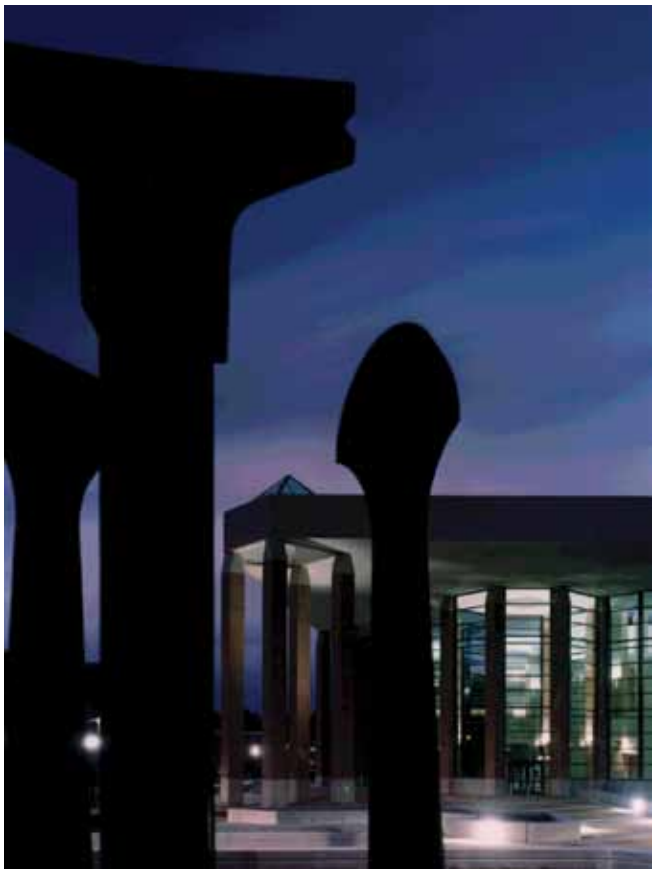
In a rapidly changing world, innovation no longer depends only upon the explicit dimension characterizing conventional content-focused pedagogy focused on "learning to do". Rather, one needs to enable an integration of tacit knowledge with explicit knowledge. Emerging ICT technologies that enable social networking to form learning communities and immersive virtual environments for simulation and play facilitate the "deep tinkering" that provides the tacit knowledge necessary to "learn to be", tools already embraced by the young if not yet the academy. In a sense, learning has become a "culture", in the sense of the Petri dish that is in a state of constant evolution.

Once we have realized that the core competency of the university is not simply transferring knowledge, but developing it within intricate and robust networks and communities, we realize that the simple distance-learning paradigm of the virtual university is inadequate. The key is to develop computer-mediated communications and communities that are released from the constraints of space and time.

Distance learning based on computer-network-mediated paradigms allows universities to push their campus boundaries outward to serve learners anywhere, anytime. Those institutions willing and capable of building such learning networks will see their learning communities expand by an order of magnitude. In this sense, the traditional paradigm of "time-out-for-education" can be more easily replaced by the "just in time" learning paradigms, more appropriate for a knowledge-driven society in which work and learning fuse together.

The University as an Emergent Civilization

So what might we anticipate over the longer term as possible future forms of the university? The monastic character of the ivory tower is certainly lost forever. Although there are many important features of the campus environment that suggest that most universities will continue to exist as a place, at least for the near term, as digital technology makes it increasingly possible to emulate human interaction in all the sense with arbitrarily high fidelity, perhaps we should not bind teaching and scholarship too tightly to buildings and grounds. Certainly, both learning and scholarship will continue to depend heavily upon the existence of communities, since they are, after all, high social enter-



The emergence of new learning ecologies

prises. Yet as these communities are increasingly global in extent, detached from the constraints of space and time, we should not assume that the scholarly communities of our times would necessarily dictate the future of our universities. For the longer term, who can predict the impact of exponentiating technologies on social institutions such as universities, corporations, or governments, as they continue to multiply in power a thousand-, a million-, and a billion-fold?

But there is a possibility even beyond these. Imagine what might be possible if all of these elements are merged, i.e., Internet-based access to all recorded (and then digitized) human knowledge augmented by powerful search engines and AI-based software agents; open source software, open learning resources, and open learning institutions (open universities); new collaboratively developed tools (Wikipedia II, Web 2.0); and ubiquitous information and communications technology (e.g., inexpensive network appliances such as iPhones, iPads, or netbooks). In the near future it could be possible that anyone with even a modest Internet or cellular phone connection will have access to the recorded knowledge of our civilization along with ubiquitous learning opportunities and access to network-based communities throughout the world (perhaps even through immersive environments such as Second Life).

Imagine still further the linking together of billions of people with limitless access to knowledge and learning tools enabled by a rapidly evolving scaffolding of cyberinfrastructure, which increases in power one-hundred to one thousand-fold every decade. This hive-like culture will not only challenge existing social institutions–corporations, universities, nation states, that have depended upon the constraints of space, time, laws, and monopoly. But it will enable the spontaneous emergence of new social structures as yet unimagined–just think of the early denizens of the Internet such as Google, Facebook, Wikipedia, …and, unfortunately, Al Qaeda. In fact, we may be on the threshold of the emergence of a new form of civilization, as billions of world citizens interact together, unconstrained by today's monopolies on knowledge or learning opportunities.

Perhaps this, then, is the most exciting vision for the future of knowledge and learning organizations such as the university, no longer constrained by space, time, monopoly, or archaic laws, but rather responsive to the needs of a global, knowledge society and unleashed by technology to empower and serve all of humankind. And all of this is likely to happen during the lives of today's students. These possibilities must inform and shape the manner in which we view, support, and lead higher education. Now is not the time to back into the future.

Chapter 6

A Vision for the University of Michigan's Future

Developing a vision for the future of the University of Michigan is always a challenging exercise, both because of the unusual size, breadth, and complexity of the institution and because of the important leadership role it is expected to play as a pathfinder in American higher education. During the past two centuries of its history, Michigan has responded time and time again to the changing needs of an evolving nation by transforming itself and higher education more generally.

Today the University of Michigan faces yet another pivotal moment in its history, a fork in the road. Taking one path can, with dedication and commitment, preserve the University as a distinguished–indeed, a great–university, but only one among many such institutions. There is another path, a path that will require bold visions, courage, and creativity in addition to dedication and commitment. By taking this second path, the University would seek not only to sustain its quality and distinction, but it would seek to achieve leadership as well, embracing its long history–its saga–as a pathfinder and trailblazer for higher education.

Of course there are always those who believe that Michigan should settle for achieving excellence and leadership within the confines of the current American research university paradigm. The University of Michigan, they argue, should take the necessary steps to preserve its options, to create flexibility, to develop the capacity to adapt to and control change, and to open up opportunities during the decades. They see our current strategies as a way to clearly identify the goals that would enable the University of Michigan to adapt to a changing world in a far more organic, evolutionary manner.

But such a laissez-faire approach to the future is not the Michigan style. The University tends to flourish when it has been enlivened and emboldened by challenging visions of the future. While acknowledging the difficulties and the risks inherent in long-range planning exercises, the University's heritage as a leader in higher education demands the development and articulation of a bold vision for the third century. It is a fitting exercise for an institution aspiring to become "the leader and best."

Hence we contend that as the University approaches its third century, it should embrace once again its heritage as a pathfinder, a saga established two centuries ago in the late 19th century when the University of Michigan became a primary source for much of the innovation and leadership in higher education. Once again Michigan has the opportunity to influence the emergence of a new paradigm of what the university should become in our 21st Century world to respond to the changing needs of our society. But this will require a bold vision, an unusual commitment to excellence, a challenge and engaging strategy, and strong and dedicated leadership.

Earlier chapters in this report have provided the foundation for this effort, scanning the environment

The forces driving change in higher education

in which the University now (or soon will) finds itself and assessing our current assets and challenges. In this chapter we turn our attention toward developing an appropriate vision for the University of Michigan as it begins its third century of service to the state, the nation, and the world.

Evolution or Revolution?

In spite of the growing awareness of the powerful forces driving change in today's world, the "game changers" and possible paradigm shifts suggested in Chapter 5, many within the academy still believe that change will occur only at the margins of higher education. They stress the role of the university in stabilizing society during a period of change rather than leading those changes. This too shall pass, they suggest, and demand that the university hold fast to its traditional roles and character. And they will do everything within their power to prevent change from occurring.

Yet, history suggests that the university must change and adapt in part to preserve its ancient values and traditional roles. Many accept this reality, both within and outside the academy, since they realize that significant change must occur not simply in the higher education enterprise but in each and every one of our institutions. Yet, even most of these people see change as an evolutionary, incremental, long-term process, compatible with the values, cultures, and structure of the contemporary university.

There are a few voices, however, primarily outside the academy, who believe that both the dramatic nature and compressed time scales characterizing the changes of our times will drive not evolution but revolution. They have serious doubts about whether the challenges of our times will allow such gradual change and adaptation. They point out that there are really no precedents to follow. Some even suggest that long before reform of the educational system comes to any conclusion, the system itself will collapse.

The forces driving change in higher education, both from within and from without, may be far more powerful than most people realize. It could well be that both the pace and nature of change characterizing the higher education enterprise both in America and worldwide will be considerably beyond that which can be accommodated by business-as-usual evolution. While there is certainly a good deal of exaggeration and hype about the changes in higher education for the short term—meaning five years or less—it is difficult to overstress the profound nature of the changes likely to occur in most of our institutions and in our enterprise over the longer term—a decade and beyond. The waves of change lapping on the beach may not be simply the tide coming in once again but instead the first warning of an approaching tsunami.

Developing a vision for a hazy future

While some colleges and universities may be able to maintain their current form and market niche, others will change beyond recognition. Still others will disappear entirely. New types of institutions—perhaps even entirely new social learning structures—will evolve to meet educational needs. In contrast to the last several decades, when colleges and universities have attempted to become more similar, the years ahead will demand greater differentiation. There will be many different paths to the future.

So, where to begin? What are some alternatives to the historical model of the University of Michigan? For purposes of discussion, we might first consider several highly simplistic—indeed, cartoonish—possibilities captured by the titles on the next page. These models, while amusing, actually represent extreme cases of existing paradigms of the 20th Century. However they do not provide much guidance about where the University of Michigan should head in the century ahead.

An alternative is to begin with the core values and characteristics of the university and then identify a se-

2000s Paradigms
- University of the Common Man? No!
- University of the State of Michigan? No!
- Harvard of the West? Similar culture for excellence, but too rich
- Stanford of the East? Similar culture of innovation, but too rich
- University of America? Yes, a strong possibility
- University in and OF the World? Yes, eventually

2010 Paradigms?
- Current Trajectory: UM -> MSU/OSU
- Financial Vision: UM -> M (Ponderous, Change-Adverse)
- Auxiliaries: Michigan Athletics, Medical Center >>Academic Core
- Michigan Politics: UM -> Alabama (or Wayne State University)
- Donors: UM -> Midwestern U
- Regents: UM -> Free UM for State; USC for everybody else

Third Century Possibilities?
- UM -> National "public" university
- UM -> Hybrid: state/nation/world public; law/bus/med services private
- UM -> University of the Heartland
- UM -> University of America
- UM -> University of the World
- UM -> University FOR the World

Simplistic models of the future of the University of Michigan

ries of experiments that might be launched to explore various possible futures of the University, e.g., as a cyberspace university, a world university, a creative university, or a university characterized by great social diversity. This was the approach taken in the 1990s and led to some of the most interesting initiatives of that era (e.g., Internet 2, the International Institute, the Media Union, and the Michigan Mandate).

Yet in this study we have taken not only a more structured approach–strategic roadmapping–in part because we are going to suggests bolder visions for the future of the university. However, we begin, as before, with the key values and characteristics of the University.

The Foundations of a Vision for the University of Michigan's Future

So how might we construct an appropriate vision for the University as it enters its third century? Clearly this exercise must begin by articulating the most important values of the institution:

Excellence
Leadership
Critical and Rational Inquiry
Liberal Learning
Diversity
Community
Innovation
Excitement
Spirit

Key as well are our fundamental aspirations for the future of the University, those actions and goals that must receive high priority to achieve our vision. From Michigan's history we might suggest characteristics such as the following:

"The leaders and best"
"An uncommon education for the common man"
"A broad and liberal spirit"
"Diverse, yet united in a commitment to academic excellence and public service"
"A center of critical inquiry and learning"
"An independent critic and servant of society"
"A relish for innovation and excitement"
"Freedom tempered by responsibility for students and faculty"
"Control of our own destiny comparable to private universities"

The Vision 2017 diagram developed during the 1990s planning activities

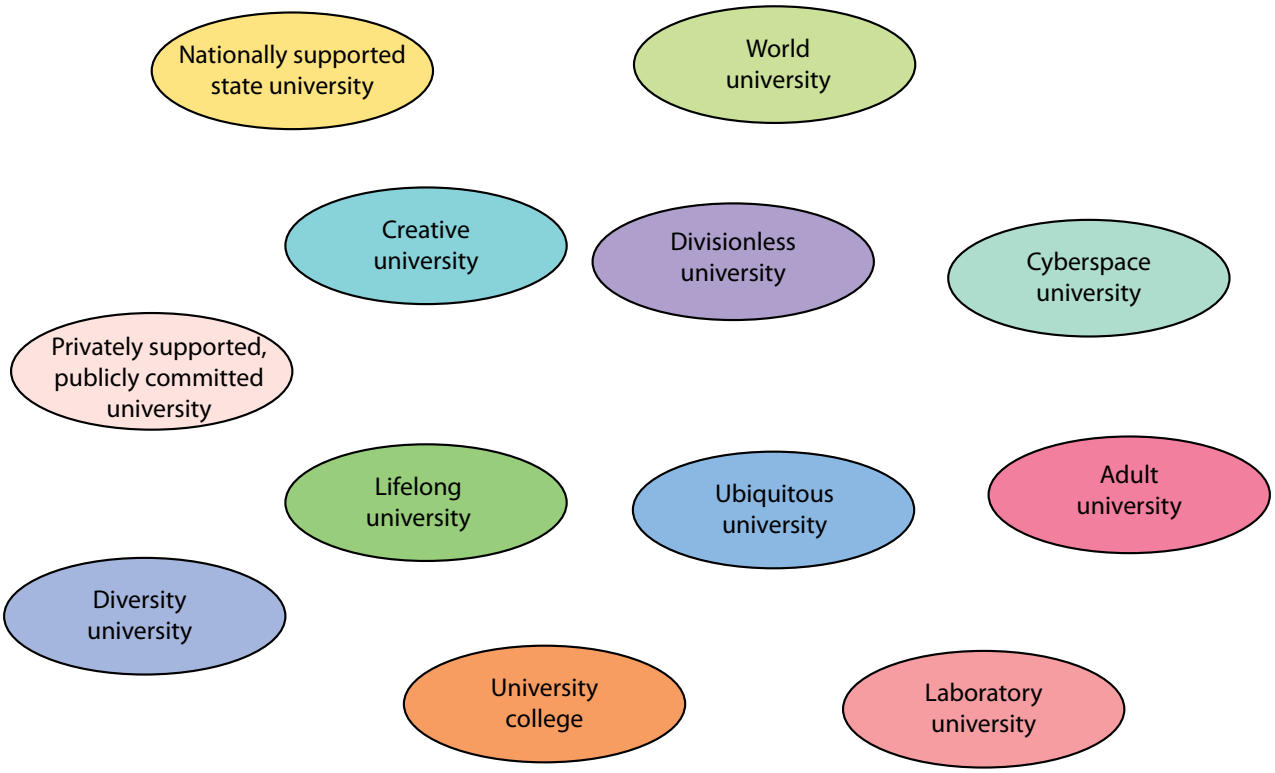
During the planning effort of the 1990s, we took a somewhat different approach by turning to the late Michigan Professor of Business Administration, C. K. Pralahad, for his concept of *strategic intent* (Prahalad, 1994). The traditional approach to strategic planning focuses on the fit between existing resources and current opportunities; strategic intent is a stretch vision that intentionally creates an extreme misfit between current resources and future objectives that requires institutional transformation to build new capabilities.

> *The Strategic Intent (Vision 2017): To provide the university with the capacity to re-invent itself as an institution more capable of serving a changing state, nation, and world.*

Vision 2017 depended for its success upon sustaining our most cherished values and our hopes for the future: excellence, leadership, critical and rational inquiry, liberal learning, diversity, caring and concern, community, and excitement. In addition, we paid particular attention to those elements of the university's institutional saga that were important to preserve, as well as those values and characteristics that were our fundamental aspirations.

Around the core of values and characteristics are arranged a number of possible paradigms, actually cartoonish characterizations exaggerating particular missions of the univrersity, e.g.

the world university
the diverse university
the creative university
the divisionless university
the adult university
the university college
the lifelong university
the ubiquitous university
the laboratory university



Paradigms based on particular missions or aspirations of the University

While none of these alone would appropriately describe the university as it entered its third century, each was a possible component of our institution, as seen by various constituents. Put another way, each of these paradigms was a possible pathway toward the University of the 21st Century. Each was also a pathway we believed should be explored in our effort to better understand our future.

Finally, and most important, during a time of great change in society, Michigan's most important saga might be that of a pathfinder, a trailblazer, building on its tradition of leadership, and relying on its unusual combination of quality, capacity, and breadth to reinvent the university, again and again, for new times, new needs, and new worlds.

With this foundation, we now introduce the key themes of the vision we suggest for the future of the University of Michigan, arranged in three time epochs: now, soon (2017), and the University's third century.

The Theme for the Near Term: *Reflection*

For the near term, from now until the Bicentennial Year 2017, we suggest the University of Michigan would benefit from a period of *reflection* upon its remarkable history and accomplishments. The University community should not simply prepare to celebrate two centuries of leadership in higher education, but it first should strive to understand and secure those values and characteristics that have played such an important role throughout its history:

Academic quality: The reputation of Michigan as one of the world's great universities has been based primarily on the quality of its academic programs. While there are many sources of superficial rankings (e.g., US News & World Report, the London Times, Shanghai Jaio Tong), the most reliable rankings are the assessments of graduate programs performed every decade by the National Academies (the National Research Council). Of comparable importance is an ongoing assessment of the "ebb and flow" of faculty recruitment and retention, along with faculty awards and reputations.

Establishing and sustaining the academic core of the University as its highest priority: Sometimes in the face of the substantial assets and growth characterizing auxiliary activities of the University (e.g., hospitals, housing, athletics), it is all to easy to forget that Michigan's impact on the state, nation, and world is determined primarily by the quality of its academic programs and the achievements of its faculties. This must always be clearly established and understood as the University's highest priority.

Diversity: The University has long been distinguished by its strong and sustained commitment to providing educational and faculty opportunities to underrepresented racial and ethnic populations. From its earliest efforts to enroll minority students in the 19th century to the BAM activism of the 1960s to the Michigan Mandate of the 1990s, the University has been long viewed as a national leader in the achievement of diversity. Despite the challenges it faces, the University simply must renew its commitment to regain this leadership. Failure is not an option.

Public Purpose: So too, the University's long-standing commitment to providing "an uncommon education for the common man" demands that it provide educational opportunities for students from all economic circumstances. While this has become increasingly difficult in the face of eroding state support, it nevertheless is both a core value of the University and a critical element of its public purpose. It simply must take those actions necessary to restore a more equitable socioeconomic balance in its student body.

Spirit: Michigan's "broad and liberal spirit" has long been an important characteristic of our students, faculty, and staff. While this may at times annoy or antagonize the politics that swirl about the institution, such activism is not only an important element of our heritage but at times represents the conscience of the nation on controversial issues. This spirit must always be not only respected and tolerated but furthermore encouraged on the part of the University community.

Leadership: The University of Michigan has long taken pride in its "leaders and best" heritage, seeking both leadership and excellence in its achievements. Key in establishing and sustaining this element of our character is setting bold goals where the University not only aspires to excellence but can have great impact on society, where it can change the world!

The Michigan Saga: Finally, the role of the University in serving as both a pathfinder and trailblazer for all of higher education remains one of its most important roles. To sustain this role requires attracting to the University students, faculty, staff, and leadership of unusual initiative, creativity, and determination.

While renewing the effort (or restoring our commitment if necessary) to achieve these characteristics seems obvious, particularly as we prepare for the University's bicentennial by reviewing its history and honoring its heritage and saga, it is nevertheless in the spirit of the near term vision that we suggest the University should set out to challenge itself.

The Theme for the Next Generation: *Renaissance*

As we have noted throughout this report, the world is changing rapidly, driven by the role played by educated people, new knowledge, creativity, innovation, and entrepreneurial zeal. These characteristics are driving profound changes in our world and its social institutions. They also contain the elements of what could become a renaissance in the 21st century. Since universities will play such a critical role as the source of these assets of the age of knowledge, our vision for the early 21st century involves stressing the following characteristics among our people and our programs:

Creativity
Innovation
Ingenuity and Invention
Entrepreneurial Zeal

The professions that dominated the late twentieth century—and to some degree, the late-twentieth century university—were those that managed knowledge and wealth, professions such as law, business, and politics. Today there are signs that our society is increas-

ingly valuing those activities that actually create new knowledge and wealth, professions such as art, music, architecture, and engineering. Perhaps the university of the 21st century will also shift its intellectual focus and priority from the preservation or transmission of knowledge to the process of creation itself. After all, the tools of creation are expanding rapidly in both scope and power. Today, we have the capacity literally to create objects atom by atom. We are developing the capacity to create new life-forms through the tools of molecular biology and genetic engineering. And we are now creating new intellectual life-forms through artificial intelligence and virtual reality.

But herein lies a great challenge. While we are experienced in teaching the skills of analysis, we have far less understanding of the intellectual activities associated with creativity. In fact, the current disciplinary culture of our campuses sometimes discriminates against those who are truly creative, those who do not fit well into our stereotypes of students and faculty.

This vision of *renaissance* aligns well with several aspects of the University's institutional saga such as its commitment to excellence and leadership and its belief that this rests upon building diverse learning communities. But such achieving such a vision will also likely require a culture change that encourages risk taking and tolerates occasional failure as the price one must frequently pay for setting and accomplishing challenging goals.

The university may also need to reorganize itself quite differently, stressing forms of pedagogy and extracurricular experiences to nurture and teach the art and skill of creation. This would probably imply a shift away from highly specialized disciplines and degree programs to programs placing more emphasis on integrating knowledge. Universities might form strategic alliances with other groups, organizations, or institutions in our society whose activities are characterized by great creativity, for example, the art world, the entertainment industry, or even Madison Avenue.

Particularly key in this effort is the earlier goal of diversity. As Tom Friedman noted in a recent New York Times column, "The sheer creative energy that comes when you mix all our diverse people and cultures together. We live in an age when the most valuable asset any economy can have is the ability to be creative–to spark and imagine new ideas, be they Broadway tunes, great books, iPads, or new cancer drugs. And where does creativity come from. As Newsweek described it, 'To be creative requires divergent thinking (generating many unique ideas) and then convergent thinking (combining those ideas into the best result).' And where does divergent thinking come from? It comes from being exposed to divergent ideas and cultures and people and intellectual disciplines." Just what a world-class research university characterized by great socioeconomic diversity such as the University of Michigan can offer!

The Theme for the Third Century: *Enlightenment*

Any vision proposed for the University of Michigan's third century must consider the extraordinary changes and uncertainties of a future driven by exponentially evolving information and communications technology. The extraordinary connectivity provided by the Internet already linking the majority of the world's population, the capacity to capture and distribute the accumulated knowledge of our civilization in digital form, and ubiquitous opportunities for learning through new paradigms suggest the possible emergence of a new global society no longer constrained by space, time, monopoly, or archaic laws and instead even more dependent upon the generation of new knowledge and the education of world citizens. Hence we suggest that the University of Michigan set as its long-term vision the development of the capacity to serve just such a society, to distribute "the light of knowledge and learning" to the world.

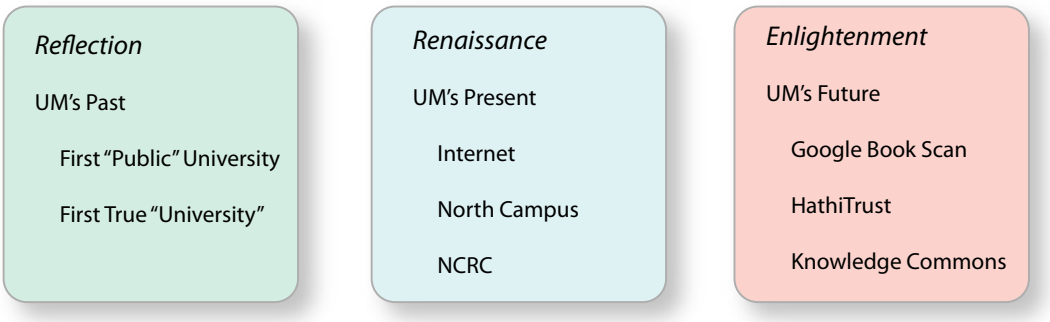
In a sense, this vision for the third century of the University combines several themes that might characterize the university of the future:

The emergence of a universitas magistrorum et scholarium in cyberspace.

The power of network architectures in distributing knowledge and learning

The perspective of learning organizations as ecologies that evolve and mutate into new forms

The university as the prototype of an emergent global civilization



Linking Future Themes to Past Accomplishments

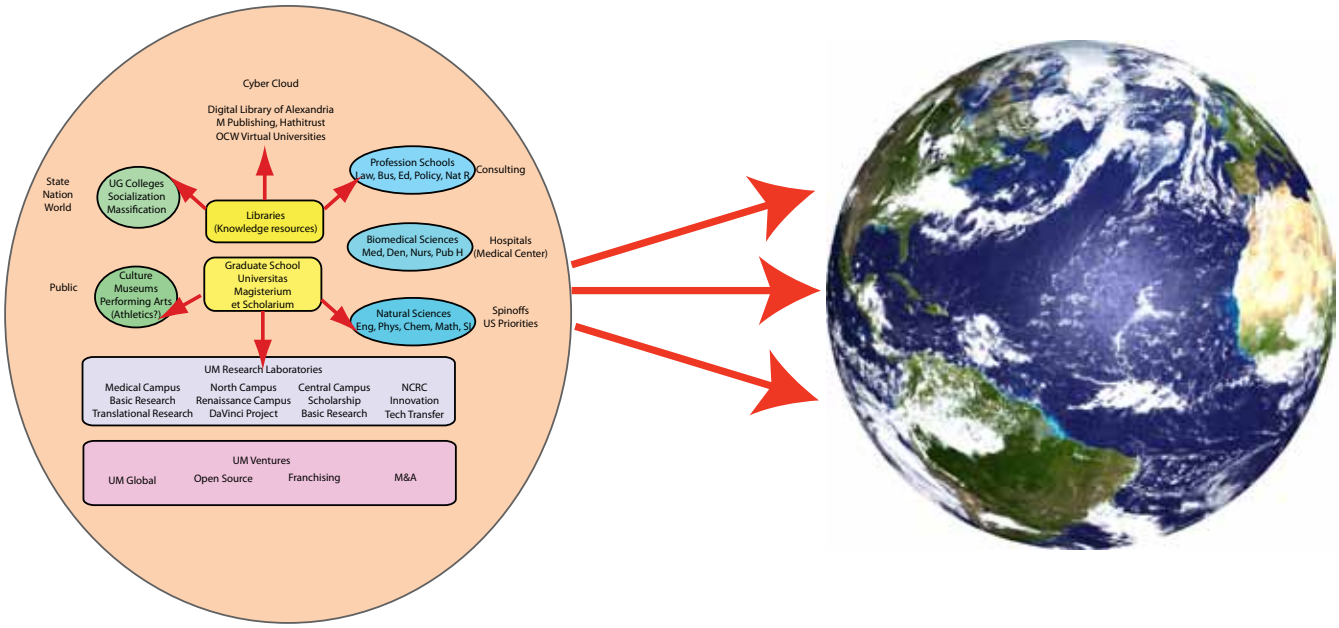
William Germano suggests a provocative argument for such themes as the possible next stage in speculating about the evolution of the "book", from the invention of writing to the codex to the printed volume to the digital revolution. As he explains:

> "Right now we are walking through two great dreams that are shaping the future of scholarship, even the very idea of scholarship and the role "the book" should play within it. Great Dream No. 1 is universal access to knowledge. This dream means many things to many people, but for knowledge workers it means that scholarly books and journals can, and therefore should, be made available to all users. New technologies make that possible for the first time in human history, and as the argument goes, the existence of such possibilities obligates us to use them. Great Dream No. 2 is the ideal of knowledge building as a self-correcting, collective exercise. Twenty years ago, nobody had Wikipedia, but when it arrived it took over the hearts and laptops for undergraduates and then of everyone else in the education business. Professional academic life would be poorer, or at least much slower, without it. The central premise of Wikipedia isn't speed but infinite self-correction, perpetually fine-tuning what we know. In our second dream, we expand our aggregated knowledge quantitatively and qualitatively" (Germano, 2010).

Germano continues on to suggest that "these two dreams–the universal and the collective–should sound very familiar since they are fundamentally the latest entries in Western culture's utopian tradition: Thomas More's *Utopia*, the Enlightenment's rational distribution of free, or Karl Marx's reorganization of labor." In a sense, these are the values not only of the academic community but moreover of the Enlightenment– the" *Liberté, Egalité, Fraternité*" driving the French revolution, or perhaps better, Thomas Jefferson's opening word from the Declaration of Independence: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."

The Enlightenment movement of the 18th century swept aside the aristocracy of the *ancien regime*, using knowledge and learning to empower the bourgeoisie (the middle classes), and creating the liberal democracies and capitalist economies that now characterize most developed nations. Today our world needs once again the illumination provided by distributing "the light of learning and knowledge" both to counter the ignorance and address the challenges of our times. Yet there is ample evidence that much of our current educational infrastructure is inadequate to the task, as the numerous international comparisons that document the decline in the quality of K-12 education in the United States sadly suggest.

Today the educational institution most capable of launching a new "age of Enlightenment" is the "university", with its dual missions of creating "unions" of scholars and learners and providing "universal" access to knowledge. In a sense, the word "university" itself conveys the elements of this vision: both the sense of a "union" or community of learners (i.e., universitas magistrorum et scholarium) and the "universality" or totality of knowledge and learning as the key to social well-being in an age of knowledge. In this sense, then, the proposed vision for the University of Michigan's



A Public Purpose for the Third Century: Providing the light of knowledge and learning to the world!

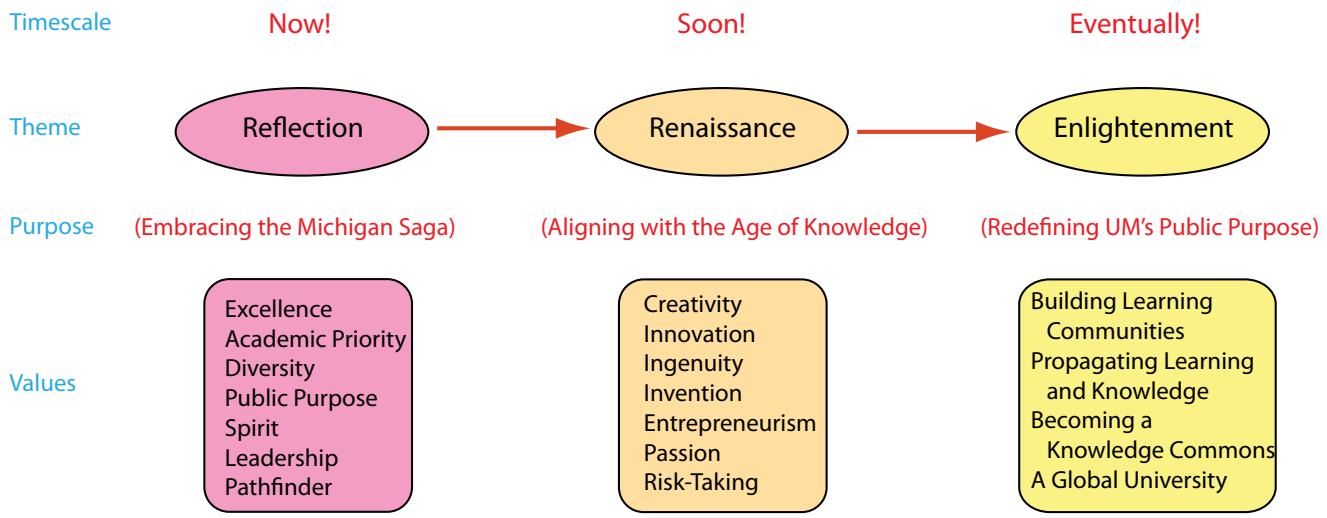
third century echos the Enlightenment theme of knowledge and learning as the keys to freedom and empowerment.

So why would we suggest the theme of Enlightenment for the third century of the University of Michigan? To be sure, our future will continue to be one in which freedom and prosperity depend upon widespread distribution of "the light of learning and knowledge". So, too, the University's long history as one of the nation's first and most prominent "public" "research" universities continues to define its public purpose in terms of both creating and distributing learning and knowledge to society. In fact, the original incarnation of the University as the "Catholepistemiad of Michigania" was just such a utopian vision of such a learning society. Henry Tappan's efforts to build a true university based not simply on learning but on scholarship laid the foundation for the research university in America. Hence it is natural that any vision for the University's future embrace and extend its character as a truly "public university" to address the nature of our changing world.

But while the Enlightenment of the 18th century was concerned with "celebrating the luminosity of knowledge shining through the written word", today knowledge comes in many forms–words, images, immersive environments, "sim-stim". And learning communities are no longer constrained by space and time but rather propagated instantaneously by rapidly evolving technologies (e.g., cyberinfrastrucure) and practices (e.g., open source, open knowledge). The ancient vision of the Library of Alexandria to collect all of the books of the world in one place is rapidly becoming true–except the "place" has now become a cloud in cyberspace. Learning communities are evolving into knowledge generating communities–wikis, crowd sourcing, hive cultures that span the globe. These, too, are paths to a 21st century vision of the Enlightenment.

Today the University of Michigan is already playing a leadership role in achieving just such a vision. Its efforts during the 1980s (together with IBM and MCI) to build and manage the backbone of the Internet, its role in creating Internet2, and most recently the early effort to create a "national learning, research, and innovation network" linking together the nation's research universities, national laboratories, federal agencies, and industry with advanced cyberinfrastructure all provide strong evidence of the leadership role it plays in linking together people and institutions around the world.

The University of Michigan has also played a leadership role in redefining the nature of the "library" for a digitally connected world, first with the NSF digital library project in the 1990s–a consortium of universities that stimulated the development of the First Rank search algorithm and the creation of Google, and helping to build the JSTOR project, the first major effort to digitize a massive collection of scholarly publications



A Vision for the Third Century of the University of Michigan

in disciplines such as economics and history. Today it serves as the lead partner in the Google Books project, to provide search access to the printed knowledge of the world, and the HathiTrust, a collection of 50 leading libraries aimed to provide full-text access to large inventories of scholarly materials. Furthermore, as a participant in the OpenCourseWare and iTune U movements to provide global access to learning resources, the University has firmly established its leadership role in providing both knowledge and learning on an unprecedented global scale.

Finally, its leadership in promoting open access to research data and intellectual property through efforts such as the Creative Commons has potential for redefining the public university as a "knowledge commons" serving the world.

Today the University is well positioned to participate in a contemporary version of the Enlightenment, spreading kowledge and learning throughout the world. We suggest this should become its primary mission as it prepares to begin its third century.

Achieving the Vision

We have suggested three visions for the future of the University of Michigan: 1) a vision for today of *Reflection* upon the past accomplishments, values, and key characteristics of the University's institutional saga; 2) a near-term vision of a *Renaissance* as the University aligns itself to support a learning, knowledge, creativity, and innovation world by spanning the broad range of learning "to know", "to do", and "to be"; and a longer term vision of *Enlightenment* as it commits itself to provide "the light of learning and knowledge" to the world in the new forms enabled by rapidly evolving information and communications technologies. Although bold, we believe these visions to be consistent both with the University's heritage and the challenges and opportunities it will face as it begins its third century. Yet they remain somewhat abstract at this point, suggesting a destination but with little guidance on just how to proceed.

But, of course, this is the objective of strategic roadmapping. How that we know where we want to go, we need to develop a map to our chosen destination. But there is one more step before constructing the roadmap. We must first understand how far we must travel, the distance between the University of Michigan today and the visions of *Reflection, Renaissance, and Enlightenment* for the University's future. Hence we turn next to the process of gap analysis, to determine how far we currently fall short of the vision proposed for Michigan's third century.

Chapter 7

How Far to Go? A Gap Analysis

Today most of American higher education is reeling from the impact of the Great Recession of 2008 and 2009. Endowments have collapsed; state support has dropped to the lowest levels in three decades; faculty and staff layoffs and furloughs have become common. Yet the University of Michigan appears to be enjoying a period of relative peace, prosperity, and growth. New buildings are appearing across the campus–Weill Hall, the Ross School of Business Administration, North Quad, the new Mott Pediatrics Hospital, and of course, the "new" Michigan Stadium. In contrast to the rest of higher education, Michigan seems financially secure, having just completed a $3.2 billion fundraising campaign and launching a highly successful program of cost reductions in its business activities to keep its top AAA credit rating intact. Student applications and enrollments continue to grow, as do research expenditures, now exceeding $1 billion per year. To be sure, some highly visible University programs are enduring hard times, e.g., the first losing seasons of the Michigan football teams in over half-a-century and the athletic dominance over the Wolverines by Ohio State and–even worse–Michigan State! But otherwise the spirit of the campus seems upbeat, confident, and secure. Or at least so we are told.

Yet if one looks more closely there are numerous warning signs that suggest that below the surface the University community should not be so sanguine. Beyond these signals of possible problems, a more thorough investigation suggests that Michigan is clearly facing many of the challenges currently experienced by the rest of higher education, e.g., the unsustainability of its traditional sources of financial support, the increasing competition for the best students and faculty, and mission creep that dilutes the priority given to the academic core of the university. Cracks are beginning to appear in our façade of confidence. There is a growing fear we may be whistling through the graveyard, ignoring serious issues and concerns that could threaten our most fundamental goals of quality, public purpose, leadership, and even our institutional saga as a pathfinder for American higher education.

In this chapter we will examine these challenges in more detail through the fourth stage of the strategic roadmapping process, the *gap analysis*, where we compare the current status of the university with the vision of *Reflection, Renaissance, and Enlightenment* proposed for its third century. Through such a process we will identify the actions, resources, and transformations required to achieve this vision in the broadest sense as they involve our people, finances, facilities, quality, values, and spirit. These will form the basis of the development in the next chapter of the roadmap to the University's third century.

Warning Signs

All too frequently we tend to measure progress of a university by inputs (e.g., funds raised, buildings built, students enrolled, events hosted, etc.) rather than outputs (e.g., academic quality, faculty and student achievement, impact on society, etc.). If we were to measure progress of the University over a period of time, we might construct a university "business dashboard" comprised of indicators such as academic quality, diversity, faculty achievement, student quality, reputation, financial strength, and societal impact that are relatively straightforward. There are also more subjective measures such as values (integrity), innovation (excitement), and alignment with institutional saga (for Michigan, pathfinder and trailblazer), more difficult to measure but nevertheless extremely important to track.

While the analysis in Chapter 3 has noted many of the current strengths of the University, there are numerous warning signs that raise concerns.

Quality

There are many measures of institutional quality, some highly visible such as the various rankings of academic programs, and some more subtle indicators such as the ability of the university to recruit and retain outstanding faculty members and students. Most of the popular rankings or "league tables" continue to place the overall academic reputation of the University among the leading public research universities but well below many of the elite private institutions. For example, in 2010 *US News & World Report* ranks the University of Michigan 29th among all national universities, public and private, and 4th among public universities, behind UC-Berkeley, UCLA, and the University of Virginia. At the international level, Michigan is ranked 31st by the *London Times* rankings and 22nd by the Shanghai Jiaotong University rankings. Of course these rankings vary quite considerably in both method and rigor from year to year and serve more as "beauty pageants" than definitive measures of academic quality, even though they are taken quite seriously by prospective students and sometimes government officials. Yet the decline over the past decade of the University's rankings both as an institution and for many of its academic programs requires at least some analysis rather than simply discounting the results.

Of far more importance are the assessments of the quality of graduate programs in each of the major disciplines conducted every decade by the National Research Council (NRC) of the National Academies. Michigan's academic departments ranked very high in the rankings released in 1982, 1995, and 2010. In fact, across all 41 disciplines ranked by the NRC, Michigan ranked 3rd behind only Stanford and UC-Berkeley in overall academic quality and ahead of all other American research universities, public and private (although leading private universities such as Harvard, Yale, MIT, and Caltech were ranked below Michigan because they did not span the broad range of disciplines of the leading institutions). The release of the 2010 round of graduate program evaluations is much more complex and makes rankings difficult, but it suggests that the University has maintained its traditional strength in most areas (NRC, 2010).

National Research Council Graduate Program Rankings
(Faculty Quality Rank/Number of Programs Assessed)

	1982	1995	2010
Biochemistry	18 /139	26 /187	22/160
Botany	7 /83	12 /127	12/141
Cellular/Molecular	29 /89	30 /165	21/122
Microbiology	16 /134		10/74
Genetics	-	21 /102	4/18
Pharmacology	-	13 /121	3/118
Neurosciences	-	18 /98	16/94
Physiology	7 /101	15 /135	12/141
Zoology	-		
Art History	8 /41	11 /38	12/58
Classics	5 /35	3 /29	6/31
Comparative Literature	-	15 /44	7/46
English	16 /106	16 /127	6/122
French	6 /58	9 /45	6/43
German	12 /48	21 /32	15/60
Linguistics	22 /35	31/41	11/53
Musicology	6 /53	9 /65	11/63
Philosophy	8 /77	8 /71	1/90
Spanish	6 /69	13 /54	15/60
Astronomy	-	25 /33	16/33
Chemistry	26 /140	35 /168	11/180
Computer Science	-	21 /107	11/128
Geology	23 /91	18 /95	9/94
Mathematics	11 /115	9 /135	4/127
Physics	20 /123	19 /146	14/122
Statistics	21 /64	24 /81	3/61
Aerospace Eng	-	5 /33	2/31
Biomedical Eng	-	11 /38	4/50
Chemical Eng	16 /79	18 /93	7/106
Civil Eng	9 /74	10 /86	10/131
Electrical Eng	5 /91	6 /126	4/136
Industrial Eng	-	4 /37	3/74
Materials Science	-	14 /62	11/84
Mechanical Eng	5 /82	5/110	3/128
Anthropology	2 /70	1 /69	1/82
Economics	14 /93	13 /106	11/118
Geography	20 /49	-	-
History	5 /102	11 /111	6/138
Political Science	3 /83	3 /97	3/237
Psychology	1 /150	2 /185	4/120
Sociology	3 /92	4 /95	5/120

National Academy rankings of U Michigan program quality

Public Purpose

Here there are reasons for concern. A 2010 report by the Education Trust, *Opportunity Adrift*, stated: "Founded to provide 'an uncommon education for the common man', many flagship universities have drifted away from their historic mission" (Haycock, 2010). Analyzing measures such as access for low-income and underrepresented minority students and the relative success of these groups in earning diplomas, they found that the University of Michigan and the University of Indiana received the lowest overall marks for both progress and current performance among all major public universities in these measures of public purpose. For example, Michigan's percentage of Pell Grant students in its freshman class (the most common measure of access for low-income students) has fallen to 13%, well below most other public universities including Michigan State (20%) and the University of California (33%); it even

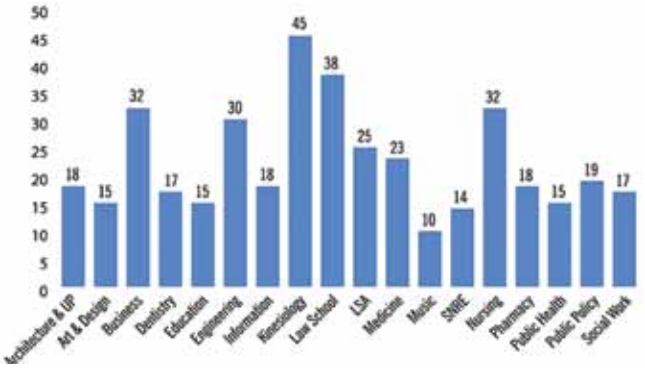
lags behind several of the most expensive private universities including Harvard, MIT, and Stanford.

Of comparable concern is the significant drop in enrollments of underrepresented minority students, dropping from 17% of undergraduates in 1996 (including 9.4% African American) to 12% in 2010 (5.6% African American). Once Michigan's professional schools were leaders in minority enrollments (with Medicine, Business, and Law at 12% African American enrollments in the 1990s); today they have fallen badly to levels of 5% or less. While the very recent decline may be attributable in part to the impact of the State of Michigan's Proposition 2 passed in 2007 that restricted the use of affirmative action, racial diversity on campus has actually been declining for well over a decade, suggesting more fundamental concerns about the University's commitment to diversity.

Size

The University of Michigan has continued to grow over the past two decades. With a total budget now exceeding $5.3 billion/year (of which $3 billion/year is for academic programs), a campus continuing to expand both with new buildings and the acquisition of the 177 acre site and research and office facilities of the adjacent Pfizer Global Research Laboratories, and a research budget now in excess of $1.3 billion/year, one could well claim that the Ann Arbor campus of the University of Michigan has become the largest, most comprehensive, and most complex university campus in the world.

Yet while such growth brings opportunities (and pride), it also brings challenges such as financing and managing such a gigantic complex. After all, many institutions in our society have learned that scale alone cannot guarantee quality or sustainability, with the recent bankruptcy of General Motors a nearby example. Of particular note here has been the growth in student enrollments, from 35,000 in the 1990s to over 42,000 today, a 20% growth occurring mostly at the undergraduate level with a particular emphasis on out-of-state students primarily designed to increase tuition revenue to compensate for the loss of state support. Yet this growth has also changed the character of the University, shifting the balance from graduate to undergraduate education, demanding a significant increase in the number of non-tenure track lecturers (who now provide over 50% of undergraduate instruction), driving a major expansion of student housing (on the part of both the University and private developers), and threatening to overload other academic infrastructure such as libraries, study space, course availability, and cyberinfrastructure. Teaching loads, as measured by students per full-time faculty member, are the highest in the University's history.



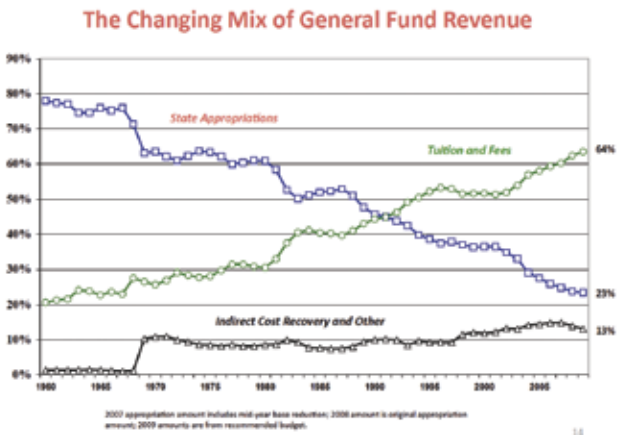
Fall 2008 Student-to-Faculty ratios (full-time faculty)

Beyond the concern that Michigan's recent enrollment growth may be taking it toward the characteristics of very large, undergraduate campuses such as Michigan State and Ohio State, there is also a serious concern as to whether academic quality is sustainable with such enrollments as state support continues to dwindle. Essentially all leading private universities are much smaller, typically one-third the size of the University's Ann Arbor campus.

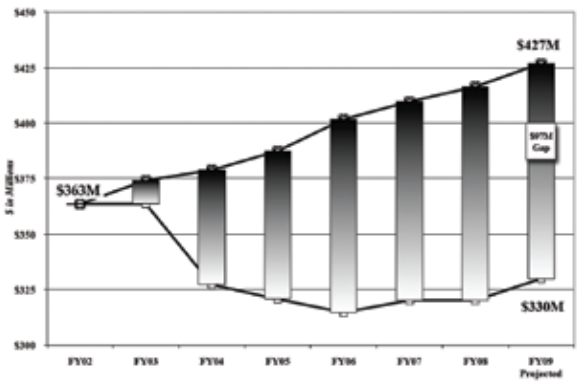
While overwhelming size commands respect, it also demands serious thought be given to how one organizes and manages such scale. In fact, we have many disturbing examples of how size and complexity can lead to disaster, e.g., the dinosaurs and General Motors. On a more positive note, we also have some excellent examples of organizations that have managed to transform themselves to achieve agility and innovation despite their immense scale, e.g., IBM and China!

Financial Strength

As state support has declined over the past three decades, the University of Michigan now finds itself a predominantly "privately-supported" public univer-



State appropriations are rapidly disappearing as a component of the University's General Fund.



The "Jaws" diagram showing the erosion in state support compared to the CPI

sity, in the sense that roughly 90% of its revenues come from non-state sources (as shown in charts detailing the 2009 financials of the University). Actually, it is more enlightening to separate off the UM Health System, residential housing, and athletics and to consider only the revenues that support the academic missions of the university (including research and student housing).

While the University's state appropriation is still important today at $260 M/y, (UMAA), the State of Michigan's support has fallen behind all of the University's other patrons including students (tuition), the federal government (research grants and student financial aid), and private contributors (gifts and endowment income). This erosion in state support is demonstrated convincingly by charts showing its share of the General Fund as well as an estimate of the loss in state support over the past decade (the so-called "jaws" diagram).

These charts make it apparent that the University has been able to adjust revenues to compensate for the loss of state support largely by increasing enrollments (by 20%), increasing student tuition (particularly for non-resident students, now in excess of $38,000/year), and shifting the student mix of instate to out-of-state students. This combination of actions has generated a revenue increase of roughly $300 million/y, more than enough to compensate for declining state appropriations. Yet here there are worries about the future. While once the state appropriation was viewed as providing the tuition discount given instate students, the current state appropriation per instate student ($10,000) plus the instate tuition ($12,500) falls far short of estimated instructional costs ($30,000) and nonresident tuition ($38,000). Hence as state support continues to decline, the University will clearly need to continue to increase instate tuition (at least for those students who can afford it) or sacrifice other objectives such as quality.

Other revenue streams face similar challenges. While the University faculties have been extraordinarily successful in attracting sponsored research grants, it must be kept in mind that these usually cover only about 80% of the cost of the research procured by the federal government and other sponsors. That is, to sustain a $1.3 billion/year research program costs, the University invest an additional $250 million/year. Currently this subsidy comes from sources such as clinical income for biomedical research and general funds for academic units (including tuition). But it should be kept in mind that increasing sponsored research funding, while important to both the University and the nation, will require a corresponding increase in the University funding necessary to compensate for cost-sharing requirements, unfunded indirect research costs, and administrative costs.

Finally, a word about private support: Clearly this has been essential to the University, since as state support for major capital facilities disappeared in the 1990s, this provided a critical source of funding for new buildings. It has also been critical for ongoing operations, bringing in roughly $100 M/y to $150 M/y for this purpose. But its most critical impact is building an endowment whose growth can then be managed to provide significant ongoing support for academic programs for

the long term. The ability of the University to build its endowment through fund-raising campaigns and effective asset management has been impressive, resulting in endowment growth to $7.6 billion in 2008, although declining to $6 billion with the Great Recession.

However two caveats are important here: First roughly 26% of the endowment is associated with hospital reserves and hence restricted to biomedical research and education. Second, as a rule of thumb, the wealthiest private institutions achieve endowments capable of sustaining their institutions only when the endowment reaches a level of $1 million per student (since this generates sufficient payout at 4.5% to cover tuition levels). With the rapid growth in Michigan's enrollment, its endowment for academic purposes amounts to only $107,000 per student, which at 4.5% payout would generate only $5,357 per student. Hence while impressive, the University's endowment is far short of that required to provide independence from state support with our current enrollment.

Campus Evolution

The University of Michigan campus has continued to evolve over the past two decades, despite the disappearance of state support for major capital facilities. The two major complexes designed by architect Robert Stern, Weill Hall (for the Ford School) and North Quad, provide elegant entrances to the Central Campus. The major building of the Ross School of Business Administrations is also an important facility. While Venturi's Life Sciences complex is actually a somewhat smaller version of buildings he designed for Yale and UCLA, the biomedical research complex on Huron and Observatory is important for the continued expansion of research activity in the life sciences, as will be the recently acquired North Campus Research Center (the former Pfizer R&D Laboratories). Extensive renovations of residence halls will be important for the growing student enrollment, and the addition of skyboxes and club facilities for Michigan Stadium may bring in needed additional income. And, of course, the clinical facilities for the University Hospitals have grown very significantly with the addition of the Cardiovascular Center and the new Mott Pediatrics Hospital, along with planned expansion of the Medical School.

Yet here there are also concerns. Most of the campus growth (75%), at least in terms of investment ($1.5 B), has occurred in auxiliary units (i.e., clinical activities, housing, athletics) and funded by auxiliary revenue streams, albeit with debt secured by student fee income. Those buildings responding to academic needs have generally depended upon anticipated federal research support (e.g., Public Health Annex) or private funding (Ross Business School, Weill Hall). This raises a serious question as to just how, in the absence of state support, the University will meet the future capital facilities needs of those academic units that have no donors or other external revenue sources (e.g., federal R&D).

Institutional Priorities

The budget growth of auxiliary units (hospitals, housing, athletics) also raises the important issue of university priorities and balance. At Michigan there is some truth to the old saying that the core of the contemporary university is a quite fragile academic institution striving to survive between the pressures exerted by the football stadium on one end of the campus and the university hospital on the other. But more serious is the issue of how one sustains the highest priority for the academic core of the university in an increasingly resource-driven (and for many academic units, resource-starved) constrained by "fund accounting", in which it is increasingly difficult to provide cross-subsidies from one unit to another (and particularly from auxiliary units to academic units).

This concern about academic priorities applies not only to resource allocation but even more to the attention of governance (the Regents), leadership (the Executive Officers), and management. Too many universities have seen the quality of their academic programs deteriorate through the distraction of important but clearly secondary activities such as fund-raising (e.g., donor cultivation and influence), the management of billion-dollar enterprises such as health systems, and, of course, the politics and public visibility of intercollegiate athletics.

Culture

There is also the related issue of the changing cul-

ture of the university as it becomes larger, more extended, more complex, and less driven by academic priorities. We have raised the concern that the University of Michigan's long-standing public role of providing "an uncommon education for the common man" through leadership in providing exceptional educational opportunities to low income and underrepresented minority students has already declined as its state support has eroded. One might also suggest that the long-standing tradition of Michigan Stadium that all spectators are treated the same, come rain, snow, or sunshine, today has yielded to the upper-class privileges of professional venues with skyboxes and private clubs (ironically, subsidized in part by the "common man" through the generous tax treatment of the payments for these premium services).

So too, one might well worry that the increasing scale and complexity of the University might inhibit the grass-roots innovation and experimentation that so energizes the trailblazing character of the institution. While becoming too big to fail is always a misconception–witness the collapse of General Motors and Chrysler–this perspective can sometimes inhibit the willingness to embark on high-risk activities so essential to the Michigan spirit.

The final warning flag has to do with the use of initiatives at the presidential or executive officer level to lead or steer the university, since Michigan throughout its history has been very much a bottom-up driven institution. It is not just that most top-down initiatives are soon rejected by the Michigan grassroots culture and fade away into obscurity, but more important, the true creativity, wisdom, and drive flourishes best at the grass-roots level with outstanding faculty members, students, and staff rather than administrators. Contrast the limited success of the earlier presidential initiatives such as the repertory theater planned to be originally sited next to the Power Center), the Venturi-Scott-Brown master plan for the campus, the brief (and expensive) tenure of the Royal Shakespeare Theatre group, the "Halo" design of Michigan Stadium, and even the Life Sciences Institute. Some have sunk beneath the waves, some have been bailed out and still float (at considerable expense), but none is a dramatic success. Contrast these with grass-roots initiatives such as NSFnet (later to become the Internet), the Molecular Medicine Institute (a precursor to the Human Genome Project), and the Digital Library Project (leading eventually to the PageRank algorithm, Google, and the HathiTrust).

Worries

UM --> MSU?

UM --> GM?

UM Medical Center ==> UM <== UM Athletics

Michigan Politics ==> UM --> U Mississippi?

In fact, it is probably best to approach leadership in such a decentralized bottom-up environment much as a farmer would approach growing crops, by planting seeds to encourage innovation; watering, fertilizing, and nurturing exciting grassroots initiatives (and occasionally weeding out failures), and then harvesting the success for all to share.

Faculty Concerns

It is appropriate to conclude this section of warning signs by summarizing the views of a number of faculty leaders (including several deans) expressed during a series of round-table discussions during Fall of 2009:

Threats Posed by the "Great Recession" of 2008-2009: While the confidence expressed by the University leadership is encouraging, the faculty has a nagging sense that we may be whistling through the graveyard. Most colleagues at other institutions are being asked to sacrifice. Faculty members ask why are they not being asked to do more? Clearly Michigan is going to have to develop a much different business model for the University than most realize. Simply expanding the enrollments of out-of-state students is only a short-term strategy. There is particular concern about the impact of our environment on the long-term strength of the University, surrounded as it is by a state declining in almost all characteristics (prosperity, demographics, quality of life, workforce quality).

The "P-Word": Productivity: How can Michigan get more bang for the buck? Do we need more differentia-

Faculty Views: The Past Two Decades

Faculty Views: The UM Today

Faculty Views: Major Concerns

Faculty Views: Major Concerns Continued

tion among faculty roles that take advantage of faculty skills and experience? Has the rapid increase in enrollments (20% since the mid 1990s) changed the character of the University (e.g., the rapid expansion of part-time faculty) in ways not currently appreciated?

Socioeconomic Stratification: The faculty worries about the socioeconomic stratification of the University, almost inevitable with the University's increasing dependence on affluent out-of-state students paying tuition at private college levels. Perhaps one way to address this is to build more robust relationships between the University and the rest of Michigan colleges and universities, i.e., "franchising" our impact to some degree.

Globalizing the University: Until 1910, most leading faculty had spent time in Germany. In the 20th century, this shifted to the United States. Today it may be shifting once again, this time to Asia. (Today the most common language in the Medical School labs is Mandarin!) How do we function in an increasingly global (peer-to-peer) context, sustaining and expanding our global activities? How many faculty members are ready to participate in "going global"? Do we need different incentives? How can we sustain these efforts that in many cases are top-down driven rather than engaging grassroots commitments?

Immigration and Globalization: There is a growing concern that the current financial climate is driving isolationist tendencies that may challenge the international character of American universities, e.g., enrolling outstanding graduate students from around the world.

Yesterday

UM Values

- Excellence
- Leadership
- Critical Inquiry
- Liberal Learning
- Diversity
- Innovation
- Excitement
- Spirit

Characteristics

- Leaders and Best
- Control of its destiny (constitutional autonomy)
- Freedom and responsibility
- Broad and Liberal Spirit
- Critical inquiry and learning
- Diverse in character, united in spirit
- Uncommon education for the common man
- Critic and servant of society
- Relish for innovation and excitement
- Pathfinder, Trailblazer, Pioneer

Today

Publically committed?
Privately supported?
State governed (lay, politically governed)
Nationally supported
Decentralized, distributed leadership
Misunderstood (from within, from without)
Ponderous, risk adverse
Distracted (lost in forest for the trees)
Trapped in sinking state
Large, larger, largest in the land
- Campus
- Budget
- Michigan Stadium
- Medical Center

Trajectories
- UG up
- Out-of-state up
- Rich students up
- Research volume up
- Graduate education down
- Tenure-track faculty declining
- Part-time faculty up

Priorities
- Academic programs benign neglect
- Quantity up
- Quality down
- Auxiliaries up
  - Medical Center up
  - Housing up
  - Athletics way up
- Resources
  - State ignored
  - Federal leveraged
  - Donors up (but inadequate)
  - Investments stable

A Summary of Concerns at the University Level.

It is important to recognize just how much impact international students have on this nation (one-third of all startups, providing important contacts if and when they return to their home countries, etc.) In fact, most of us are only a few generations away from being immigrants ourselves!

An Achilles Heel: Secondary education: Compared to the rest of the world, U.S. secondary education is "too thin"–too brief, not rigorous enough, pushing too much remedial education up to the college level (including much of general education). Is this something we have to accept, or does the University need to become more engaged with changing our "supplier network"?

Re-establishing UM as a National Leader in Cyberinfrastructure: The UM has a long history of leadership in IT, e.g., the first academic program in computer engineering, developing time-sharing (with IBM), playing a key role in building the Internet (with Merit and IBM). Today, as cyberinfrastructure plays an increasingly important role in all aspects of the university (learning, scholarship, engagement), it is critical that UM develop a strategic vision and make the necessary commitments to reestablish its leadership role. Possibilities include cloud computing, open educational resources (e.g., OCW, Google Book Scan, UM Publishing), and new educational paradigms ("four-quadrant" activities).

The Michigan Saga: What is UM? A pathfinder, trailblazer, pioneer, or settler? In the past, we have had most impact as a pathfinder, trailblazer, and pioneer. Indeed, this role as a pathfinder is at the core of "the Michigan Saga". Will our patrons–the state, federal government,

and donors–continue to support (or at least tolerate) this role?

Grassroots excitement: How do we identify, support, promote, harvest, and enable the excitement occurring at the grassroots level to drive the University?

Where do we go next? Should UM hunker down to protect itself during the collapse of the state and wait until things get better? Certainly not! Things are NOT going to get better (at least for a generation). Instead, when the going gets tough, the tough get going.

How much are the near term initiatives pushing aside the long term planning (tactics dominating strategy).

How do we neutralize distractions?

How do we balance strategy with adaptation and opportunism, e.g., goal driven vs. nimble and responsive to opportunities?

What are the "big ideas" now within range of the UM?

What is our current trajectory? Building quality and impact? Or gliding on a slightly downward path from earlier heights?

Concerns at the State Level

By any measure, the assessment of the State of Michigan today is very disturbing. The state is having great difficulty in making the transition from a manufacturing to a knowledge economy. In recent years it has led the nation in unemployment; the out-migration of young people in search of better jobs is particularly severe in our state; our educational system is underachieving with one quarter of Michigan adults without a high school diploma and only one-third of high school graduates college-ready. Although the state's system of higher education is generally regarded as one of the nation's best, over the past decade Michigan has fallen to the bottom of the nation–dead last–in its support of higher education. Yet at the same time it has risen to national leadership in its incarceration rate, with prison costs exceeding its investment in higher education.

More generally, for many years Michigan has been shifting public funds and private capital away from investing in the future. Instead of priorities such as education, research, and innovation, the state has chosen instead to fund near-term obligations such as prisons, Medicaid and expensive health and retirement benefits for public employees. It has provided tax abatements for declining industries even as it reduced state revenues still further through tax cuts that benefit primarily the affluent at the expense of the social services so critical to our less fortunate citizens–not to mention our children. And all the while, as the state budget began to sag and eventually collapsed in the face of a weak economy, Michigan leaders continued to fight the old and increasingly irrelevant cultural and political wars (cities vs. suburbs vs. exurbs, labor vs. management, religious right vs. labor left). Preoccupied with the political rhetoric and social demands of the past, Michigan has been consuming its seed corn for its future.

Michigan today spends an average of $5,700 a year on a public university student, significantly below the national average of $6,600 and a statewide average of $7,300 for each K-12 student (Boulus, 2009). But even more disturbing is that after a massive prison building boom in the 1980s, today Michigan spends almost 30% more on locking people up ($1.9 billion, corresponding to $40,000 per inmate) than it does on educating them in our public colleges and universities, a truly tragic statement of our state's priorities (SHEEO, 2010).

During much of this period, state universities strained to hold tuition increases in check. In fact, when financial aid and inflation are included, the net tuition levels for public higher education in Michigan have actually declined over the past decade. But with the most recent cuts, occurring after state government abrogated an earlier agreement to restore funding cuts if the universities would hold tuition increases below inflation, the universities had no choice but to begin to raise tuition levels at double-digit rates. Perhaps indicative of state government's myopia, the governor and state legislators continue to blast these tuition increases, pandering to the fears of students and parents, even as state government plans to cut higher education still further (Boulus, 2009).

More specifically, while all of the state's public universities have seen declines in inflation-adjusted state appropriation of 25% or more, Michigan's research universities have been particularly hard hit. Because of strong enrollment increases, Michigan State University

Abandoned auto plants...

And an equally abandoned GM Headquarters

has seen an effective decline of 40% in state support. State support of the University of Michigan's Ann Arbor campus has now declined to less than 7% of its total operating budget (and only 11% of its academic budget).

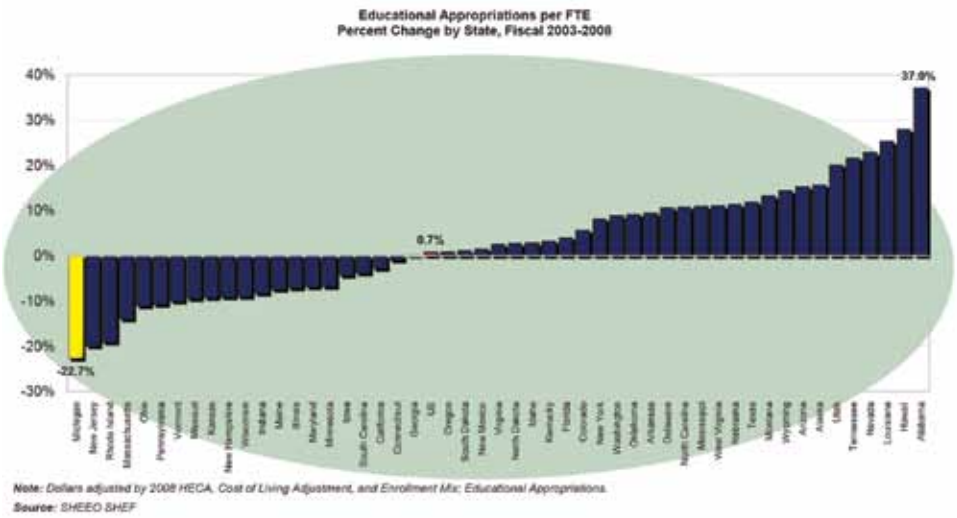
Michigan also lags far behind other states in providing state support of needed academic buildings on university campuses. Since the 1980s, there has been relatively little state capital outlay for higher education. In fact, the state has currently seen a decade-long drought with no appreciable funding of university facilities, ranking Michigan lowest in the nation in this important criterion.

Today there are increasing signs that both the quality and capacity of Michigan's public universities are beginning to suffer, at just that moment when the challenges of a global, knowledge-driven economy have positioned our universities as among our most important assets. Student-to-faculty ratios and workloads have been increasing, eroding not only the quality of classroom instruction but also constraining research university faculty from conducting the research critical to economic development in a knowledge economy increasingly dependent upon technological innovation. Faculty salaries at our public universities have fallen 20% behind those at private universities (compared to 1980 when they were roughly even), leading to a migration of some of the best professors from public to private institutions. Further erosion has occurred in the value of pension plans, medical benefits, life insurance, housing, and other benefits key to faculty recruiting and retention.

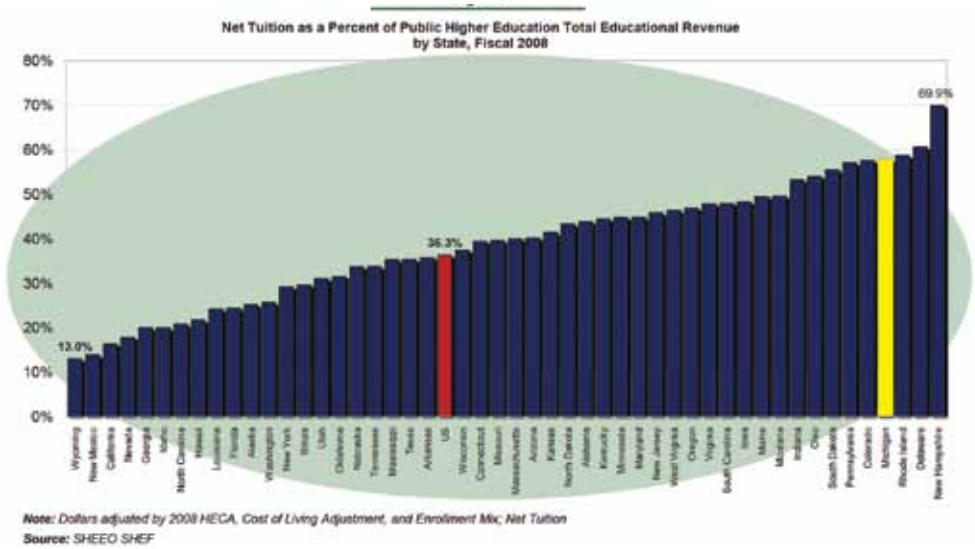
To compound these challenges, state government continues to threaten the autonomy of the Michigan's public universities, guaranteed by the state constitution, by attempting to influence admission policies, curriculum, facilities funding, and personnel policies. Particularly insidious has been the impact of recent statewide referenda that now prohibit policies such as affirmative action critical to the ability of Michigan's universities to serve its increasingly diverse population.

The harsh manner in which state government has treated higher education in recent years demonstrates in a convincing fashion that our public leaders simply don't get it. They fail to understand the imperatives of the new economy for Michigan's future. But even in the short term, considering the economic impact of Michigan's colleges and universities, cutting higher education is clearly penny-wise and pound-foolish!

Little wonder that after the cavalier treatment higher education has received from state leaders over the past several years, the governing boards with fiduciary responsibility for the welfare of Michigan's public universities have begun to lose confidence in state government as a reliable partner in providing adequate support for this critical state asset. Term-limited legislators and governors, political parties controlled by narrow special-interest groups, and a body-politic addicted to an entitlement economy simply cannot be trusted. Instead, governing boards are relying more heavily on the autonomy provided by the state constitution, which gives them control over decisions such as admission, tuition



Tragically, Michigan now ranks 50th in the nation in change in its support of higher education.



As state appropriations have plummeted, Michigan's universities have been forced to raise tuition.

and fees, faculty and staff compensation, procurement, and other areas sometimes micromanaged by state government. In fact, as a consequence of inadequate state support, several of Michigan's public universities are rapidly becoming predominantly "privately financed public universities," facing the challenge of sustaining their public purpose and service to Michigan citizens by competing in the marketplace rather than depending primarily upon adequate state support.

There is little hope of returning to a level of state support adequate to sustain world-class quality in the foreseeable future. The constraints on tax revenue and the priority of other needs will constrain any significant growth in funding for higher education in Michigan. Furthermore, political pressures will continue to make it very difficult to prioritize state support for flagship institutions such as the University of Michigan. Instead, these same forces will drive a leveling process in which state appropriation per student gradually equalizes across the state. Of course, this situation will likely be the future of other flagship public universities in the years ahead. The very concept of the comprehensive state university of world-class quality is in serious jeopardy, at least to the degree that we expect these institutions to be supported in a significant way from state appropriations and driven primarily by state priorities (and politics).

Concerns at the National Level

While public surveys still suggest strong support of higher education, numerous studies sponsored by government, business, foundations, the National Academies, and the higher education community have suggested that the past attainments of American higher education may have led our nation to unwarranted complacency about its future.

The United States currently ranks 10th among OECD nations with on 39% of 25-to-34 year olds having an associate degree or higher (although it ranks 5th for 25-to-65 year olds) and almost last in college completion rates, particularly when the fastest growing component of our population comes from minority groups (particularly Latinos) with the lowest participation in higher education.

If less than 40% of Americans earn a two- or four-year college degree, and much of the adult population in the U.S. has never taken a single college class, then most of our citizens are falling behind. They are vastly underserved by traditional colleges and universities. To fully develop our nation's human capital, new means of knowledge access must be made available.

There is clear evidence of an increasing stratification of access to (and success in) quality higher education based on socioeconomic status. Students from the highest income quartile are ten times more likely to graduate with college degrees than those from the lowest quartile!

Many question whether our colleges and universities are achieving acceptable student learning outcomes (including critical thinking ability, moral reasoning, communication skills, and quantitative literacy).

But there is another concern. A recent analysis ranked the global competitiveness of 40 leading nations. While the United States ranked sixth overall among 40 leading nations in current global competitiveness according to these measures, it ranked dead last, 40th out of 40, in the progress made over the past decade. The study also noted the degree to which the United States was falling behind in higher education, ranking currently 9th among nations in baccalaureate degree participation and 15th in change over the past decade.

Here part of the problem appears to be that many policy makers in Washington and at the state level simply assume that we will continue to be world leaders in innovation without a national strategy for further progress, while most other nations, particularly in Asia and Europe, are making major investments in education, R&D, and knowledge infrastructure. When global corporations are polled and asked to identify the most attractive country locations for locating new R&D facilities, China ranks higher than the United States by 61% to 41%, and India is in third place with 29%. Between 1998 and 2003, the share of R&D investment by U.S. firms and affiliates grew twice as fast overseas (52%) as it did domestically (26%). Thus, foreign markets and the climate they provide for investment appear to be outpacing us.

The future of public higher education is of immense importance to the United States. Beyond the fact that three-quarters of all college students are enrolled in public universities, the increasing dependence of our nation on advanced education, research, and innovation compel efforts to both sustain and enhance the quality of our public colleges and universities. Yet, the current structure for financing public higher education may no longer be viable. Traditionally, this has involved a partnership among states, the federal government, and private citizens (the marketplace). In the past the states have shouldered the lion's share of the costs of public higher education through subsidies in an effort to keep tuition low for students; the federal government has taken on the role of providing need-based aid and loan subsidies. Students and parents (and to a much lesser extent donors) pick up the rest of the tab.

This system has become vulnerable as the states face the increasing Medicaid obligations of a growing and aging uninsured population, made even more difficult by the state tax-cutting frenzy during the boom period of the late 1990s. This is likely to worsen as a larger percentage of young people and working adults seek higher education while the tax-paying population ages and health care costs continue to escalate. As Kane and Orzag conclude, "the traditional model of higher education finance in the U.S. with large state subsidies to public higher education and modest means-tested grants and loans from the federal government is becoming increasingly untenable" (Kane, 2003).

Little wonder then that many are calling upon national leaders to articulate a national agenda for higher education in America, similar to other national agendas

The Spellings Commission

in K-12 education such as "A Nation At Risk" and "No Child Left Behind". Here part of the challenge is a profound misunderstanding of the relationship among the cost, price, and value of a college education by both students and parents and by elected public officials. The funding of higher education by state and federal government support (including tax benefits), philanthropy, and other various revenue streams not only disguise true costs but make pricing, e.g., tuition, largely fictitious, since all students, rich and poor, in public and private institutions receive very substantial subsidies. In some ways the financing of higher education is reminiscent of health care, where third-party payers (insurance companies, Medicare and Medicaid) also decouple the consumer from the marketplace. However in health care, at least one can estimate the costs of medical treatment and patients can assess the value of their health care, in contrast to higher education where true costs are difficult to estimate and the benefit of a college education is usually assessed only many years later.

One might approach this as an appropriate challenge to the federal government. After all, in some ways it was federal inaction by earlier Washington administrations that created the current dilemma, crippling state budgets with unfunded federal mandates such as Medicaid, through federal inaction on national priorities such as universal health care, and shifting philosophies of federal financial aid programs. It is also the federal government's responsibility to invest adequately in providing for economic prosperity and national security, particularly in the new flat world characterized by phenomena such as outsourcing and off-shoring characterizing a hypercompetitive, global, knowledge-driven economy increasingly dependent upon knowledge workers, research, and technological innovation (Friedman, 2005).

The Spellings Commission

Of particular importance here was the National Commission on the Future of Higher Education (the "Spellings Commission"), launched in 2005 to examine issues such as the access, affordability, accountability, and quality of our colleges and universities (Miller, 2006). This unusually broad commission–comprised of members from business, government, foundations, and higher education–concluded that "American higher education has become what, in the business world would be called a mature enterprise: increasingly risk-averse, at times self-satisfied, and unduly expensive. It is an enterprise that has yet to address the fundamental issues of how academic programs and institutions must be transformed to serve the changing educational needs of a knowledge economy. It has yet to successfully confront the impact of globalization, rapidly evolving technologies, an increasingly diverse and aging population, and an evolving marketplace characterized by new needs and new paradigms."

More specifically, the Commission raised two areas of particular concern about American higher education: social justice and global competitiveness. Too few Americans prepare for, participate in, and complete higher education. Notwithstanding the nation's egalitarian principles, there is ample evidence that qualified young people from families of modest means are far less likely to go to college than their affluent peers with similar qualifications. America's higher-education financing system is increasingly dysfunctional. Government subsidies are declining; tuition is rising; and cost per student is increasing faster than inflation or family income.

Furthermore, at a time when the United States needs to be increasing the quality of learning outcomes and the economic value of a college education, there are disturbing signs that suggest higher education is moving in the opposite direction. Numerous recent studies suggest that today's American college students are not

The National Academies Study on Research Universities requested by Congress.

really learning what they need to learn (Bok, 2006).

Although the Spellings Commission proposed a number of recommendations to address these concerns, these were largely ignored by the Bush administration. In sharp contrast, the Obama administration has not only set out bold goals for the nation that address many of these concerns, such as the President's challenge to raise college attainment by 25% to raise the nation to the world's leader by 2020 while providing at least one year of college for every American, but it has also launched a number of important initiatives and programs to address these concerns such as the restructuring of federal financial aid in the Reconciliation Health and Education Act of 2009, the Race to the Top and Early Learning programs, a dramatic expansion of the Pell Grant program.

The National Academies Commission on the Future of the American Research University

While American research universities continue to provide the nation with global leadership in research, advanced education, and knowledge-intensive services such as health care, technology transfer, and innovation, this leadership is threatened by rising competition from abroad, by stagnant support of advanced education and research in key strategic areas such as science and engineering, and by the complacency and resistance to change of the academy.

Recently members of the United States Congress have asked the National Academies to conduct a thorough study of the state of the nation's research university. As stated in their letter: "America's research universities are admired throughout the world, and they have contributed immeasurably to our social and economic well-being. Our universities, to an extent unparalleled in other countries, are our nation's primary source of long-term scientific, engineering, and medical research. We are concerned that they are at risk. Hence we are writing to ask the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine to assembly a distinguished group of individuals to assess the competitive position of American research universities, both public and private, and to respond to the following question: What are the top ten actions that Congress, state governments, research universities, and others can take to maintain the excellence in research and doctoral education needed to help the United States compete, prosper, and achieve national goals for health, energy, the environment, and security in the global community of the 21st Century."

Although it is still early in its studies, some of the major issues and possible recommendations that will receive consideration include:

1. Unsustainable Financial Models: Graduate education and research require subsidies from increasingly vulnerable revenue sources: federal support (threatened by growing federal debt), state support (collapsing with state budgets and shifting priorities), corporate support (declining for both research and employee education), tuition (approaching a market ceiling), gifts and endowments (sufficient for only a small number of institutions), and clinical income (threatened by new health legislation).

Possible Recommendation: Institute a new financial model that better distributes the primary responsibilities for the support of the nation's research universities among the states, the federal government, students,

and private sector (foundations, corporations, donors).

2. Global Competition: Currently the United States has no comprehensive policy for enhancing and sustaining its research universities in the face of growing international competition from nations making major commitments to build world-class universities in Europe and Asia. In fact, many current federal policies and practices actually harm the competitiveness of U.S. universities, e.g., the failure to cover the full costs of federally procured R&D (ICR, cost sharing), federal R&D priorities that drive imbalance among disciplines (biomedical >> physical science & engineering >> social sciences) while failing to adequately address critical national needs such as energy infrastructure and industrial innovation and design.

Recommendations: Complete the objectives of the America COMPETES Act; commit to providing full cost funding of federally procured R&D; develop and implement federal research policies that more strategically target national priorities; and develop a national policy for sustaining world-class American research universities.

3. Human Capital: Current federal and state policies constrain the capacity of American research universities to address the nation's critical needs for human capital–particularly in science and engineering–by restricting actions to address the increasing diversity of the American population (e.g., affirmative action) and limiting the ability of research universities in attracting international students and faculty as immigrants who can eventually enter the nation's workforce.

Possible Recommendation: The federal government should place a higher priority on encouraging and supporting programs aimed at providing access to graduate and professional education to underrepresented minorities while modifying immigration policies to both attract outstanding international students and facilitate their eventual immigration following graduation (e.g., "stapling a green card to each diploma"…)

4. The Capacity for Change: Research universities face major challenges from the changing intellectual nature of knowledge creation and application (e.g., transformational and translational research), the changing nature of faculty activities (e.g., the growing responsibility for resource generation in addition to traditional responsibilities for teaching, research, and service) and the changing needs and character of a new generation (e.g., the "Millennials") that will require major transformations in university organization, management, and leadership.

Possible Recommendation: Both governments (state and federal) and the private sector (foundations, corporations, donors) should give a higher priority to stimulating and supporting major experiments in both restructuring existing research universities and launching new university forms (e.g., global universities and cyberspace universities,).

5. Institutional Competition: One of the great strengths of American higher education is the presence of a system of world-class public and private research universities, sustained by public policies that ensure sufficient balance in financial assets, flexibility, and quality to serve the diverse needs of the nation. Yet today, shifting state and federal policies (e.g., tax policy, financial aid policies, tuition constraints, sponsored research policies, affirmative action constraints) differentially affect various elements of the U.S. research university enterprise and drive predatory practices and cost escalation in the recruitment of faculty and students.

Possible Recommendation: Encourage the leaders of higher education to reaffirm the importance to the nation of a balanced mix of world-class public and private research universities while modifying federal and state policies that preferentially advantage various elements of the research university system (public or private) to create a level playing field in the competition for students, faculty, and grants.

6. University Governance, Management, and Leadership: The current governance, management, and leadership of America's research universities are increasingly overwhelmed by their complexity, scale, and importance to national priorities.

Possible Recommendation: To dramatically improve the quality of university governance, leadership, and management by adopting the best practices of corporate governing boards and management that stress competence, accountability, and integrity.

7. Public Understanding: The American public has little understanding of the role played by world-class research universities in both creating new knowledge (and stimulating innovation critical to economic prosperity, and national security) and in training those capable of generating knowledge and innovation (graduate education).

Possible Recommendation: Launch a major public awareness campaign aimed at persuading voters about the importance in investing in higher education in general and stimulating efforts to restore funding adequate to sustain the nation's world-class research universities critical to economic prosperity, national security, and social well being.

The Need for a National Strategy

Most nations are taking action to address–or at least cope with–the ongoing challenges of meeting workforce needs while elevating their universities to world-class status, although local cultures, traditions, and politics shape their particular approach.

Because of our origin as a federation of independent colonies (and then states), the United States continues to rely on a highly decentralized market-driven approach, consistent with the constitutional role that the states play in higher education and the autonomy of private institutions, with little strategic direction from the federal government.

In fact, the United States is essentially the only developed nation without a national strategy for higher education in general and for research universities in particular (Weber, 2007). Of course our nation does have a well-organized national research system, based on competitive grants from federal agencies. But the budgets and control of our public research universities, which conduct most of the research and produce most of graduates of advanced degree programs, are at the state level, with only minimal influence by policies of the federal government.

Today, more than ever, the United States needs to develop a national strategy for sustaining (and perhaps expanding) a system of world-class research universities. Actually we have done this before, a century ago, with the Land-Grant Acts that provided the revenues from the sale of federal lands to the states to build the public universities that have provided educational opportunities to the working class and conducted both the basic and applied research to address key national priorities such as agriculture and industry. The federal government stepped in once again after WWII to create a partnership between the research universities and federal agencies through a peer-reviewed competitive grant system. Today many believe we need a new national strategy to sustain and enhance the quality of the nation's higher education enterprise.

Yet since that time, for almost four decades, the nation really has had no agenda for higher education in America. Little wonder that at times we appear to be drifting aimlessly, with changing social priorities putting at great risk the very institutions that earlier generations built and supported so strongly as key to the future of a great nation.

The Future of the Public University in America

An important, perhaps even dominant, theme of American higher education in the twentieth century was the evolution of the public university. With an expanding population, a prosperous economy, and driving needs such as national security and industrial competitiveness, the public was willing to make massive investments in higher education. While elite private universities were important in setting the standards and character of higher education in America, it was the public university that provided the capacity and diversity to meet our nation's vast needs for postsecondary education.

Today, however, in the face of limited resources and more pressing social priorities, this expansion of public support of higher education has slowed. While the needs of our society for advanced education will only intensify as we evolve into a knowledge-driven world culture, it is not evident that these needs will be met

by further expansion of our existing system of public universities. The terms of the social contract that led to these institutions are changing rapidly. The principle of general tax support for public higher education as a public good and the partnership between the federal government and the universities for the conduct of basic research are both at risk. These changes are being driven in part by increasingly limited tax resources and the declining priority given higher education in the face of other social needs.

There is a paradox here. Both state governments and the public at large call on public universities to achieve greater access, quality, and cost savings. Yet they also encourage–indeed, expect–them to draw an increasing share of their resource base from non-state sources. Public universities are challenged to demonstrate that they are not solely dependent upon the state, that they can increase faculty productivity and lower costs, all the while improving educational quality. In a sense, higher education funding policy in many states has shifted from tax-support of the public university as a public good to a philosophy of procuring low-cost educational services.

Here the University of Michigan is obviously not alone. Declining state support is driving many public research universities to become increasingly similar to their private counterparts in the development of an entrepreneurial faculty culture and in the manner in which priorities are set and assets are managed. Many of the nation's leading public universities are already far down the path taken by the University of Michigan as it has evolved into a privately financed public university. In such universities only a small fraction of operating or capital support comes from state appropriation. Like private universities, these hybrid institutions depend on tuition, federal grants and contracts, private gifts, and revenue from auxiliary services such as health care for most of their support.

There is already almost three decades of evidence that the states are simply not able—or willing—to provide the resources to sustain growth in public higher education, at least at the rate experienced in the decades following World War II. In many parts of the nation, states will be hard pressed to even sustain the present capacity and quality of their institutions. Little wonder that public university leaders are increasingly reluctant to cede control of their activities to state governments. Some institutions are even bargaining for more autonomy from state control as an alternative to growth in state support, arguing that if granted more control over their own destiny, they can better protect their capacity to serve the public.

Today, one might even conclude that America's great experiment of building world-class public universities supported primarily by tax dollars has come to an end. It could well be that the concept of a world-class, comprehensive state university might not be viable over the longer term. It may not be possible to justify the level of public support necessary to sustain the quality of these institutions in the face of other public priorities, such as health care, K–12 education, and public infrastructure needs—particularly during a time of slowly rising or stagnant economic activity.

One obvious consequence of declining state support is that the leading public universities may increasingly resemble private universities in the way they are financed, managed, and governed. Many will follow the path toward becoming increasingly privately financed, even as they strive to retain their public character. In such universities only a small fraction of operating or capital support comes from state appropriation. State universities forced to undergo this "privatization" transition–or, in more politically acceptable language, "self-sufficiency"–in financing must appeal to a broad array of constituencies at the national—indeed, international—level, while continuing to exhibit a strong mission focused on state needs. In the same way as private universities, they must earn the majority of their support in the competitive marketplace, that is, via tuition, research grants, and gifts, and this will sometimes require actions that come into conflict from time to time with state priorities. Hence the autonomy of the public university will become one of its most critical assets, perhaps even more critical that state support for some institutions.

This is a particularly important challenge to the privately supported, publicly committed paradigm that now appears to be evolving for flagship public research universities. It has become increasingly clear that few states are able or willing to commit the resources to build and sustain world-class universities. To sustain the quality of their programs, these remarkable public

institutions, built during earlier times when state support was more abundant, must now earn support from a far broader set of constituencies than the state alone. Yet the capacity to position state universities to attract these resources occasionally require actions that come into conflict with state priorities, for example, by admitting more out-of-state students.

How might we embark on this path to serve far broader public constituencies without alienating the people of our state—or risking our present (albeit low) level of state support? One constructive approach would be to attempt to persuade the public—and, particularly, the media—that our universities are vital to the state in a far more multidimensional way than simply education alone—through health care, economic development, pride (intercollegiate athletics), professionals (doctors, lawyers, engineers, and teachers), and so forth. We might shift the public perception of our universities from that of a consumer to that as a producer of state resources. We might argue that, for a relatively modest contribution toward our educational costs, the people of our states get access to the vast resources and benefit from the profound impact of some of the world's great universities.

The public university has always responded quite effectively to the perceived needs—and opportunities—of American society. Today these institutions are straining to balance public needs for greater access, high quality, and cost-effectiveness in a period of limited resources and political turmoil. The incompatibility of the demands placed upon the public university during a time of constrained resources could well erode the quality, the public character, and the civic purpose of these important institutions. It seems clear that we need a new dialogue concerning the future of public higher education in America, one that balances both its democratic purpose with economic imperatives. In fact, as we will suggest later, this is both an appropriate and perhaps imperative theme upon which to focus the activity of the University of Michigan's Bicentennial Year.

General Questions Concerning the University of Michigan Today

From this brief review of the current status of the University, a number of questions have arisen that frame the development of a vision for its third century:

Question l: What is the fundamental role of the university in modern society? What are its core values to society? If the issue is to get back to fundamentals, to reorganize the institution according to our basic values, then how and where do we begin?

Question 2: How does one preserve the public character of an increasingly privately financed university? How does a "state-related" or "hybrid state-national-global" university adequately represent the varied interests of its majority shareholders (e.g., students, parents, patients, federal agencies, private donors)? Can one sustain an institution the size and breadth of the University of Michigan on self-generated revenues alone?

Question 3: Should we intensify our commitment to undergraduate education in the face of the expanding importance of a college education in a knowledge-driven economy? Or should we instead focus on our unique core competency of high quality scholarship and research, advanced graduate and professional education of exceptionally high quality and intellectual breadth across the disciplines (noting that in the last National Academy rankings of academic quality (1995), the University of Michigan ranked 3rd in the nation (and world) behind only Stanford and the University of California Berkeley.

Question 4: What is the proper balance between disciplinary and interdisciplinary activity? How can we encourage more people to work in truly innovative areas without unduly jeopardizing their academic careers? How can we stimulate a greater risk-taking intellectual culture in which people are encouraged to take bold initiatives?

Question 5: We have an unparalleled opportunity to shape the academy for the future through this generation of graduate students. How should we meet this responsibility? Is the Ph.D. degree the appropriate training for the broadly educated, change-tolerant faculty needed by today's universities?

Question 6: In the early 21st Century, we will be facing a major number of faculty retirements, thereby providing us the opportunity to attract bright young faculty to the University. How should we select new faculty for brilliance and creativity? Do our present traditions and practices in faculty selection allow us to select genius? How do we assess and enhance teaching ability? How do we evaluate and reward service activities? Indeed, what is the appropriate form of service in the research university?

Question 7: How do we enable the University to respond and flourish during a period of very rapid change?

Question 8: How do we best protect the University's capacity to control its own destiny?

Question 9: Should our balance of missions shift among teaching, research, and service? Among undergraduate, graduate, and professional education? Among service to state, nation, and world?

Question 10: Should the University be a leader? If so, then where should it lead?

Provocative questions, indeed. And both challenging and appropriate for today.

Chapter 8

A Roadmap for Michigan's Third Century

We now turn to the development of a strategic roadmap for the University of Michigan as it approaches its third century. This is designed as an evolving framework of actions aimed to guide the University through its vision trilogy of *Reflection, Renaissance, and Enlightenment*.

Earlier chapters in this report have provided the foundation for this effort, scanning the environment in which the University now finds itself, assessing our current assets and challenges, and proposing a vision for our future, based upon our values, characteristics, and opportunities. In this chapter we begin by suggesting a framework for the recommendations that will comprise the University's roadmap for the third century, drawing from the experience of earlier strategic planning efforts both at Michigan and other venues. Key in this framework effort is the establishment of goals involving the most critical assets of the university: people, resources, culture, and the capacity for change. These will shape the subsequent recommendations of the roadmap.

The roadmap itself will be structured into three time-frames or "event horizons" associated with each element of the vision proposed in Chapter 6: *Reflection*, (to be accomplished by 2017); *Renaissance*, (launched over the next several years but guiding the University as it moves into its third century; and *Enlightenment* phase, launched over the next decade and lasting well into the University's third century.

Clearly the various phases of the roadmap associated with the trilogy of visions are interdependent. In the sense one might think of the roadmap as a path through a series of mountain range. Until one successfully climbs the first range, it is impossible to set the course for climbing the next. Hence in this chapter we will also suggest a series of plans, processes, and tactics for keeping the roadmap effort on track.

Always Begin with the Basics

So how to begin? How does one grapple with the many issues and concerns swirling about higher education in general and the University of Michigan in particular to chart a course toward the visions for its third century? Let us suggest the following framework drawn from experience in higher education and other contexts.

It is critical to first determine those key roles and values of the institution that simply must be protected and preserved in the years ahead. While it is important to engage the university community in an ongoing discussion of these guiding principles, one might begin with the canonical roles of the research university, namely education of the young, preservation of culture, basic research and scholarship, critic of society, and so forth. The starting point for a discussion of fundamental values could also be drawn from academe, e.g., academic freedom, a rational spirit of inquiry, a community of scholars, a commitment to excellence, and shared governance.

The next phase would be to identify actions to help the university better respond to the changing needs of society rather than defending and perpetuating an obsolete past. Key here is listening carefully to society to learn and understand its changing needs, expectations, and perceptions of higher education, along with the forces driving change.

Since roadmapping is very much an exercise in institutional change, it is important to prepare the academy for change and competition, e.g., by removing unnecessary constraints, linking accountability with privilege, redefining tenure as the protection of academic freedom rather than lifetime employment security, etc. This includes developing a tolerance for strong leadership and instituting the best practices of governance, leadership, and management.

When the road ahead becomes uncertain, experimentation becomes an important element of the planning framework. The university should strongly encourage experimentation with new paradigms of learning, research, and service by harvesting the best ideas from within the academy (or elsewhere), implementing them on a sufficient scale to assess their impact, and disseminating their results.

Finally, in today's hyperconnected world, universities must place a far greater emphasis on building alliances with other institutions that will allow them to focus on core competencies while relying on alliances to address the broader and diverse needs of society. Here alliances should be encouraged not only among institutions of higher education (e.g., consortia of peer institutions such as the CIC or AAU universities, partnering research universities with liberal arts colleges and community colleges) but also between higher education and the private sector (e.g., information technology and knowledge services companies). Differentiation among institutions should be encouraged as an important objective.

The Fundamental Goals

We propose several simply-stated goals to provide a foundation for the roadmap that will guide the University toward the vision for its third century:

Goal 1: People

To attract, retain, support, and empower exceptional students, faculty, and staff.

Goal 2: Resources

To provide these people with the resources and environment necessary to push to the limits of their abilities and their dreams.

Goal 3: Culture

To build a University culture and spirit that values adventure, excitement, risk-taking, leadership, excellence, diversity, caring, concern, and community.

Goal 4: The Capacity for Change

To develop the flexibility, the ability to focus resources necessary to serve a changing society and a changing world.

These four concrete goals have profound implications, and each will be deceptively challenging to execute. While we have always sought to attract high-quality students and faculty to the University, we tend to recruit those who conform to more conventional measures of excellence. If we are to seek "paradigm breakers," then other criteria such as creativity, intellectual span, and the ability to lead become important.

We need as well to acquire the resources to sustain excellence, a challenge at a time when public support is dwindling. Yet this goal also suggests that we need to focus resources on our most creative people and programs. And we need to acquire the flexibility in resource allocation to respond to new opportunities and initiatives.

While most people and institutions would agree with the values set out in the third goal of cultural change, many would not have assigned such a high priority to striving for adventure, excitement, and risk-taking. However, if the University is to sustain its saga as a pathfinder and trailblazer in defining the nature of higher education in the century ahead, this type of culture will be essential.

Developing the capacity for change, while an obvious goal, will also be both challenging and controversial. We need to discard the status quo as a viable option, challenge existing premises, policies, and mindsets, and empower our best people to drive the evolution—or revolution—of the University.

This capacity for change, for renewal, is the key objective that we must strive to achieve in the years ahead—a capacity that will allow us to transform ourselves once again as the university has done so many times in the past, to become an institution capable of serving a changing society and a changing world. Such institutional transformation has become commonplace in other sectors of our society. We frequently hear about companies "restructuring" themselves to respond to rapidly changing markets. Government is also challenged to transform itself to be more responsive and

accountable to the society that supports it. Yet transformation for the university is necessarily more challenging, since our various missions and our diverse array of constituencies give us a complexity far beyond that encountered in business or government. It must be approached strategically rather than reactively, with a deep understanding of the role and character of our institutions, their important traditions and values from the past, and a clear and compelling vision for their future.

The Roadmap to *Reflection*

For the near term, from now until the Bicentennial Year 2017, our vision of *Reflection* suggests the University of Michigan should focus on understanding, assessing, and embracing those values and characteristics that have played such an important role throughout its history:

Academic quality
Academic priority
Diversity
Public Purpose
Spirit
Leadership:
The Michigan Saga as pathfinder and trailblazer

While renewing our effort (or restoring our commitment if necessary) to achieve these characteristics seems obvious, particularly as we prepare for the University's bicentennial by reviewing its history and honoring its heritage and saga, it is nevertheless this near term vision that the University should set out as today's most important challenge. We suggest the following elements of a roadmap to achieve this near term vision:

Preparing for the University's bicentennial in 2017: Use the next few years prior to 2017 to build resources that capture the University of Michigan's remarkable history; make these materials available to both scholars, the University community, and the public more broadly; and use this history archive to more firmly establish the key elements of the University's institutional saga to both those on the campus (students, faculty, staff) and beyond. Elements of this major effort would include:

Reflecting upon the Michigan saga

Providing open digital access to existing historical materials (publications, photographs, film and video).

Developing historical databases for all those who have served as faculty members of the University over the past two centuries.

Developing similar archives on the role of students, staff, Regents, and alumni in shaping the University's history

Constructing social networking infrastructures to engage the University community in developing historical materials (faculty memoir databases and a UM "wikipedia").

Develop a bold plan for a series of events and activities during the 2017 Bicentennial Year to enable the University to lead major discussions on the future of the public university in America and the world more broadly, thereby re-establishing the visibility of the University's role as a pathfinder and trailblazer in American higher education. (Note this would be similar to the manner in which Harvard used its 1936 tercentennial to redefine the purpose of a liberal education or MIT's centennial in helping to stimulate and shape federal research policy.)

A series of conferences could be launched to address questions such as:

What is a public university in the knowledge-driven global society of the 21st century? What is its public purpose? Whom does it serve? Who are its stakeholders and patrons?

What is the role and responsibility of the flagship state university in a world characterized by increasing

connectivity and mobility of people and knowledge? Will the eroding state support of many leading state universities lead them to play more of a national or international role? ("He who pays the piper calls the tune!")

Restoring a Sense of Public Purpose: The University has drifted too far from its early public purpose of providing "an uncommon education for the common man". In fairness, much of this has been a consequence of eroding state support that has forced the University to develop alternative revenue streams, e.g., increasing the enrollments of out-of-state students paying higher tuition, promoting "premium" services for those activities with strong market appeal (e.g., college athletics, student housing, parking). But these decisions have had a significant impact on the University's "public" character, as the fraction of the student body from low-income backgrounds has declined and public participation in spectator activities such as Michigan football and theatrical productions (e.g., University Musical Society) has become increasingly rarefied with skyrocketing ticket prices.

As it has throughout its history, the University needs to acknowledge its public nature and be attentive to the needs of the society it serves. New financial paradigms will be necessary to enable the University to achieve a student socioeconomic balance that better reflects society. It is also clear that the University needs to take a more strategic approach toward public service and engagement. In the years ahead the institution will be called upon to provide a broad array of public services consistent with our public mission. Developing the capacity to assess such opportunities and responsibilities and then to make rational decisions about which to accept is crucial. We need to develop the capacity to say "no" when a societal request either does not align well with our academic mission or could better be performed by other institutions.

Strengthening the University's Commitment to Diversity: The University needs to reaffirm and broaden its commitment to creating a university characterized by great diversity. As with biological organisms or ecosystems, the diversity of the University may well be the key characteristic that will allow it to flourish in a rapidly changing environment. Diversity goes far beyond racial and ethnic representation to include almost every aspect of the human condition: race, gender, nationality, economic circumstances, and beliefs. The challenge is to build an institution in which people of different backgrounds, ethnicities, cultures, and beliefs come together in a spirit of respect and tolerance for these differences while working together to learn and to serve society.

During the 1990s the University made great progress in achieving diversity through major strategic efforts such as the Michigan Mandate, the Michigan Agenda for Women, and other initiatives to respond to the increasing diversity of our society. Yet today much of this progress has been lost. Undergraduate enrollments of underrepresented minorities have dropped to half their previous levels. Several of the University's professional schools (notably Law, Business, and Medicine) have experienced ever more dramatic declines in minority enrollments. While external factors such as Michigan's public referendum opposing affirmative action (Proposition 2), the decline of state support, and the shift of state financial aid programs from need-based to merit-based have played roles, there is a growing sense that the decline of campus diversity has also been the result of an erosion of institutional commitment to diversity. The University should strive to renew its commitment and develop and implement new strategies to restore a sense of progress

Building a Sense of Pride in, Respect for, Excitement about, and Loyalty to the University: The increasing specialization of the academic and professional disciplines and the University's long tradition of decentralization can sometimes erode personal commitment to general institutional goals and the values of a learning community. All too frequently faculty, students, and staff focus primarily on personal or professional goals rather than on the welfare of the University. It is important to seek opportunities to engage the University community in both discussions of and active participation in determining the future of the institution. Beyond this, we need to develop a sophisticated and strategic internal communications effort to give members of the University a better understanding of the challenges, opportunities, and responsibilities fac-

Recommitting Michigan to Diversity

Recapturing the Michigan Spirit

ing the University.

Re-igniting the Michigan "broad and liberal" spirit: Every effort should be made to rekindle the activist spirit that has long animated Michigan students and faculties, leading them to both identify key issues facing our society and challenging the establishment to address these. While sometimes disruptive for the institution (and the community), this should be regarded as an appropriate and important element of the University's role as both servant and critic of society. Such activism should not only be tolerated but encouraged both as an element of the learning environment and an important responsibility of the University. Today's issues such as global sustainability, social justice, and generational responsibility provide compelling opportunities for such activist engagement.

Reaffirming the Michigan Saga as a Pathfinder and Trailblazer: As we have stressed, the perception of Michigan as a trailblazer appears again and again in its history, as the university explored possible paths into new territory and blazed a trail for others to follow. At times it has also been a pioneer, building the roads that others can follow. Whether in academic innovation, social responsiveness, or its willingness to challenge the status quo, Michigan's history reveals this trailblazing character. During an era of profound and rapid change it is more important than ever that the University recapture this saga as a pathfinder.

The *Renaissance* Roadmap

As we have noted throughout this report, the world is changing rapidly, driven by the role played by educated people, new knowledge, innovation, and entrepreneurial zeal. These characteristics are driving profound changes in our world and its social institutions. They also contain the elements of what could be a renaissance in the 21st century. Since universities will play such a critical role as the source of these assets of the age of knowledge, our vision for the early 21st century involves stressing the following characteristics among our people and our programs:

Creativity
Innovation
Ingenuity and Invention
Entrepreneurial Zeal
Risk-taking
Tolerance of Failure as a Learning Experience

People

The first and most important goal of the roadmap for the Renaissance time frame is to attract and sustain exceptional students, faculty, and staff:

Recruit Outstanding Students: The University should place great emphasis on identifying and attracting students of truly exceptional ability and creativity. This effort may require special scholarship or fellowship programs (such as the Morehead Scholars at UNC)

Reflection--> To Know

Renaissance --> To Do

Enlightenment --> To Become

Learning Objectives of the Vision Themes

to augment existing need-based programs. It might also involve extending the dual admission practice (which our Medical School once used as the Inteflex programs) to other professional and graduate programs to attract outstanding undergraduate students. We need to reduce the disciplinary barriers between various graduate and professional programs to attract the very best graduate students.

Recruit Paradigm-Breaking Faculty: We should allocate more resources toward the recruitment of truly exceptional faculty through a University-wide effort. Although endowed chairs are important, this recruiting of paradigm-breaking faculty might be better served through the introduction of institution-wide appointments as University Professorships reporting directly to the Provost similar to those at leading institutions such as the University of California (University Professors) and MIT (Institute Professors).

Strengthen the Emphasis on Human Resource Development: The University should continue efforts to give high priority to human resource development throughout all areas of the institution. It is important that we sustain the University's commitment to education, training, and career planning for both staff and faculty.

Intellectual

Enabling Intellectual Change: The University needs to take steps to assist its students and faculty in responding to the extraordinary pace of intellectual change. As our society increasing values creativity and innovation, the university will be called up to augment its traditional emphasis on "learning to know" with "learning to do" and "learning to become". Of course these latter skills have always been valued by studio- or laboratory-based disciplines such as engineering, architecture, and the arts ("doing") and the professional disciplines ("becoming"). In fact, much of the campus infrastructure has evolved to support "doing" (e.g., the North Campus) and "becoming" (e.g., the Medical Center). The university may need to reorganize itself quite differently, stressing forms of pedagogy and extracurricular experiences to nurture and teach the art and skill of creation and innovation to ALL of its students. This would probably imply a shift away from highly specialized disciplines and degree programs to programs placing more emphasis on integrating knowledge.

Lowering Disciplinary Boundaries: Beyond the changing needs of a knowledge-driven society, the boundaries among the disciplines are rapidly converging. Biomedical advances depend increasingly on the physical sciences (atomic, molecular, and even nuclear physics) and engineering (complex systems analysis). Similar professional practice is changing rapidly, e.g., medical practice evolving more toward the team-based system approaches of engineering, engineering requiring the perspective of the social sciences, etc. Key will be to breaking down the constraints posed by disciplinary organizations—e.g., academic units such as departments, schools, and colleges, and academic degree programs at the undergraduate, graduate, and professional level. To allow faculty and students to teach, study, and learn where the need and interest are highest, we need greater flexibility. In this regard, Michigan should encourage more flexibility that spans disciplinary boundaries (e.g., centers and institutes), and university faculty appointments that could span multiple disciplines. More effort also needs to be made to coordinate faculty appointments, academic programs, research activities, and resource allocation among academic units.

"T" Graduates: An increasingly complex and rapidly changing world requires "T" graduates, capable of both depth in a particular discipline as well as intellectual breadth. This counters the current educational philosophies adopted by many academic programs particularly in more applied areas such as engineering, business administration, and allied heath profes-

sions, where a growing disciplinary knowledge base has largely pushed aside the "liberal education" component of an undergraduate education that is particularly important for creativity and innovation. These programs must heed the wisdom that "the purpose of an undergraduate education is not to prepare a student for their first job but rather prepare them for the last job" and restore the philosophy of a liberal education to their curriculum to produce "T" graduates.

Restructuring the Ph.D.: While the Ph.D. degree continues to be superb preparation for a research career, it has become clear that most Ph.D. students will continue on to many other careers in the public or private sectors. Recent national reports have challenged the excessive specialization, attrition rate, and time-to-degree characterizing today's Ph.D. programs. The university should provide leadership in examining and perhaps restructuring its Ph.D. programs to better serve the students enrolling in them and the society they will serve. A similar assessment and restructuring of the postdoctoral experience is also urgently needed, and the University should provide leadership for such an effort.

Transformative Research: The University should give more priority in both student and faculty recruiting and resource allocation to areas with the potential for truly transformative research, i.e., breaking the current knowledge paradigms. This will require both the development of flexible funding to stimulate high-risk research, as well as organizational structures similar to the "advanced research project agencies" (ARPA) now appearing in several federal research agencies.

Translational Research: In a similar sense, the University should also build organizations and programs capable of translational research, i.e., linking fundamental scientific discovery with the use-inspired technological innovation to serve society. The recently acquired Pfizer Global Research Center (the North Campus Research Center) provides an ideal site for the translational research sought by federal sponsors through new programs such as regional innovation hubs.

Strategic Alliances: Over a longer time frame, the higher education enterprise in America will clearly undergo significant restructuring. Anticipating this, the University of Michigan should give high priority to forming and sustaining strategic alliances with regional institutions (e.g., the CIC universities), national institutions (e.g., the AAU), and international institutions (e.g., Europe and Asia). We also should establish alliances with other knowledge-based institutions in the public and private sector (e.g., software and entertainment companies or national laboratories and institutes.)

Culture

Stimulate a Sense of Adventure, Excitement, Risk-taking: During a period of rapid change, the University's capacity to try new things, to be adventurous and experimental, had become increasingly important. The unusual size, comprehensiveness, and quality of the institution provide us with an unusual capacity for such risk-taking. But, ironically, Michigan's culture at times can become quite conservative and adverse to risk, particularly during times of financial stress or preoccupation with growth (enrollments, campus, bureaucracy). Hence, an early objective should be to create a more fault-tolerant community, in which risk-taking is encouraged, failure is anticipated and tolerated, and creativity and innovation are prized.

Next-Generation Leadership: Throughout the University, the selection and appointment of leaders who have bold visions, energy, and a sense of adventure is key to preparing for the future. Simply selecting leaders to maintain the status quo is dangerous for an institution such as Michigan, particularly during an era of rapid change. The University needs to build a leadership team that would be committed to the necessary transformations in the University and that relished the role of leading during a time of challenge and change.

Possible Initiatives

Explore pathfinding-trailblazer leadership opportunities, for example:

The University College: There is no more compelling—nor difficult—challenge facing the research uni-

versity than reaffirming its commitment to undergraduate education. We need to develop an undergraduate experience that draws on all of the University's resources to prepare our students for the 21st Century. While individual colleges have taken some important steps, these have been largely efforts to improve upon the current paradigms of undergraduate instruction. Far more important and challenging are those efforts to create new paradigms for undergraduate education that weave together the multiple activities of the University—teaching, research, and service—with student academic programs and residential life.

Michigan should develop a more coherent academic program for all undergraduates, reducing the amount of specialization offered in degree programs, and striving to provide instead a more general liberal learning experience. We should rapidly expand experiments in pedagogical alternatives to classroom learning, including collective learning experiences based on studio or laboratory paradigms, greater use of social networking e.g., wikis, blogs, Facebook, and Twitter), and immersive environments such as those characterizing the gaming world (e.g., World of Warcraft, Second Life).

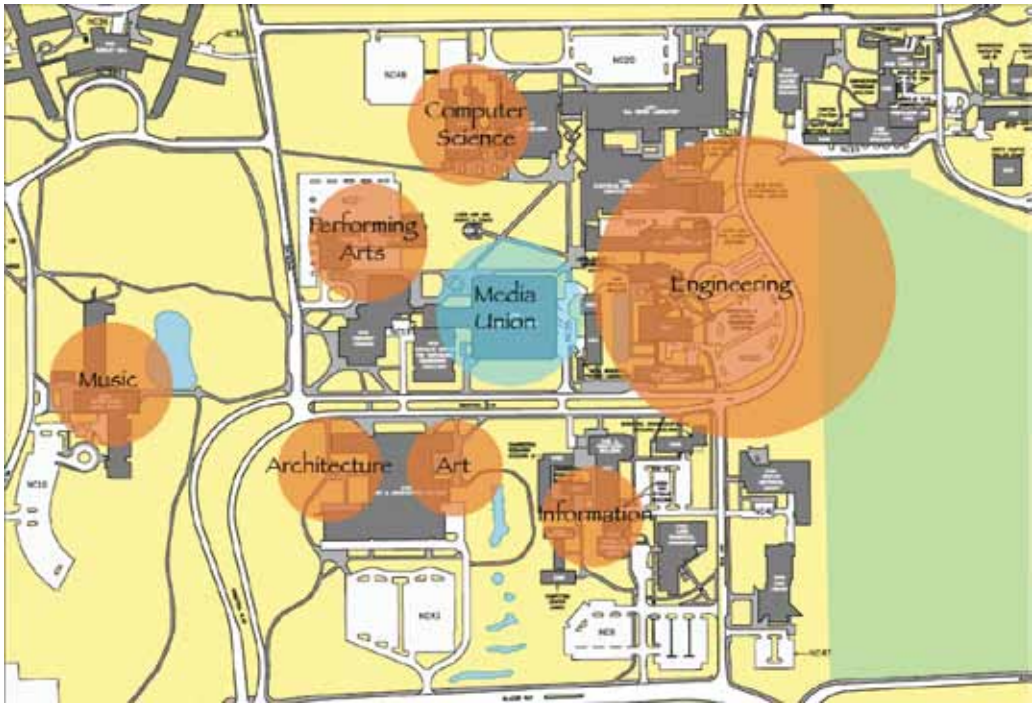
Finally, the presence of an unusually broad array of professional schools is one of the great strengths of the University and clearly one of the major factors in attracting outstanding undergraduates. We need to develop closer linkages between undergraduate education and these schools, so that students could have the opportunity to explore and choose among various careers. Indeed, many professional-school faculty members seek more direct interaction with undergraduate students.

The "New" University: Experience has revealed the difficulty of approaching university transformation by changing existing programs and activities. While such a direct approach may suffice for incremental changes at the margin, an effort to achieve more dramatic change usually creates so much resistance that little progress is possible. It is sometimes easier to take a "green-field" approach by building separately a model of the new paradigm, developing the necessary experience with it, and, then, propagating successful elements of the model to modify or, perhaps, replace existing programs.

One possible approach to major university transformation taken in earlier and more affluent times was to build a separate campus. The efforts of the University of California in the 1960s to explore academic colleges built around research themes at UC-San Diego and residential learning at UC-Santa Cruz, are examples of this approach. However, today's resource-limited circumstances are substantially different from the population-boom-driven 1960s, and it is difficult to justify such separate new campuses to explore new educational paradigms–not to mention finding sites comparable to the bluffs overlooking the Pacific. But there is a more important reason to consider an alternative approach: we believe that it is far more effective to develop and explore such new paradigms of the university directly, within an existing university community, better to prototype and rapidly propagate successful efforts.

To this end the University might consider creating a "New University" within its existing organization to provide an environment in which creative students and faculty could join with colleagues from beyond the campus to develop and test new paradigms of the university. In some ways, the New University would be a laboratory where the fundamental missions of the university—teaching, research, service, extension—could be redeveloped and tested. But it would also be aimed at developing a new culture, a new spirit of excitement and adventure that would propagate to the university at large. In such an academic enterprise, the University would hope to build a risk-tolerant culture in which students and faculty were strongly encouraged to "go for it," in which failure is accepted as part of the learning process, and is associated with ambitious goals rather than poor performance.

The New University could have both a physical and a virtual presence. In terms of structure, the New University might be organized not along conventional disciplinary lines, but, rather, stressing integrative themes. Furthermore, while it would offer academic degrees, such programs would stress far stronger linkages among undergraduate, graduate, professional, and lifetime education programs than those offered by the traditional university. The New University could strive to more effectively integrate the various activities of the University by engaging its students in an array of teaching, research, service, and extension activities. The New University would almost certainly involve



The Renaissance Campus

an array of outreach activities, e.g., linking alumni to the on-campus activities of the University or providing richer and more meaningful international experiences for students.

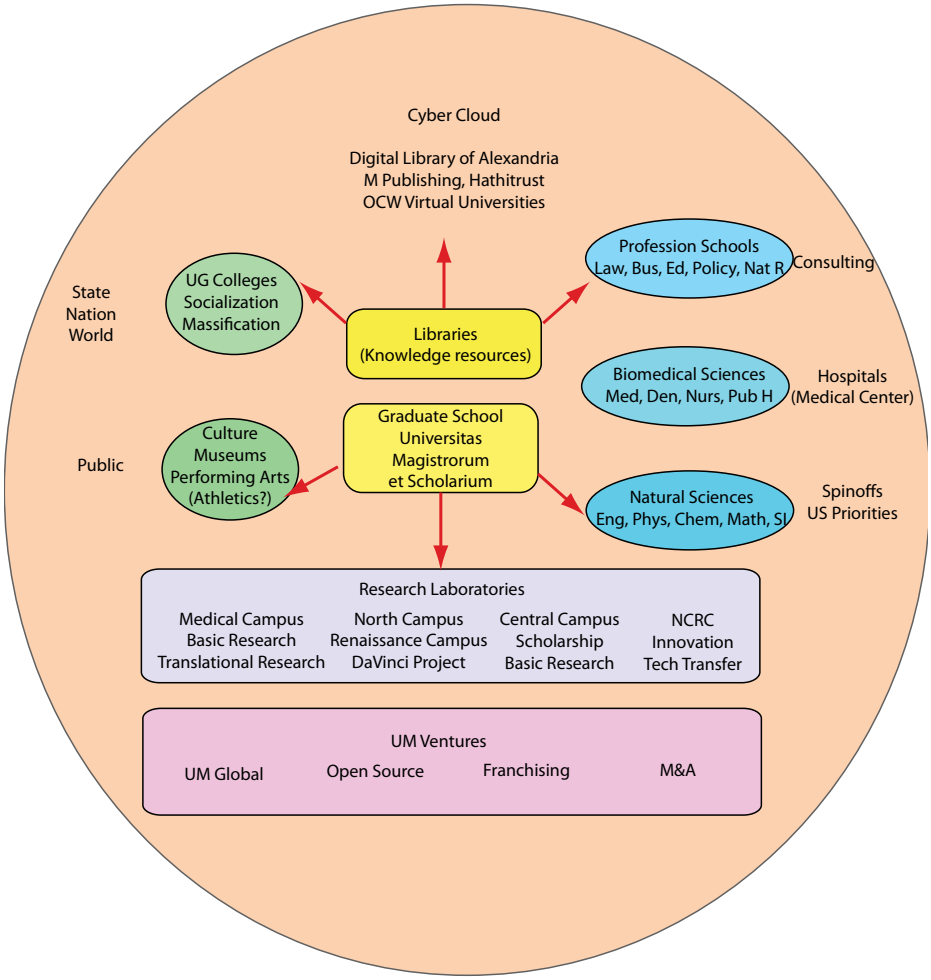
While the New University would enroll a significant number of students, it would not have a large, permanent faculty or staff. Rather, it would draw faculty members from across the University and around the world who would become associated with the New University for specific programs. This would allow it far greater flexibility, since it could avoid the constraints posed by faculty appointments and tenure.

The success of the New University would depend in large part upon its governance and advisory structure. Although it would report through the normal University channels, it could also have its own steering board comprised of leaders from many sectors of society. It would also make extensive use of external advisory groups for its various activities.

The Renaissance Campus: Largely due to historical accident, the University has located on its North Campus an unusual concentration of those academic programs characterized by the common intellectual activities of creativity and innovation (e.g., art, architecture, music, theatrical arts, engineering, information technology, and design), along with very unusual commons facilities to bring together students and faculty from these disparate disciplines. This colocation of the University's creative disciplines provides the University not only with the opportunity to address the rapid convergence of their intellectual activities, e.g. linking the creativity of the arts with the technological innovation of engineering and architecture. It also positions the University to respond to the increasing importance attached to innovation in our society. Indeed, one might even think of the North Campus, its academic programs, faculties, and students, as the "Renaissance Campus" of the University.

The Roadmap to *Enlightenment*

The final vision proposed as a theme for the University's third century, that of taking advantage of exponentially evolving information and communications technologies to "spread the light of knowledge and learning" to the world as its new public purpose requires a more challenging roadmap. Here we suggest several major elements of a possible roadmap to this future based on several of the paradigms discussed in Chapter 5:



The academic "core" in a cyberspace "cloud".

The emergence of a universitas magistrorum et scholarship in cyberspace.

The power of network architectures in distributing knowledge and learning

The perspective of learning organizations as ecologies that evolve and mutate into new forms

The university as the prototype of an emergent global civilization

Of course the themes we have suggested for comprising at least a rough roadmap to the Enlightenment vision of the University of Michigan's third century are highly speculative if not utopian in nature. They need to be better defined, refined, and translated into practical steps that the University can begin to take. But such is the case with any bold vision. And, interestingly enough, the University is already taking important steps down the path sketch out by this roadmap.

Capturing and distributing knowledge to the world:

We have noted the leadership role that the University has played (JSTOR) and is playing (Google Book, HathiTrust) in the massive digitization of printed materials and the use of these digital repositories. In fact, since the digitization of the University Libraries collections currently provide the largest component of these digital resources, one might suggest that Michigan is currently serving as the nucleus of what will become a 21st century analog to the great Library of Alexandria.

The University is also playing an important leadership role in the open resource movement, using its influence to push for open access to research data and other scholarly materials. Finally, its School of Information, one of the first such academic programs merging

traditional library science with informatics and other digital age technologies, provides leadership in both education and research in areas that will be critical to unprecedented access to the world's knowledge.

Open Education Resources: Although the University has some participation in efforts such as the OpenCourseWare movement and digital course development and distribution through iTunes, Amazon, and other mechanisms, its current involvement is limited to only a few academic units (most notably the School of Medicine). Clearly it will need much greater commitment to these areas if it is to achieve leadership in this important area. One possibility would be to make available to Michigan students an Amazon-like catalog of available open educational resources from other universities, thereby bringing the digital "marketplace" into Michigan classrooms and using competitive forces to stimulating our faculty members to develop similar materials.

Cyberinfrastructure: In recent years the University has once again begun to develop strategies and make investments to restore the position of leadership it once had in developing and deploying advanced cyberinfrastructure in partnerships with leading IT companies. The recent decision to select Google as the lead system integrator for collaboration technology is an important step in this direction. But here it must embrace a balanced strategy, both utilizing advanced technology in an efficient and cost-effective manner, and partnering with leading companies in both technology development and application for academic environments (much as it has in the past through efforts such as MTS, CAEN, NSFnet, Internet2, and Sakai).

Networking: Clearly advanced network development is key to the Enlightenment vision. The University has long had leadership in the development of national and international networks (e.g., NSFnet, the Internet, Internet2). This effort continues today with the University's efforts to stimulate the development of a National Learning, Research, and Innovation Network. This network, based on advanced cyberinfrastructure (in the broadest sense) would connect together the nation's research universities, national laboratories, federal agencies, and industry, thereby creating the world's most powerful knowledge resource. Note this would not only involve ultra-high speed connectivity both among and within organizations, but also coordinated data centers, clouds, personnel, and supporting policies. It would take advantage of rapidly changing paradigms (IT services as a utility, open knowledge paradigms such as digital libraries and open courseware, and data-intensive research). It would enable both collaboration AND competition (e.g., bringing competitive forces into the classroom), by connecting both fundamental research, technological innovation, academic programs, faculty and students, federal and industry scientists and engineers to create new opportunities for collaboration and eliminating redundancy, while linking these extraordinary resources to both the private and public sector as well as to the world. It would also provide even more incentive to move to an open access policy for ALL federally-sponsored research, representing a profound upgrade in "knowledge bandwidth" in addition to network bandwidth.

Yet simply providing high-speed network links between campuses and other knowledge institutions is only the first step, since such connectivity must be distributed to the desktop, laptop, and laboratory on the campus and to the homes of faculty and students in the surrounding community. Here the University is also leading an effort to assemble a coalition of the nation's leading research universities to challenge industry (e.g., carriers such as AT&T, Verizon, and Comcast and technology companies such as Google and IBM) to provide ultra-high bandwidth connectivity through the campuses and surrounding communities (much like the Goggle community fiber program).

Advanced Learning Environments: The University should launch a major effort to develop and deploy advanced learning environments–particularly those enabling social networking and immersive environments (including "sim-stim"–high fidelity simulation of all the senses at a distance). Its past experience with the development of open source curriculum management software such as Sakai and CTools positions it well for this effort.

Establishing a Global Footprint: Clearly the Univer-

sity of Michigan will need to establish a global footprint to achieve this vision. While it certainly has a strong international reputation in higher education, its current strategy of developing selected partnerships at the institution level will need to be expanded considerably. To some degree this is a "branding" exercise, but more significantly, it will require developing strategic relationships with key international higher education and technology organizations such as OECD and the European University Association.

Building the Necessary Scholarly Foundation for the Effort: To enable such a bold effort, the University will have to establish a strong intellectual foundation of faculty scholarship in areas key to a global knowledge and learning enterprise. Here the University's great strength in the social sciences, along with its many research institutions and professional schools position it well for such an effort.

The "University of the Future" Institute: Finally, since this vision is, in effect, an effort to build a "university" of the future, in the broadest sense of the term, establishing a University-wide research institute to consider both the evolution and future of the university as a social institution seems critical to this effort.

Concluding Remarks

The visions we have suggested for the future of the University of Michigan, captured by the terms Reflection, Renaissance, and Enlightenment, become more challenging as we move into the future. Not surprisingly, the roadmaps to these visions for each epoch become less detailed and more uncertain, as does our speculation about the future itself.

This should not be surprising. Such eras of dramatic change have happened many times throughout the history of higher education in America. In this spirit, then, perhaps we should end with a discussion that occurred with the AAU provost's workshop in 2004. While university presidents are reluctant to put speculation about the survival of the university on the table, not so with provosts, who were quite comfortable talking about very fundamental issues such as the values, roles, mission, and even the survival of the university, at least as we know it today.

During this discussion it was pointed out during the 19th century, in a single generation following the Civil War, essentially everything that could change about higher education in America did in fact change: small colleges, based on the English boarding school model of educating only the elite, were joined by the public universities, with the mission of educating the working class (Lohmann, 2004). Federal initiatives such as the Land Grant Acts added research and service to the mission of the universities. The academy became empowered with new perquisites such as academic freedom, tenure, and faculty governance. Universities increased 10-fold and then 100-fold in enrollments. The university at the turn of century bore little resemblance to the colonial colleges of a generation earlier.

The consensus of our discussions with the provost suggested that we are well along in a similar period of dramatic change in higher education. In fact, some of our colleagues were even willing to put on the table the most disturbing question of all: Will the university, at least as we know it today, even exist a generation from now?

Disturbing, perhaps. But certainly a question deserving of very careful consideration, at least by those responsible for leading and governing our institutions, suggesting that perhaps such discussions should shift from "the impact of technology on the future of the research university" to "the impact of technology on scholarship and learning, wherever they may be conducted"!

Chapter 9

Plans, Tactics, and Processes

A roadmap is just that, a set of possible directions to the future. Of course the destination we have proposed for the University's third century, the vision, has been stated for a series of timeframes in deceptively simple terms:

1. *Reflection*: Reaffirming the Michigan Saga. (Now)

2. *Renaissance*: Aligning the University to the Age of Knowledge. (Soon)

3. *Enlightenment*: Redefining the University's public purpose to be that of providing knowledge and learning to the world. (Eventually)

But setting a direction, even with a roadmap, is far from arriving at one's destination. Furthermore recommendations that require major institutional change are not spontaneously or miraculously implemented. The acceptance of and action upon the recommendations this proposed roadmap to the University of Michigan's third century require active involvement and commitment from a variety of stakeholders. Without commitment at all levels–faculty, administration, Regents, and stakeholders, long-term or sustained innovation and change on the scale recommended in this report cannot be achieved–unless, of course, revolution becomes an option (just remember earlier experiences during the Age of Enlightenment–e.g., *Liberté, Egalité, Fraternité*).

Institutions and their stakeholders require a more definitive operational plan that addresses key questions such as: What are the first steps to be taken? What policy actions are necessary? Are there follow-on studies that need to be commissioned? What about an ongoing process or framework to assess and sustain progress?

Furthermore, we acknowledge that this roadmapping study has been stated in straightforward–sometimes even blunt–terms. To survive in the political environment of state (and federal) policy, it must be reclothed in more Machiavellian garb.

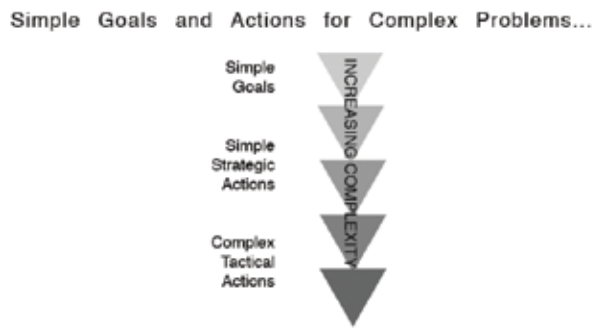
Finally we must also acknowledge that both the proposed vision and roadmap for the University of Michigan's third century is, in reality, a call for *institutional transformation*.

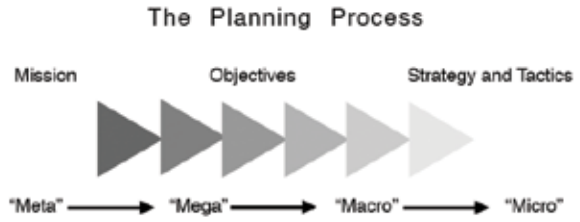
It is clear that we are entering an era of great challenge and opportunity for higher education, characterized by a rapid and profound transformation into a global knowledge society. The task of transforming the University of Michigan to better serve such a society and to move toward a new vision for its third century would be challenging under any circumstances. But perhaps the greatest challenge of all would be the university's very success. It will be difficult to convince those who have worked so hard and successfully to build one of the world's great universities for the twentieth century, that they cannot rest on their laurels when the old paradigms will no longer work. The challenge of the University's third century will be to reinvent the university once again to serve a new generations in a new world.

Strategic Planning

As we noted earlier, strategic planning at the institution level becomes absolutely essential during a time of rapid change. Simply encouraging and supporting planning at the unit level, perhaps augmented by occasional presidential initiatives, for an institution of Michigan's scale, complexity, and impact is both inadequate and dangerous indeed, both for the institution and those dependent upon it.

Yet as many leaders in higher education have come to realize, our changing environment requires a far more strategic approach to the evolution of our institu-





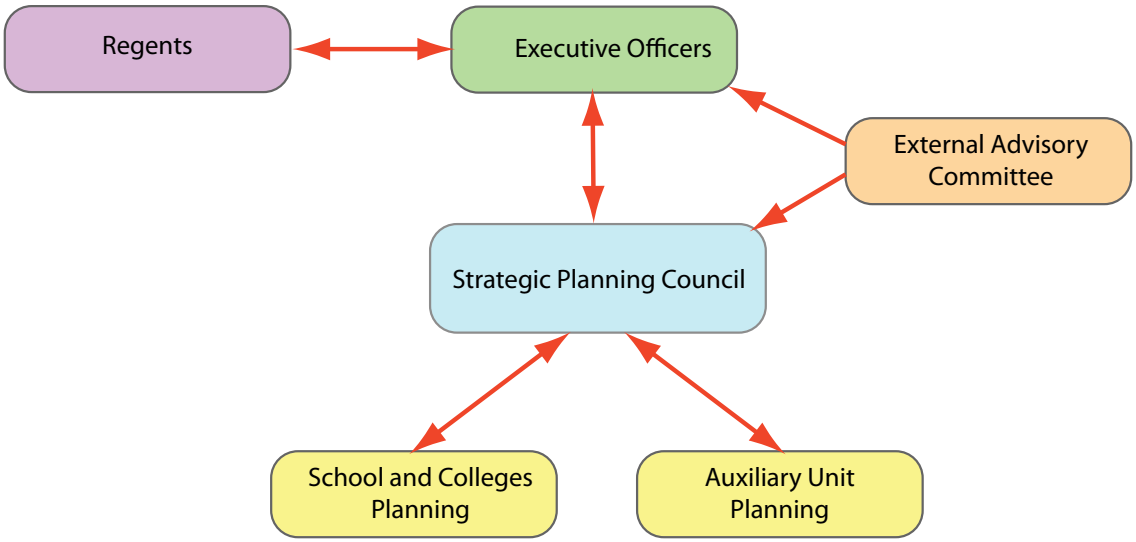
tions. It is critical for higher education to give thoughtful attention to the design of institutional processes for planning, management, and governance. The ability of universities to adapt successfully to the profound changes occurring in our society will depend a great deal on the institution's collective ability to develop and execute appropriate strategies. Key is the recognition that in a rapidly changing environment, it is important to develop a planning process that is not only capable of adapting to changing conditions, but to some degree capable of modifying the environment in which the university will find itself in the decades ahead. We must seek a progressive, flexible, and adaptive process, capable of responding to a dynamic environment and an uncertain—indeed, unknowable—future.

Here there is an important distinction to make. Strategic planning is deciding what should be done, that is, choosing objectives ("What do we want to do"); tactics are operational procedures for accomplishing objectives ("How do we go about doing it?"). Note as well that long-range planning is not the same thing as strategic planning. Long-range planning establishes quantitative goals, a specific plan. Strategic planning establishes qualitative goals and a philosophy. Because strategic planning should always be linked to operational decisions, some prefer to use the phrase strategic management rather than strategic planning to denote it.

Key to any planning effort is an assessment of the planning environment. In large universities it is particularly important to tap the wisdom of a variety of groups to help evaluate both the current and past state of the University as well as the internal and external environment issues that should be considered in planning activities. All of these factors are time-dependent, of course. Hence it is important to consider not only the current environments for planning, but also the historical context that led to these environments and the possible futures that might evolve. Furthermore, it is essential to recognize that the internal and external environments are tightly connected. Hence, external conditions that might first appear to be constraints can be altered through appropriate modifications of the internal environment and related activities.

Rather than view environmental factors as absolute constraints, they can be recast as challenges or opportunities subject to modification. That is, one can adopt the mindset that the university can influence its planning environment. The key is to begin with the challenging question of asking what can be done to modify the planning environment. There are always opportunities to control constraints—and the future—if one takes a proactive approach. Universities are rarely playing in a zero-sum game. Instead they may have the opportunity to increase (or decrease) resources with appropriate (or inappropriate) strategies. The university is never a closed system. Put in more engineering terms, any complex system can be designed in such a way as to be less sensitive to initial and/or boundary conditions. (In the language of systems engineering, a system can be designed with sufficiently short time constants or decay lengths so that it evolves rapidly into an asymptotic state where the constraints imposed by initial and boundary conditions are no longer controlling.)

A successful strategic planning process is highly iterative in nature. While the vision remains fixed, the goals, objectives, actions, and tactics evolve with progress and experience. During a period of rapid, unpredictable change, the specific plan chosen at a given instant is of far less importance than the planning process itself. Put another way, one seeks an "adaptive" planning process appropriate for a rapidly changing environment.



A posslble organizational structure for University strategic planning

In an institution characterized by the size and complexity of the contemporary research university, it is usually not appropriate (or possible) to manage centrally many processes or activities. One can, however, establish institutional priorities and goals and institute a process that encourages local management toward these objectives. To achieve institutional goals, processes can be launched throughout the institution aimed at strategic planning consistent with institutional goals, but with management authority residing at the local level. One seeks an approach with accurate central information support and strong strategic direction.

To this end, it is important to create a high-level "steering group" with strong representation from the leadership of both the administration and the academic units. During earlier times of intensive planning activities, such as the resource-constrained era of the 1980s and 1990s, this group was the Budget Priorities Committee, reporting to the Executive Officers through the Provost (as the University's chief budget officer) and involving deans, faculty governance, senior administrators, and student representatives. The Budget Priorities Committee had both advisory roles and executive authority, delegated from the Executive Officers. Ironically, today the University has recently created a very similar body, the Information Technology Council, that provides strategic guidance for the University's cyberinfrastructure environment (and the roughly $300 million/year spent on these activities).

Each of the major academic and administration units of the University should be encouraged to utilizing similar strategic planning organizations, either adding these missions to existing bodies such as school, college, and department executive committees or new organizations created for this role.

Key in such a distributed planning organization is the importance of aligning unit planning activities with those of the university-wide effort. Similarly it is essential to maintain alignment and coordination of these efforts with both Executive Officer and Regental roles and responsibilities. One approach utilized in earlier University planning efforts was to conduct strategic and tactical planning processes as parallel and concurrent processes within the following framework, with the strategic planning process conducted at the University level and a tactical implementation process involving all academic, administrative, and auxiliary units of the University. The strategic and tactical processes would be conducted concurrently. Because the strategic process was an ongoing University effort to develop, articulate, and occasionally modify its objectives over time, it was appropriate to pursue the process of tactical implementation simultaneously. And many units already had planning activities in place.

The two processes would be tightly coupled and interactive. The early phases of strategic planning at the institution level would influence the context of unit level planning activities as resource allocation and management decisions. Conversely, interaction with units through the tactical process would help us to refine the

strategic process.

Both processes would be highly iterative in nature. Each step would be viewed as a learning process with the power to influence not just subsequent stages of the process, but to feed back information to revise and sharpen the results of earlier stages.

Strategic planning involved a less formal process at the unit level, working as much as possible within existing mechanisms and allowing units considerable flexibility in their response. We wanted to avoid any sense of uncertainty among units that might paralyze ongoing activities, while taking advantage of the aggressive "strategic" processes already underway in many of our units.

For this process to be effective, a hierarchy of resource management tools need to be developed that can be used to focus resources on key University priorities and to stimulate units to develop their own strategic plans and priorities. At the highest level, one might utilize major University-wide initiatives to move aggressively toward objectives that have broad impact across most programs. By funding these initiatives off the top of centrally controlled resources, one can demonstrated in a convincing fashion the University's commitment to focus its resources on key priorities. Such initiatives would have the additional objective of creating a sense of excitement and involvement across the campus, pulling together the University community behind common goals.

At the next level of resource allocation, one might challenge units of the University to reallocate a small percentage of their annual budget growth to contribute to these initiatives at the unit level. Such actions are useful not only in providing the resources necessary to fund the University-wide initiatives, but also stimulate the units to become more engaged in internal planning activities aimed at focusing resources at highest priorities.

Tactics

Financial

Developing a New Business Model: Numerous economists and higher education scholars have suggested that state support of public universities is likely to continue to decline for at least a generation, as priorities shift to meeting the needs of an aging baby boomer population (e.g., retirement security, health care, safety from crime, tax relief) while unfunded federal mandates (e.g., Medicaid and Medicare) become more burdensome to the states. This is particularly true for Michigan, a state undergoing a traumatic transformation from a factory-based industrial economy to one increasingly dependent upon knowledge services. With the state currently comprising less than 10% of the University's general and education budget and 6% of the total budget (including auxiliary activities), it is clear that the state has already become one of the University's "smaller shareholders". This is compounded by the fact that the state's support of capital facilities essentially disappeared in the 1990s and is unlikely to be significant in the face of the deteriorating state economy.

Today the state support is no longer sufficient to justify the large tuition discount given Michigan resident students (e.g., $12,000/year vs. $36,000/year for non state resident students, which would amount to roughly $400 million/year for current enrollments). The impact of this erosion of state subsidy on the socioeconomic composition of the student body is already painfully apparent.

The current financial management of the University is both impressive and effective: implementing major cost reductions particularly in business units, expanding the enrollments of high tuition nonresident students, intensifying efforts to attract new resources through private fund-raising, sponsored research support, and where possible, using auxiliary unit revenues to provide additional support for academic priorities (e.g., using clinical fees to support clinical research). Yet it is also clear that these are only short-term measures and likely inadequate for a future in which state support may effectively disappear.

It is important that the University continue its effort to explore bolder business plans capable of sustaining the quality of the University in a future with little state support. Among the issues to be considered are:

1. What level of resources (on a per student and per faculty member scale) is needed to sustain the University's quality at world-class levels? As noted above, today state support per student has already declined to

roughly one-half the level characterizing leading public universities such as the Universities of California and North Carolina. Private support, while growing rapidly, is still an order of magnitude less on a per student basis than the levels characterizing elite private universities. Hence there are serious doubts as to whether the anticipated resource base available to the University can support the current enrollment or academic program breadth of the size of the Ann Arbor campus. Further growth, at least with the current business model, is simply not sustainable at our traditional levels of quality.

2. The University's current business model no longer appears to be capable of sustaining the University's quality over the long term. In the current business model, the "profit making" activities of the University are undergraduate education for non-state-resident students, some programs of professional education (law, business), clinical care, philanthropy, and investments. Auxiliary activities such as housing and continuing education are currently operated as revenue-neutral. Essentially all other activities currently require subsidy including: undergraduate education for Michigan students (since the state appropriation is no longer sufficient to cover the discount provided to instate students), graduate education, most professional education, sponsored research (costs are 25% above external support), arts and culture, and probably intercollegiate athletics (particularly in terms of indirect costs and impact on revenues available to academic units).

Furthermore, several of the key revenue streams are under serious threat: i) state support, while already seriously inadequate, is likely to decline still further, ii) the availability of clinical revenues to subsidize academic activities could also decline with the 2010 federal health care legislation; federal research support is likely to continue to fall roughly 25% short of covering full costs; and continued growth (enrollment, research, facilities) is likely to exceed that of private support (both gifts received and endowment income).

3. What alternatives are available for a new business model? Where do we find sufficient revenue to support our most important role and activities?

universitas (the academic core)
initiatives and innovation
institutional leadership
pathfinder, trailblazer, and saga
changing the world

4. Balancing the anticipated continued decline in traditional sources of support are the extraordinary opportunities afforded by a society that is becoming increasingly knowledge-dependent. With vision, skill, and commitment, the University should have little difficulty generating adequate resources to sustain its quality and breadth, albeit at perhaps smaller scale and capacity. But will it be able to do so while protecting its fundamental character as a public institution, particularly as the nature of the "public" it serves will broaden far beyond the state to include the nation and the world?

<u>Explore new business model paradigms</u>: For most flagship public universities, and particularly for the University of Michigan at this point in its history, developing a sustainable resource base, that is, a business plan, that can accommodate the likely disappearance of state support has become critical. Clearly the University will require a radically new business paradigm to maintain quality with declining state support. While tuition adjustment and internal cost reductions may suffice in the near term, the UM needs to focus on either increasing the top line (revenue) or "right-sizing" the institution to better align it with available resources.

However, rather than simply reacting to current challenges and opportunities, it is important to adopt a more strategic perspective by considering new paradigms for financing higher education, first determining the appropriate mix of public support (i.e., higher education as a "public good") and private support (higher education as a personal benefit). This should include a full accounting of both direct public support (e.g., appropriations, research grants, and student financial aid) and indirect public subsidy (e.g., "tax expenditures" currently represented by favorable tax treatment of charitable gifts and endowment earnings and distributions). Furthermore, consider key policy issues such as: i) the appropriate burdens borne by each generation in the support of higher education as determined, for example, by the mix of grants versus loans in federal

financial aid programs, ii) the degree to which public investment should be used to help shape powerful emerging market forces to protect the public purpose of higher education, and iii) new methods for internal resource allocation and management that enhance productivity.

Structural Possibilities

Develop Flexible Resources ("Venture Capital"): Moving the University forward require more flexibility to support new initiatives and change. While the responsibility center management system provides some of this capacity, it would also be important to attract or reallocate sufficient "venture capital" to support the array of initiatives associated with University transformation over the next several years.

Break down the Financial Firewalls between Academic and Auxiliary Units: As state support has declined while tuition has been constrained by political considerations, the academic core of the University has been faced with serious financial pressures for the past decade. Yet during this same period the revenues available to auxiliary activities such as the University hospitals, residence halls, and Athletics Department have grown very substantially, igniting a massive capital expansion program. The University should seriously reconsider the constraints imposed by its current fund accounting model to explore ways to redeploy a significant fraction of the revenue growth of auxiliary units to the support of academic units, at least until a more long-term solution can be found for disappearing state support. Since the success of these auxiliary activities depends heavily on the academic reputation of the University, one could make a strong case for a tax on auxiliary revenues to benefit its academic core (similar to the reallocation of assets to highest priorities practiced by most other ventures in the private and public sector, including state and federal government.)

Develop New Markets: As both the need for and capacity to deliver educational services become increasingly decoupled from space and time, the University recognized a need to explore new markets for its activities. Efforts ranged from on-campus programs such as summer sessions and continuing education to worldwide educational programs facilitated by multimedia computer networks.

Expand international and distance learning students

Develop an export business using educational services or certification.

Exploit brandname and franchising

Access capital markets in novel ways

Join in Efforts to Seek New Paradigms for Federal Support:

"Degree taxes" that link income repayment of federal student loans with IRS tax surcharge and collection

Learn Grants that establish federal-state funded 539 accounts for all students entering K-12

Federal government assuming primary responsibility for the support of doctoral education (just as it has for campus-based research support)

Reengineering with ICT: We have only scratched the surface in our application of information technology to the activities of the University. In particular, the rapid evolution of networking and communications technology has the capacity to release the University from the constraints of space and time, permitting students, faculty, staff, and external constituents to interact with our programs from any place at any time. This technology would eventually permit us to re-engineer the work of the University to achieve higher quality and efficiency. It could provide better information to support strategy development and decisions.

Selecting Leadership for the Times: Leadership has always been an important characteristic of the University of Michigan's role both for higher education and more broadly for changing the world through the contributions of its faculty, students, and alumni. While such institutional leadership flows upward from the quality, creativity, and importance of academic efforts at the grass-roots level, to flourish they require capable, energetic, and enlightened academic and institutional leadership appropriate for the times. As the University prepares to enter its third century, it is important to seek leadership well-aligned both with the challenges facing our world and responsive to the new generations joining the institution as students, faculty, and staff.

Year: 2008 All dollars are reported per FTE Student, in 2008 dollars (CPI adjusted).

Institution	Carnegie	Net Tuition (a)	State and Local Appropriations (b)	Private Gifts, Investment Returns, and Endowment Income (c)	Federal Appropriations and Federal, State, and Local Grants and Contracts (d)	Auxiliary Enterprises, Hospitals, Independent Operations and Other Sources (e)	Total Revenue (f)=(a+b+c+d+e)
Michigan State University	Public Research	$11,164	$9,056	$2,683	$7,991	$6,773	$37,667
University of California-Berkeley	Public Research	$8,900	$15,515	$4,447	$16,044	$8,715	$53,620
University of California-Los Angeles	Public Research	$8,776	$18,302	$4,661	$23,500	$57,880	$113,119
University of California-San Diego	Public Research	$8,588	$12,049	$2,249	$28,924	$44,562	$96,372
University of Illinois*	Public Research	$11,880	$10,237	$2,069	$12,464	$20,736	$57,386
University of Michigan-Ann Arbor	Public Research	$15,963	$9,007	$18,995	$21,223	$59,506	$124,693
University of Minnesota-Twin Cities	Public Research	$10,522	$15,773	$3,780	$19,255	$10,264	$59,593
University of North Carolina at Chapel Hill	Public Research	$9,001	$21,654	$10,609	$28,596	$23,106	$92,966
University of Virginia-Main Campus	Public Research	$12,552	$7,583	$17,716	$13,900	$49,221	$100,975
University of Wisconsin-Madison	Public Research	$7,855	$10,132	$6,716	$16,564	$11,061	$52,348
Selected Comparison Group	**Median**	**$9,762**	**$11,143**	**$4,554**	**$17,920**	**$21,921**	**$76,260**
Selected Comparison Group	**Mean**	**$10,520**	**$12,931**	**$7,393**	**$18,848**	**$29,182**	**$78,874**

Note: Data presented may differ from that reported by institutions; some data were adjusted to account for changes in financial reporting standards or data collection surveys over time. Data in italics were imputed.
N/A - Not Applicable
Source: Delta Cost Project IPEDS Database, 1987-2008 generated by TCS Online.

A comparison of the current revenues of the University of Michigan with peer public universities suggests that a new business model is needed to sustain quality in the face of disppearing state support.

Organizational Possibilities

Develop Spires of Excellence: While the breadth and capacity of the University's programs are important, we believed that the institution's primary emphasis in the decades ahead should be on program quality. Resource constraints will require us to build "spires" of excellence in key fields, rather than try to achieve a uniform level of quality across all of our activities. Here we do not propose to focus the resources of the University in order to build only a few isolated areas of excellence, in the manner of a small liberal arts college, for example. Nor should we accept models that distribute resources to achieve a uniform level of necessarily lower quality across all programs. Rather, we believed 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. Constrained resources meant that we would therefore have to accept that some areas would be very good as opposed to excellent. In our effort to focus resources and to prune or even discontinue programs, we will have to revise and streamline many current policies and procedures.

Align Faculty/Staff Incentives with Institutional Values and Priorities: While the highly decentralized, entrepreneurial culture of this modern university is remarkably adaptive to change, faculty generally move toward individual or local unit goals rather than embracing institutional goals. The challenge is to tap the extraordinary energy of this entrepreneurial spirit and align it with institutional goals. This effort should focus on establishing strong incentives, such as incentive compensation and promotion criteria, to reflect the broader goals of the University.

Renegotiate the Faculty Contract: One of the most difficult challenges to institutional change results from the nature of faculty appointments. While tenure and the disappearance of mandatory retirement policies are frequently noted as barriers to flexibility, perhaps even more challenging is the extraordinary degree of disciplinary specialization and the narrowness of faculty roles resulting from our current hiring and promotion policies.

The changing nature of the university and the society it serves compels us to think carefully and creatively about the nature of the faculty of the University in the years ahead. For example, we need to discuss the definition and role of the faculty, particularly in the face of the growing diversity in missions and activities of our various academic units (e.g., the contrast between clinical departments in medicine and performance departments in music). As the character of the faculty and its activities evolves, we must rethink the privileges and responsibilities of faculty members, including the na-

ture of appointments, tenure, rewards, and retirement. These will be difficult but important discussions that should occur both within and among major research universities.

Redefine the State Contract: Over the past three decades, state appropriations have eroded to the point that today the state is only a relatively minor shareholder in the support of the University. It is time to renegotiate the University's "contract" with the people of Michigan, redefining just what services the state should expect and what kind of control it could exert for the ever-diminishing support it provides.

Protect the Autonomy of the University: One of the most important characteristics of the University is its constitutional autonomy, as vested in the Board of Regents, which allows the University to control its own destiny and adapt to change. Unfortunately, in recent years this autonomy had come under attack from a number of quarters. Michigan's sunshine laws, now regarded as among the most intrusive in the nation, had jeopardized the operation of the University and its selection of leadership. Both the Governor and the Legislature have attempted to dictate key policies of the institution, including tuition, nonresident enrollments, and academic focus. In addition, the media has made a concerted effort to push the University toward the mediocrity of a broader populist, anti-intellectual strain already in evidence in parts of our society. The University needs to vigorously resist these threats to its autonomy, but also actively seek ways to re-establish its capacity to control its own destiny.

Restructure Organization and Governance: As a third class of initiatives, we should continue to explore alternative corporate structures for the diverse range of University activities. The current organization of the University into departments, schools and colleges, and various administrative units is largely historical rather than strategic in nature. To some degree it is more a byproduct of our incremental style of resource allocation, with its presumption that units and activities continue unless a very good case can be made for doing something else, rather than a conscious strategy of intellectual objective. We have to assess whether existing organizational structures would be capable of the transformations we are suggesting. Most evidence suggests that while these units are capable of modest internal change, they generally feel threatened by broader institutional change and will strongly resist it. For example, it is clear that the present organization of our schools and colleges is increasingly incompatible with intellectual, human, and financial resource-management goals. Our administrative organizations also need to be restructured to support better the multiple missions of the University. With the appearance of more University-owned subsidiaries to provide services, we need to experiment with alternative corporate structures such as holding-company models.

Experiments and Ventures

In a world of such rapid and profound change, as we face a future of such uncertainty, perhaps the most effective near-term approach to preparing the University for its Third Century is to explore possible futures of the university through experimentation and discovery. That is, rather than continue to contemplate possibilities for the future through abstract study and debate, a more productive course may be to build several prototypes of future learning institutions as working experiments. In this way the university can actively explore possible paths to the future.

But, of course, not all of these experiments will be successful. Some may crash in flames, in some cases spectacularly. Nevertheless, in most of these cases, at least we would at least learn something, particularly if these efforts are driven by the grass-roots interests, abilities, and enthusiasm of faculty and students. While such an exploratory approach may be disconcerting to some and frustrating to others, fortunately there are many on our campus and beyond who would view this phase as an exciting adventure. These initiatives could be very important in understanding better the possible futures facing our university and influencing its evolution.

The Process of Transformation

From earlier experiences at Michigan and at other organizations in both the private and public sector, one

can identify several features of the process necessary to implement such a strategic roadmapping effort. First it is critical to properly define the real challenges achieving such bold visions. The challenge, as is so often the case, is neither financial nor organizational. Rather it is the degree of cultural change required. We must transform a set of rigid habits of thought and organization that are incapable of responding to change rapidly or radically enough.

True faculty participation in the design and implementation of the necessary change process is essential, because the transformation of faculty culture is the biggest challenge of all. Both the creativity and the commitment of the faculty are essential to success. Policies come and go without perturbing the institution; change happens in the trenches where faculty and students are engaged in the primary activities of the university, teaching and research, learning and scholarship.

The involvement of external groups is not only very helpful, but also probably necessary to provide credibility to the process and assist in putting controversial issues on the table (e.g., tenure reform).

Unfortunately, universities, like most organizations in business and government, are rarely able to achieve major change through the motivation of opportunity and excitement alone. It often takes a crisis to get the community to take the transformation effort seriously, and sometimes even this is not sufficient. As one colleague put it, folks must not only see the wolf at the door, but know that it is big enough to eat them!

Part of the challenge lies in directing the attention of members of the university community and its multiple constituencies toward those aspects of the agenda most appropriate for their talents. For example, the faculty should focus primarily on the issues of educational and intellectual transformation and the evolving nature of the academy itself. The governing board, because of its unusual responsibility for policy and fiscal matters, should play a key role in the financial and organizational restructuring of the university. Faculty and staff with strong entrepreneurial interests and skills should be asked to guide the development of new markets of the knowledge-based services of the university.

It is hard to persuade existing programs within an organization to change to meet changing circumstances. This is particularly the case in a university, in which top-down hierarchical management has limited impact in the face of the creative anarchy of academic culture. One approach is to identify and then support islands of entrepreneurialism, those activities within the university that are already adapting to a rapidly changing environment. Another approach is to launch new or greenfield initiatives that are designed to build in the necessary elements for change. If these initiatives are provided with adequate resources and incentives, faculty, staff, and students can be drawn into the new activities. Those initiatives that prove successful will grow rapidly and, if designed properly, will pull resources away from existing activities resistant to change. Greenfield approaches create a Darwinian process in which the successful new initiatives devour older, obsolete efforts, while unsuccessful initiatives are unable to compete with ongoing activities capable of sustaining their relevance during a period of rapid change.

Institutional transformation requires a clear and compelling articulation of the need to change and a strong vision of where the change process will lead. While the debate over specific elements of the transformation process should involve broad elements of the university community and its constituents, the vision itself should come—indeed, must come—from the president.

The president should serve not only as the leader of the transformation effort but also as its principal evangelist. In an academic institution, the role of the president is in many ways like that of a teacher, explaining to various campus and external constituencies the need for transformation and setting out an exciting and compelling vision of where the transformation process will lead.

Institutional transformation is not a linear process. It consists instead of a number of simultaneous and interacting elements such as developing a strategic vision, redesigning or perhaps even reinventing the core processes of an institution, and reassigning roles and responsibilities. It is also highly iterative, since as an institution proceeds, experience leads to learning that can modify the transformation process. To make headway in a complex institution such as a university, the transformation effort must spread among many participants and align with other institutional and personal goals.

Universities need to consider a broad array of trans-

Institutional change sometimes involving pushing an organization to the point of instability and chaos.

Hopefully, institutional values are sufficientlystrong to limit instabilities.

formation areas that go far beyond simply restructuring finances in order to face a future of change. The transformation process must encompass every aspect of our institutions, including:

the mission of the university
financial restructuring
organization and governance
general characteristics of the university
intellectual transformation
relations with external constituencies
cultural change

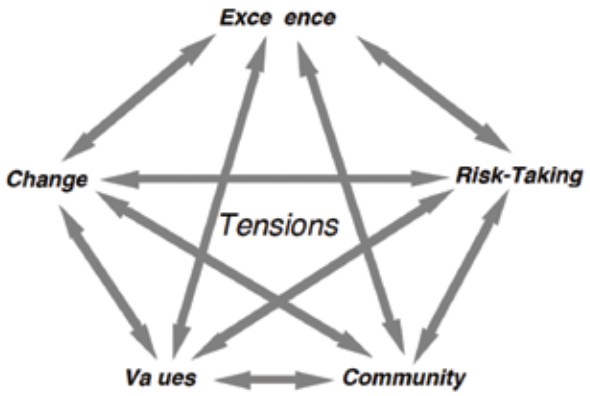
While such a broad, almost scattershot approach is complex to design and challenging to lead, it has the advantage of engaging a large number of participants at the grassroots level.

The most important objective of any broad effort at institutional transformation is not so much to achieve a specific set of goals, but rather to build the capacity, the energy, the excitement, and the commitment to move toward bold visions of the university's future. The real aims include removing the constraints that prevent the institution from responding to the needs of a rapidly changing society; removing unnecessary processes and administrative structures; questioning existing premises and arrangements; and challenging, exciting, and emboldening the members of the university community to view institutional transformation as a great adventure.

In summary, the first and most important objective of any such effort is to simply build the capacity for strategic change, change necessary to enable our universities to respond to a changing society and a changing world. Experience demonstrates that the process of transforming an organization is not only possible, but also understandable and even predictable, to a certain degree. The process starts with an analysis of the external environment and a recognition that radical change is the organization's best response to the challenges it faces. The early stages are sometimes turbulent, marked by conflict, denial, and resistance. But, gradually, leaders and members of the organization begin to develop a shared vision of what their institution should become and turn their attention to the transformation process. In the final stages, grassroots incentives and disincentives are put into place to create the market forces required to drive institutional change, and evaluation methods are developed to measure the success of the transformation process. To illustrate, it is useful to consider a stepwide approach to institutional transformation:

Steps 1: Commitment at the Top. It is critical that the senior leadership of the university buy into the transformation process and fully support it. The leadership for the transformation effort should be provided by a team of executive officers, deans, and directors, possibly augmented by an advisory group of faculty experts on organizational change.

It is also essential that the governing board of the university be supportive—or at least not resist—the transformation effort. Key elements could include informal discussions with trustees, both one-on-one and in public sessions; joint retreats with the executive of-



Planning tensions, sometimes creative, but also sometimes destructive

Ground zero for managing the process

ficers on key strategic issues; joint meetings with key university visiting groups; and the preparation of position papers to provide the necessary background for key decisions that the trustees make as the transformation effort moves forward. External advisory bodies are useful to provide alternative perspectives and credibility to the effort.

Step 2: Seeking Community Involvement. It is important to provide mechanisms for active debate concerning the transformation objectives and process by the campus community. In the 1990s a series of presidential commissions were launched on key issues such as the organization of the university, recruiting outstanding faculty and students, and streamlining administrative processes. Each of the University's schools and colleges was also encouraged to identify key issues of concern and interest.

Effective communication throughout the campus community is absolutely critical for the success of the transformation process. Since there is extensive experience in the design and implementation of such communications programs in the private sector, it may be advisable to hire private consultants to help design and execute this effort.

Step 3: Igniting the Sparks of Transformation. There are two general approaches to changing organizations: in "command and control" approaches, one attempts to initiate and sustain the process through top-down directives and regulation. However, since power declines rapidly with the distance from the leadership, this approach has limited effectiveness in large organizations. The alternative approach, more appropriate for large, complex organizations such as universities, is to create self-sustaining market dynamics, for example, incentives and disincentives that will drive the transformation process. For each of our goals, we need to identify highly targeted actions—leverage points—that create the incentives and disincentives and ignited the sparks necessary for grassroots change. This process requires the real creativity in the design of the transformation.

It is important to identify individuals at all levels, and in various units of the university, who will buy into the transformation process and become active agents on its behalf. In some cases, these will be the institution's most influential faculty and staff. In others, it will be a group of junior faculty or perhaps key administrators. We need to design a process to identify and recruit these individuals. Every opportunity should be used to select leaders at all levels of the university—executive officers, deans and directors, chairs and managers—who not only understand the profound nature of the transformations that must occur in higher education in the years ahead, but who are effective in leading such transformation efforts.

One of the objectives of a university transformation process is to empower the best faculty and enable them to exert the influence on the intellectual directions of the university that will sustain its leadership. This can be a particular challenge since the faculties of many universities have become so encumbered with rules and regulations, committees and academic units, and ineffective faculty governance that the teachers and

scholars are frequently disenfranchised, outshouted by their less productive colleagues who have the time and inclination to play the game of campus politics. It will require determination and resourcefulness to break this stranglehold of process and free our very best minds.

Step 4: Controlling and Focusing the Transformation Agenda. Since the transformation of a complex institution such as a university is broad and multifaceted, part of the challenge is focusing members of the university community and its multiple constituencies on those aspects of the agenda that are most appropriate for their attention. Universities, like most large, complex, and hierarchical organizations, tend over time to grow more bureaucratic, conservative, and resistant to change. They become encrusted with policies, procedures, committees, and organizational layers that discourage risk taking and creativity. It is important to take decisive action to streamline processes, procedures, and organizational structures to enable the university to adapt effectively to a rapidly changing world.

Clearly, significant resources are required to fuel the transformation process, probably at the level of 5 percent to 10 percent of the academic budget. During a period of limited new funding, it takes considerable creativity (and courage) to generate these resources. As we noted earlier in our consideration of financial issues, usually the only sources of funding at the levels required for such major transformation are tuition, private support, and auxiliary activity revenues, so that reallocation must play an important role.

Step 5: Staying the Course. Large organizations will resist change. They will try to wear leaders down, or wait them out ("This, too, shall pass."). We must give leaders throughout the institution every opportunity to consider carefully the issues compelling change, and encourage them to climb on board the transformation train.

For change to occur, we need to strike a delicate balance between the forces that make change inevitable (whether threats or opportunities) and a certain sense of stability and confidence that allows people to take risks. For example, how do we establish sufficient confidence in the long-term support and vitality of the institution, even as we make a compelling case for the importance of the transformation process?

As noted earlier, from a more abstract viewpoint, major change involves taking a system from one stable state to another. The transition itself, however, involves first forcing the system to the brink of instability, which will present certain risks. It is important to minimize the duration of such instability, since the longer it lasts, the more likely the system will move off in an unintended direction, or sustain permanent damage.

Concluding Remarks

Institutions all too frequently chose a timid course of incremental, reactive change because they view a more strategically-driven transformation process as too risky. They are worried about making a mistake, about heading in the wrong direction or failing. While they are aware that this incremental approach can occasionally miss an opportunity, many mature organizations such as universities would prefer the risk of missed opportunity to the danger of heading into the unknown.

But, today, incremental change based on traditional, well-understood paradigms may be the most dangerous course of all, because those paradigms may simply not be adequate to adapt to a future of change. If the status quo is no longer an option, if the existing paradigms are no longer viable, then transformation becomes the wisest course.

While universities have always successfully managed the balance between preserving and propagating the fundamental knowledge sustaining our cultures and civilizations and not only adapting to but actually creating the paradigm shifts that drive change, the time scales characterizing these roles are becoming ever shorted. The centuries characterizing social transitions such as scholasticism to humanism and enlightenment contracted to decades for the industrial revolution and globalization and now have collapsed even further to within a generation or less for the age of knowledge as the technologies of our times now evolve exponentially. Put another way, during the transition from Generation X to the Millennials, info-, bio-, and nano-technology have increased in power a millionfold and will do so yet again with Generation Z.

The capacity for intellectual change and renewal has become increasingly important to us as individuals

and to our institutions. Our challenge, as an institution, and as a faculty, is to work together to provide an environment in which such change is regarded, not as threatening but rather as an exhilarating opportunity to conduct teaching and scholarship of even higher quality and impact on our society.

To succeed, we strive for a more flexible culture, one more accepting of occasional failure as the unavoidable corollary to any ambitious effort. We must learn to adapt quickly while retaining the values and goals that give us a sense of mission and community. Many view the current rigid and hierarchical structure of the university as obsolete. To advance, we must discover ways to draw upon the unique and vibrant creativity of every member of our community.

As financial resources become increasingly constrained, and as competition for students globally increases, especially with the advent of "virtual" technology, we cannot afford to hide our heads in the sand. Increasingly, many fear an age of attrition in higher education similar to that of the post-Civil War period, those institutions that cannot reestablish their sense of purpose for a new society will begin to disappear. As we ask our students to critique the received authority of their society, to examine and decide rather than accept the status quo, so must we also re-open debates about the structure and goals of our common institution.

It is often scary and difficult to let go of old and comfortable roles, to open ourselves to new possibilities and ways of being. Yet change brings with it the possibility of deeper connections to our students and the potential for serving a much broader range of our society. Growth, both for an institution and for the individuals that comprise it, can come only with a step into the unknown.

Our challenge is to tap the great source of creativity and energy of entrepreneurial activity at the University in a way that preserves our fundamental mission, our fundamental values. We need to continue to encourage our tradition of natural evolution, which has been so successful in responding to a changing world, but do so with greater strategic intent. We must also develop a greater capacity to redirect our resources toward our highest priorities. Rather than allowing the university to continue to evolve as an unconstrained, transactional, entrepreneurial culture, we need to guide this process in such a way as to preserve our core missions, characteristics, and values.

Chapter 10

The Challenge of Leadership

The American university has changed quite considerably over the past two centuries, and it continues to evolve today. Colonial colleges have become private research universities; religious colleges formed during the early 19th century gradually became independent colleges; junior colleges have evolved into community colleges and then into regional universities. Today public research universities also continue to evolve to adapt to changes in students (from state to national to global), support (from state to national, public to private), missions (from regional to national to global), and perception (education from a public good to a private benefit). Public universities are already rapidly expanding their public purpose far beyond the borders of their states, since the more mobile the society, the more global the economy, the broader the "publics" served by the university must become.

Of course, this ever-changing nature of the university itself is part of the challenge, since it not only gives rise to an extraordinary diversity of institutions, but also a great diversity in perspectives. What is a university? Is it a "college", in the sense of the heritage of the colonial colleges (and, before that, the English boarding schools)? Is it the 20th century image of university life–football, fraternities, Joe-college, campus protests? Is it Clark Kerr's multiversity, accumulating ever more missions in response to expanding social needs–health care, economic development, technology transfer? Or is the true university something more intellectual: a community of masters and scholars (*universitas magistrorum et scholarium*), a school of universal learning (Newman) embracing every branch of knowledge and all possible means for making new investigations and thus advancing knowledge (Tappan)?

What is the core of its university activities? Student development (or, in the words of Lord Rugby, "transforming savages into gentlemen"). Or creating, curating, archiving, transmitting, and applying knowledge? Or serving society, responding to its contemporary needs–health care, economic development, national defense, homeland security, entertainment (e.g., athletics).

What are its core values? Critical, rigorous thinking (e.g., "the life of the mind")? Academic freedom? Individual achievement (noting that the contemporary organization of the university is really designed to enable individuals to strive to achieve their full potential (as students, faculty, athletes).

With much the character of the proverbial elephant being felt by the blind men, it is not surprising that discussions involving the future of the university can be difficult. It is particularly difficult to ignite such discussions among university leaders, who generally fall back upon the famous Clark Kerr quote: "About 85 institutions in the Western World established by 1520 still exist in recognizable forms, with similar functions and with unbroken histories, including the Catholic Church, the Parliaments of the Isle of Man, of Iceland, and of Great Britain, several Swiss cantons, and…70 universities."… *Hakuna Matata*

It is true that the university today looks very much like it has for decades–indeed, centuries in the case of many ancient European universities. They are still organized into academic and professional disciplines; they still base their educational programs on the traditional undergraduate, graduate, and professional discipline curricula; our universities are still governed, managed, and led as they have been for ages.

But if one looks more closely at the core activities of students and faculty, the changes over the past decade have been profound indeed. The scholarly activities of the faculty have become heavily dependent upon digital technology–rather cyberinfrastructure–whether

in the sciences, humanities, arts, or professions. Although faculties still seek face-to-face discussions with colleagues, these have become the booster shot for far more frequent interactions over the Internet. Most faculty members rarely visit the library anymore, preferring to access digital resources through powerful and efficient search engines. Some have even ceased publishing in favor of the increasingly ubiquitous digital preprint or blog route. Student life and learning are also changing rapidly, as students bring onto campus with them the skills of the net generation for applying this rapidly evolving technology to their own interests, forming social groups through social networking technology (Facebook, Twitter), role playing (gaming), accessing web-based services, and inquiry-based learning, despite the insistence of their professors that they jump through the hoops of the traditional classroom paradigm.

In one sense it is amazing that the university has been able to adapt to these extraordinary transformations of its most fundamental activities, learning and scholarship, with its organization and structure largely intact. Here one might be inclined to observe that technological change tends to evolve much more rapidly than social change, suggesting that a social institution such as the university that has lasted a millennium is unlikely to change on the timescales of tech turns, although social institutions such as corporations have learned the hard way that failure to keep pace can lead to extinction (Remember Borders?). Yet, while social institutions may respond more slowly to technological change, when they do so, it is frequently with quite abrupt and unpredictable consequences, e.g., "punctuated evolution".

It could also be that the revolution in higher education is well underway, at least with the early adopters, and simply not sensed or recognized yet by the body of the institutions within which the changes are occurring. Universities are extraordinarily adaptable organizations, tolerating enormous redundancy and diversity. It could be that the information technology revolution is more of a tsunami that universities can float through rather than a rogue wave that will swamp them.

An alternative viewpoint of the transformation of the university might be as an evolutionary rather than a revolutionary process. Evolutionary change usually occurs first at the edge of an organization (an ecology) rather than in the center where it is likely to be extinguished. In this sense the forces that are now transforming scholarship and enabling new forms of learning communities have not yet propagated into the core of the university. Of course, from this perspective, recent efforts such as the Google Book project take on far more significance, since the morphing of the university library from stacks to Starbucks strikes at the intellectual soul of the university.

Admittedly it is also the case that futurists have a habit of overestimating the impact of new technologies in the near term and underestimating them over the longer term. There is a natural tendency to implicitly assume that the present will continue, just at an accelerated pace, and fail to anticipate the disruptive technologies and killer apps that turn predictions topsy-turvy. Yet we also know that far enough into the future, the exponential character of the evolution of Moore's Law technologies such as info-, bio-, and nano- technology makes almost any scenario possible.

Clearly we have entered a period of significant change in higher education as our universities attempt to respond to the challenges, opportunities, and responsibilities before them.[9] This time of great change, of shifting paradigms, provides the context in which we must consider the changing nature of the university.

Much of this change will be driven by market forces—by a limited resource base, changing societal needs, new technologies, and new competitors. But we also must remember that higher education has a public purpose and a public obligation. Those of us in higher education must always keep before us two questions: "Whom do we serve?" and "How can we serve better?" And society must work to shape and form the markets that will in turn reshape our institutions with appropriate civic purpose.

From this perspective, it is important to understand that the most critical challenge facing most institutions will be to develop the capacity for change. As we noted earlier, universities must seek to remove the constraints that prevent them from responding to the needs of a rapidly changing society. They should strive to challenge, excite, and embolden all members of their academic communities to embark on what should be a great adventure for higher education.

As Frank Rhodes so eloquently stated it in his closing words of reassurance in the 1999 Glion Declaration:

> "For a thousand years the university has benefited our civilization as a learning community where both the young and the experienced could acquire not only knowledge and skills, but the values and discipline of the educated mind. It has defended and propagated our cultural and intellectual heritage, while challenging our norms and beliefs. It has produced the leaders of our governments, commerce, and professions. It has both created and applied new knowledge to serve our society. And it has done so while preserving those values and principles so essential to academic learning: the freedom of inquiry, an openness to new ideas, a commitment to rigorous study, and a love of learning.
>
> There seems little doubt that these roles will continue to be needed by our civilization. There is little doubt as well that the university, in some form, will be needed to provide them. The university of the twenty-first century may be as different from today's institutions as the research university is from the colonial college. But its form and its continued evolution will be a consequence of transformations necessary to provide its ancient values and contributions to a changing world. " (Rhodes, 1999)

Certainly the need for higher education will be of increasing importance in our knowledge-driven future. Certainly, too, it has become increasingly clear that our current paradigms for the university, its teaching and research, its service to society, its financing, all must change rapidly and perhaps radically. Hence the real question is not whether higher education will be transformed, but rather how . . . and by whom. If the university is capable of transforming itself to respond to the needs of a culture of learning, then what is currently perceived as the challenge of change may, in fact, become the opportunity for a renaissance, an age of enlightenment, in higher education in the years ahead.

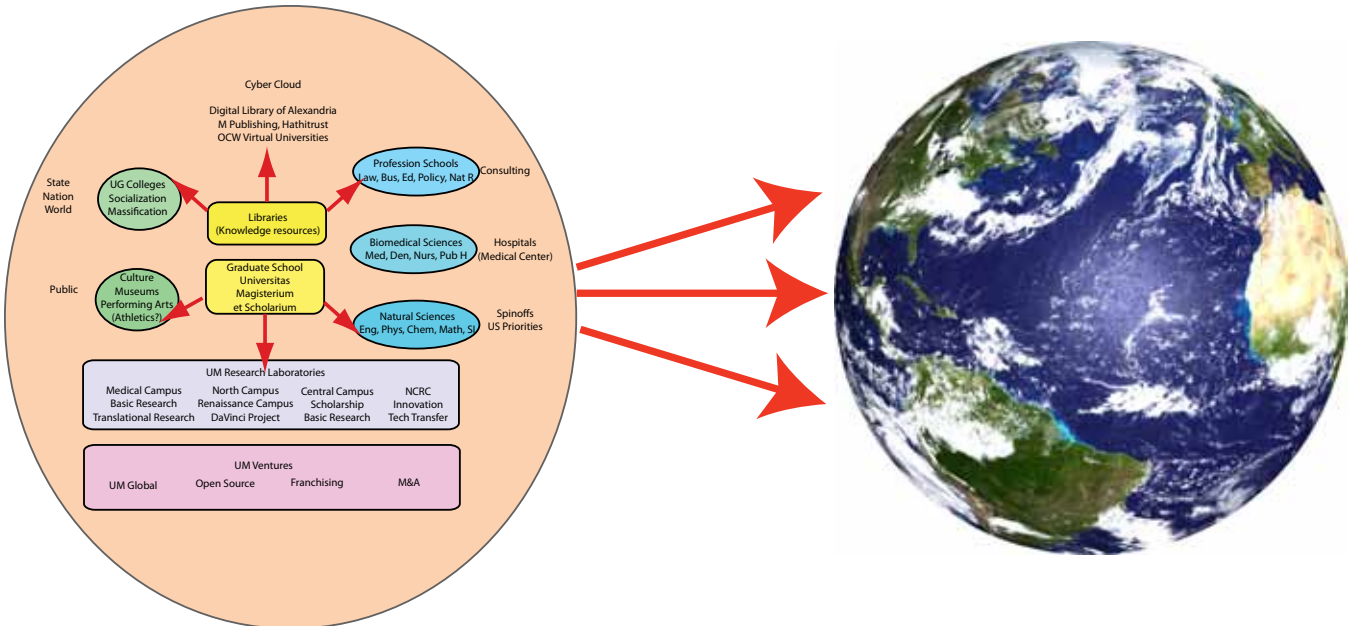
The remarkable resilience of the university, its capacity to adapt and change in the past, has occurred in part because it embraces and encourages an intensely entrepreneurial cultures. We have provided our faculty the freedom, the encouragement, and the incentives to move toward their personal goals in highly flexible ways, and they have done so through good times and bad. Our challenge is to tap this grassroots energy and creativity in the effort to transform our institutions to better serve a changing world.

Yet we must do so within the context of an exciting and compelling vision for the future of our institutions. Rather than allowing the university to continue to evolve as an unconstrained, transactional, entrepreneurial culture, we need to guide this process in such a way as to preserve our core missions, characteristics, and values. We must work hard to develop university communities where uncertainty is an exhilarating opportunity for learning.

While many academics are reluctant to accept the necessity or the validity of formal planning activities, woe be it to the institutions that turn aside from strategic efforts to determine their futures. The successful adaptation of universities to the revolutionary challenges they face will depend a great deal on an institution's collective ability to learn and to continuously improve its core activities. It is critical that higher education give thoughtful attention to the design of institutional processes for planning, management, and governance. Only a concerted effort to understand the important traditions of the past, the challenges of the present, and the possibilities for the future can enable institutions to thrive during a time of such change.

The University of Michigan is an institution that should only respond to this challenge but provide leadership for higher education in this endeavor, just as it has during earlier eras of change in America. Michigan possesses a unique combination of characteristics, particularly well suited to exploring and charting the course for higher education as it evolves to serve a changing world. Former Michigan Professor David Hollinger captured this character of the university well in an address celebrating the 75th anniversary of the founding of its graduate school (Hollinger, 1988):

> "Michigan is a more impressive university as a whole than in those of its parts that are measured by conventional indices of excellence. The principled constraint has been the University's effort to govern itself by the standard academic values of free and open inquiry, veracity, objectivity, reasoned argu-



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ment, and reliance on evidence… Multitudinous, sprawling, decentralized, contingent, imperfect, Michigan retains its capacity to inspire. That capacity derives not from any claims to uniqueness but from its strivings toward cosmopolitanism, from the enormous range of learned pursuits and doctrines available here. If there is a Michigan mystique, it is more democratic than exclusive, more egalitarian that hierarchical; it is a mystique more of pluralism than of uniqueness of any sort. Michigan's tradition is pre-eminently national rather than local. The chiefly historical significance of the University of Michigan is an embodiment of the national academic culture, as an institution successfully devoted to both excellence and comprehensiveness."

It is this unique character that should shape the University's mission, vision, and goals as the University of Michigan enters its third century. Michigan has a responsibility to help show the way to change, not to react to and follow it. Its voice must be loud, clear, and unified in the public forum. It must prepare itself to lead once again for yet another century, embracing the heritage of its institutional saga as a pathfinder, a trailblazer, and a pioneer.

References

Adelman, Clifford. *The Bologna Process for U.S. Eyes: Relearning Higher Education in the Age of Convergence*. San Jose, CA: Institute for Higher Education Policy, 2009.

Atkins, Daniel E. (chair). *Revolutionizing Science and Engineering Through Cyberinfrastructure*. Report of the National Science Foundation Blue-Ribbon Advisory Panel on Cyberinfrastructure. Washington, DC: National Science Foundation, 2003.

Atkins, Daniel E., John Seely Brown and Allen L Hammond. *External Review of the Hewlett Foundation's Open Educational Resources (OER) Program: Achievements, Challenges, and Opportunities.* Menlo Park, CA: Hewlett Foundation, February, 2007.

Augustine, Norman (chair). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. National Academies Committee on Prospering in the Global Economy of the 21st Century. Washington, DC: National Academies Press, 2005.

Bement, Arden L. "Cyberinfrastructure: The Second Revolution", *The Chronicle of Higher Education*, January, 2007.

Bok, Derek. *Our Underachieving Colleges*. Princeton, NJ: Princeton University Press, 2006.

Boulos, Michael. "Bill Gates and a Prescription for Breneman, David. "Peering Around the Bend: The Leadership Challenges of Privatization, Accountability, and Market-Based State Policy". *Association of Governing Boards*, Washington, DC, 2005.

Breneman, David. *Are the States and Public Higher Education Striking a New Bargain? Public Policy Paper Series*. Washington, DC: Association of Governing Boards and Colleges, 2005.

Brown, John Seely. "Minds on Fire", Educause, January/February 2009.

Brown, John Seely and Paul Duguid. *The Social Life of Information*. Cambridge, MA: Harvard Business School Press, 2000.

Brownstein, Ronald. "The Generational Mismatch", *National Journal*, July, 2010.

Christensen, Clayton M. *The Innovator's Dilemma*. Cambridge, MA: Harvard Business School Press, 1997.

Chronicle of Higher Education. "State Appropriations for Higher Education". *Chronicle of Higher Education,* January 11, 2008.

Clark, Burton R. *The Distinctive College: Antioch, Reed, and Swarthmore*. Chicago: Aldine, 1970.

Clark, William. *Academic Chrisma and the Origins of the Research University*. Chicago: University of Chicago Press, 2006.

Drucker, Peter. "A Better Way to Pay for College". *Wall Street Journal*, A14, May 9, 1991.

Drucker, Peter. "Beyond the Information Revolution". *Atlantic Monthly*, 284:4, October, 1999.

Duderstadt, James J., Daniel E. Atkins and Douglas Van Houweling. *Higher Education Faces the Digital Age: Technology Issues and Strategies for American Colleges and Universities*. Washington, DC: American Council on Education, 2002.

Duderstadt, James J. (chair). *Preparing for the Revolution: Information Technology and the Future of the University*. Washington, DC: National Academies Press, 2003.
http://www.nap.edu

Duderstadt, James J., William A. Wulf, and Robert Zemsky. "Envisioning a Transformed University", *Issues in Science and Technology,* 22(1), 35-41, Washington, DC: National Academy Press, 2005.

Duderstadt, James J. *A Case Study in University Transformation: Positioning the University of Michigan for the New Millennium* (Ann Arbor: University of Michigan, Millennium Project, 1999), http://milproj.dc.umich.edu/publica tions/strategy. Duderstadt, James J. *A University for the 21st Century*. Ann Arbor, MI: University of Michigan Press, 2001.

Duderstadt, James J. and Farris W. Womack. *The Future of the Public University in America: Beyond the Crossroads*. Baltimore, MD: Johns Hopkins University Press, 2002.

Duderstadt, James J. *The View from the Helm: Leading the American University During an Era of Change*. Ann Arbor, MI: University of Michigan Press, 2007.

Duderstadt, James J., Aligning American Higher Education with a Twenty-first-century Public Agenda". *Higher Education in Europe*, Vol 34, No. 3-4, 2009.

The Economist. "The Brains Business: A Survey of Higher Education". *The Economist*, September 10, 2005.

The Economist. "The Search for Talent: The World's Most Valuable Commodity Is Getting Harder to Find". *The Economist*, October 2006.

The Economist. "Now for the Reckoning—Corporate America's Legacy Costs". *The Economist*, October 15, 2005.

The Economist. "Special Report: Blacks in America". *The Economist*, August 6, 2005.

The Economist. "Detroitosaurus Wrecks: The lessons for America and the car industry from the biggest industrial collapse ever". *The Economist*, June 4, 2009.

The Economist. "A Ponzi scheme that works". *The Economist*, December 19, 2009.

Finley, Nolan. "Attitude May Make Michigan the New Mississippi". *Detroit News*, May 1, 2005.
See also Finley, Nolan. *Detroit News*, December 9, 2007.

Flexner, Abraham. *Medical Education in the United States and Canada*. New York: Carnegie Foundation for the Advancement of Teacing, 2010.

Frey, William H, "Five Myths about the 2010 Census and the U.S. Population", Brookings Institute Report, 2010.

Friedman, Thomas. *The World Is Flat: A Brief History of the 21st Century*. New York, NY: Farrar, Strauss, and Giroux, 2005.

Garcia, M.L. and O.H. Bray. *Fundamentals of Technology Roadmapping*. Albuquerque, NM: Sandia National Laboratory, 1997.

Germano, William. "What Are Books Good For?" *The Key Reporter*, Phi Beta Kappa Society, Winter, 2010, p. 8.

Gibson, William. *Neuromancer*. New York: Ace Books, 1984.Glazer, Louis. *A New Agenda for Michigan*. Ann Arbor, MI: Michigan Future, 2007.
http://www.michiganfuture.org

Glazer, Louis and Donald Grimes. *Michigan's Transition to a Knowledge-Based Economy, Annual Progress Reports, 2008, 2009, 2010*. Ann Arbor, MI: Michigan Future, Inc., 2010.

Gratz v. Bollinger, Docket 02–516, 539 U.S. 244 (2003), Decision: June 23, 2003; *Grutter v. Bollinger,* Docket 02–241, 539 U.S. 306 (2003), Decision: June 23, 2003

Harpers Magazine, 1887.

Haycock, Kati and Danette Gerald. *Engines of Inequality*. Washington, DC: Education Trust, 2008.

Hollinger, David. "Academic Culture at Michigan". 50th Anniversary of Rackham School of Graduate Studies. Ann Arbor: Rackam School Publications, 1988. Haycock, Kati. *Opportunity Adrift*. Washington, DC: Education Trust, 2010.

Ito, M., *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning With New Media*. Cambridge: MIT Press, 2009.

ITS. "Trends in College Spending (ITS) On-Line". Delta Project on Postsecondary Education Costs, Productivity, and Accountatility, 2010.

Kane, Thomas J. and Peter R. Orzag. "Funding Restrictions at Public Universities: Effects and Policy Implications" (working paper, Brookings Institution, Washington, DC, September 2003).

Kelly, Kevin. "Scan This Book!". *New York Times Sunday Magazine*, May 14, 2006.

Kerr, Clark. *The Uses of the University*. Cambridge: Harvard University Press, 1963.

Kerr, Clark. *The Gold and the Blue: A Personal Memoir of the University of California, 1949-1967*. Volume One: Academic Triumphs. Berkeley, CA: University of California Press, pp. 172-190, 2001.

Krug, Edward A., ed., *Charles W. Eliot and Popular Education,* Classics in Education, vol. 8 (New York: Teachers College, Columbia University, 1961).

Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Chicago, IL: University of Chicago Press, 1963.

Kurzweil, Ray. *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*. New York, NY: Viking, 1999.

Kurzweil, Ray. *The Singularity Is Near: When Humans Transcend Biology*. New York, NY: Viking Penguin, 2005.

Lingenfelter, Paul E. "The Firing of Henry Philip Tappan, University Builder" (master's thesis, University of Michigan, 1970) Longworth, Richard C. *Caught in the Middle: America's Heartland in the Age of Globalization*. New York, NY: Bloomsbury, 2008.

Lohmann, Susanne. Meeting of the National Academics IT Forum with the Provosts of the Association of American Universities, Beckman Center, Irvine, CA, September 9, 2003. McPherson, Peter. *Assuring That Public Research Universities Remain Vital*. Washington: Association of Public and Land-Grant Universities, 2010.

Miller, Charles (chair). *A Test of Leadership: Charting the Future of U.S. Higher Education*. National Commission on the Future of Higher Education in America ("The Spellings Commission"). Washington, DC: Department of Education, 2006.

Moe, Michael. *The Knowledge Web: People Power– Fuel* for *the New Economy*. New York, NY: Merrill-Lynch, 2000.

National Intelligence Council. *Mapping the Global Future, Project 2020*. Washington, DC: Government Printing Office, 2004.

New York Times Editorial, "Keeping the Public Colleges Afloat". New York Times, 2004.

Newman, John Henry. *The Idea of a University* (New Haven, CT: Yale University Press, 1996; 1st ed., New York: Longman, Green, 1899)

Northwest Ordinance, Article 3., printed in F. N. Thorpe, ed. *The Federal and State Constitutions, Colonial Charters, and Other Organic Laws*. Washington, DC: U.S. Government Printing Office, pp. 957, 1909.

NRC, Committee on Developments in the Science of Learning. *How People Learn: Brain, Mind, Experience, and School*. National Research Council. Washington, DC: National Academy Press, 2000.

NRC. The Impact of Academic Research on Industrial Performance. National Research Council. Washington, D.C.: National Academies Press, 2003.

Palmisano, Samuel J. "The Globally Integrated Enterprise". *Foreign Affairs*, May/June 2006.

Pancake, Cherry. Presentation to the Advisory Committee on Cyberinfrastructure, National Science Foundation, 2003

Peckham, Howard H. *The Making of the University of Michigan 1817–1992,* ed. and updated by Margaret L. Steneck and Nicholas H. Steneck (Ann Arbor: University of Michigan Bentley Historical Library, 1994)

Pensky, Marc. "Digital Natives, Digital Immigrants". NCB University Press, 9 (5), 2001.

Prahalad, C.K. and Gary Hamel. *Competing for the Future*. Cambridge, MA: Harvard Business School Press, 1994.

Price, Richard Rees. "The University of Michigan: Its Origin and Development," *Harvard Bulletin in Education* 3 (January 1923) Raschke, Carl A. *The Digital Revolution and the Coming of the Postmodern University*. New York, NY: Routledge Falmer, 2003.

Reed, Dan. "Computing for the Future: Release 2016". Chapel Hill, NC: Renaissance Computing Institute, 2006.

Rhodes, Frank H. T. *The Creation of the Future: The Role of the American University.* Ithaca, NY: Cornell University Press, pp. 137-39, 2001.
Rhodes is the former president of the first of the nation's truly public-private hybrids, Cornell University.

Rudolph, Frederick. *The American College and University: A History* (Athens: University of Georgia Press, 1962)

Ruegg, Walter. *A History of the University in Europe*, Vol. I, Universities in the Middle Ages. Cambridge: Cambridge University Press, 1992.

Ruegg, Walter. *A History of the University in Europe*, Vol. II, Universities in Early Modern Europe. Cambridge: Cambridge University Press, 1996.

Ruegg, Walter. *A History of the University in Europe*, Vol. III, Universities in the 19th and Early 20th Centuries. Cambridge: Cambridge University Press, 2004.

SHEEO. *State Higher Education Finance*. Washington, DC: State Higher Education Executive Officers, 2010.

Tappan, Henry Philip. *University Education* (New York: George P. Putnam, 1851)

Vest, Charles M. *Clark Kerr Lectures*, *The University of California, Berkeley*. Berkeley, CA: University of California Press, 2005.

Thelin, John R. A History of American Higher Education. Baltimore: Johns Hopkins University Press, 2004.

Thomas, Douglas and John S. Brown, A New Culture of Learning. San Francisco: Douglas-Brown, 2010.

Turner, James and Paul Bernard. "The Prussian Road to University", 50th Anniversary of Rackham School of Graduate Studies. Ann Arbor: Rackam School Publications, 1988.

UM Accreditation Report. *An Institution of Global Learning, Knowledge, and Engagement*. Ann Arbor: University of Michgan Regents, 2010.

Veysey, Lawrence R. *The Emergence of the American University*. Chicago: University of Chicago Press, 1965.

Weber, Luc and James J. Duderstadt, eds. T*he Globalization of Higher Education*, VI Glion Colloquium. Paris: Economica, 2007.

Weber, Luc and James J. Duderstadt, eds. *Innovation and University Research*, VII Glion Colloquium. Paris: Economica, 2009.

Wiley, John. *Forward Thinking: The University and Wisconsin's Economic Recover*y. Chancellor's Report. Madison, WI: University of Wisconsin, 2003.

Wulf, William A. "Warning: Information Technology Will Tranform the University", *Issues in Science and Technology*, pp. 46-52, Summer, 1995.

Zemsky, Robert, William Massey and Gregory Wegner. *Remaking the American University: Market-Smart and Mission Centered*. New York, NY: 2005.

Zemsky, Robert. *Making Reform Work: The Case for Transforming American Higher Education*. Rutgers, NJ: University of Rutgers Press, 2009.
See also Robert Zemsky, "Will Higher Education Ever Change as it Should?". *Chronicle of Higher Education Commentary*, August 3, 2009.