



THE MILLENNIUM PROJECT

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in all its many forms,

to better serve our world.



A tradition of evolution

As one of civilization's most enduring institutions, the university has been extraordinary in its capacity to change and adapt to serve society. Far from being immutable, the university has changed over time and continues to do so today. A simple glance at the remarkable diversity of institutions comprising higher education in America demonstrates this evolution of the species.

The challenges and changes facing higher education in the 1990s are comparable in significance to two other periods of great change for American higher education: the period in the late-nineteenth century, when the comprehensive public university first appeared, and the years following World War II, when the research university evolved to serve the needs of post-war America.

Today, many are concerned about the rapidly increasing costs of quality education and research during a period of limited resources, the erosion of public trust and confidence in higher education, and the deterioration in the partnership between the research university and the federal government. However, our institutions will be affected even more profoundly by the powerful changes driving transformations in our society, including the

increasing ethnic and cultural diversity of our people; the growing interdependence of nations; and the degree to which knowledge itself has become the key driving force in determining economic prosperity, national security, and social well-being.

There is an increasing sense among leaders of American higher education and on the part of our various constituencies that the 1990s will represent a period of significant change on the part of our universities if we are to respond to the challenges, opportunities, and responsibilities before us. A key element will be efforts to provide universities with the capacity to transform themselves into entirely new paradigms that are better able to serve a rapidly changing society and a profoundly changed world.

The Millennium Project is intended as a mechanism both to study the forces of change in higher education and to explore possible paradigms for future universities. However, rather than being designed as a study center or think tank, the Millennium Project will be more akin to an experimental laboratory for the study of the future of the University. The project will draw together scholars and students to develop working models or prototypes to explore possible futures of the university. Like the famous Lockheed Skunkworks, every so often the hanger doors of the Millennium Project will open, and something really weird will be wheeled out and flown away.

The Forces of Change in Higher Education

One frequently hears the primary missions of the university referred to in terms of teaching, research, and service. But these roles can also be regarded as simply the twentieth century manifestations of the more fundamental roles of *creating, preserving, integrating, transmitting, and applying* knowledge. From this more abstract viewpoint, it is clear that while these fundamental roles of the university do not change over time, the particular realization of these roles do change—and change quite dramatically, in fact. Consider, for example, the role of “teaching,” that is, transmitting knowledge. While we generally think of this role in terms of a professor teaching a class of students, who, in turn, respond by reading assigned texts, writing papers, solving problems or performing experiments, and taking examinations, we should also recognize that classroom instruction is a relatively recent form of pedagogy. Throughout the last millennium, the more common form of learning was through apprenticeship. Both the neophyte scholar and craftsman learned by working as apprentices to a master. While this type of one-on-one learning still occurs today, in skilled professions such as medicine and in advanced education programs such as the Ph.D. dissertation, it is simply too labor-intensive for the mass educational needs of modern society.

The classroom itself may soon be replaced by more appropriate and efficient learning experiences. Indeed, such a paradigm shift may be forced upon the faculty by the students themselves. Today's students are members of the "digital" generation. They have spent their early lives surrounded by robust, visual, electronic media—Sesame Street, MTV, home computers, video games, cyberspace networks, and virtual reality. They approach learning as a "plug-and-play" experience, unaccustomed and unwilling to learn sequentially—to read the manual—and rather inclined to plunge in and learn through participation and experimentation. While this type of learning is far different from the sequential, pyramid approach of the traditional university curriculum, it may be far more effective for this generation, particularly when provided through a media-rich environment.

It could well be that faculty members of the twenty-first century university will be asked to set aside their roles as teachers and instead to become designers of learning experiences, processes, and environments. Further, tomorrow's faculty may have to discard the present style of solitary learning experiences, in which students tend to learn primarily on their own through reading, writing, and problem solving. Instead they may be asked to develop collective learning experiences in which students work together and learn together with the faculty member becoming more of a consultant or a coach than a teacher.

One can easily identify other similarly profound changes occurring in the other roles of the university. The process of creating new knowledge—of research and scholarship—is also evolving rapidly away from the solitary scholar to teams of scholars, perhaps spread over a number of disciplines. Indeed, is the concept of the disciplinary specialist really necessary—or even relevant—in a future in which the most interesting and significant problems will require “big think” rather than “small think”? Who needs such specialists when intelligent software agents will soon be available to roam far and wide through robust networks containing the knowledge of the world, instantly and effortlessly extracting whatever a person wishes to know?

So, too, there is increasing pressure to draw research topics more directly from worldly experience rather than predominantly from the curiosity of scholars. Even the nature of knowledge creation is shifting somewhat away from the *analysis of what has been* to the *creation of what has never been*—drawing more on the experience of the artist than upon analytical skills of the scientist.

The preservation of knowledge is one of the most rapidly changing functions of the university. The computer—or more precisely, the “digital convergence” of various media from

print to graphics to sound to sensory experiences through virtual reality—has already moved beyond the printing press in its impact on knowledge. Throughout the centuries the intellectual focal point of the university has been its library, its collection of written works preserving the knowledge of civilization. Yet today, such knowledge exists in many forms—as text, graphics, sound, algorithms, virtual reality simulations—and it exists almost literally in the ether, distributed in digital representations over worldwide networks, accessible by anyone, and certainly not the prerogative of the privileged few in academe.

Finally, it is also clear that societal needs will continue to dictate great changes in the applications of knowledge it accepts from universities. Over the past several decades, universities have been asked to play the lead in applying knowledge across a wide array of activities, from providing health care, to protecting the environment, from rebuilding our cities to entertaining the public at large (although it is sometimes hard to understand how intercollegiate athletics represents knowledge application).

This abstract definition of the roles of the university has existed throughout the long history of the university and will certainly continue to exist as long as these remarkable social institutions survive. But the particular realization of the fundamental roles of knowledge

creation, preservation, integration, transmission, and application will continue to change in profound ways, as they have so often in the past. This means that change--and often radical transformation--will be a continual challenge and an essential part of our enterprise in order simply to sustain our traditional roles in society.

Some Different Paradigms

Of course these paradigm shifts are being driven by the extraordinary pace of change in our society. We are living in the most extraordinary of times: the collapse of communism, the end of the cold war, the impact of technologies ranging from computers and telecommunication to biotechnology, a redefinition of the world economic order, and, of course, the human population pushing against the very limits of the planet. Many believe that we are going through a period of change in our civilization just as momentous as that which occurred in earlier times such as the Renaissance or the Industrial Revolution—except that while these earlier transformations took centuries to occur, the transformations characterizing our times will occur in a decade or less! The 1990s are sometimes portrayed as the countdown toward a new millennium, as we find ourselves swept toward a new century by these incredible forces of change. But the events of the past several years suggest that the twenty-first century is already upon us—a decade early!

This time of great change, of shifting paradigms, provides the context in which we must consider the changing nature of the academic research enterprise itself. We must take great care not to simply extrapolate the past and instead examine the full range of possibilities of the future.

Here we face a particular dilemma. Both the pace and nature of the changes occurring in our world today have become so rapid and so significant that our present social structures—in government, education, the private sector—are having increasing difficulty in even sensing the changes, although they certainly feel their consequences. They are simply incapable of understanding the profound changes characterizing our world, much less responding and adapting in an effective way.

Let us go further. It may well be that our present institutions, such as universities and government agencies, which have been the traditional structures for intellectual pursuits such as research, could be as obsolete and irrelevant to our future as the American corporation of the 1950s. We need to explore new social structures capable of sensing and understanding change, as well as capable of engaging in the strategic processes necessary to adapt or control change.

To illustrate the profound nature of this challenge, it is interesting to consider several of the more provocative paradigms that might characterize the “university of the twenty-first century”:

The Cyberspace University: A university that spans the world (and possibly even beyond) as a robust information network linking together students, faculty, graduates, and knowledge resources.

The World University: 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).

The Diverse University (or “Transversity”): A university drawing its intellectual strength and its character from the rich diversity of humankind, providing a model for our society of a pluralistic learning community in which people respect and tolerate diversity even as they live, work, and learn together as a community of scholars.

The Creative University: As the tools for creation become more robust (e.g., creating materials atom-by-atom, genetically engineering new life forms, or computer-generating artificial intelligence or virtual reality), the primary activities of the university will shift from a focus on analytical disciplines and professions to those stressing creative activities (i.e., “turning dreams into reality”).

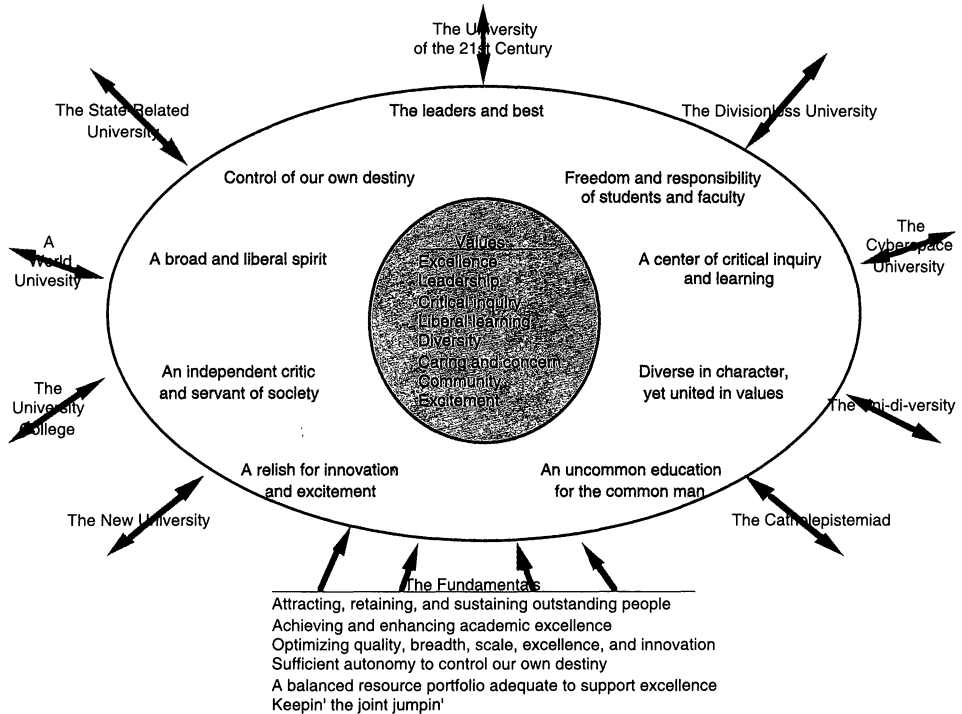
The Divisionless University: The current disciplinary (and professional) organization of the university is viewed by many as increasingly irrelevant to their teaching, scholarship, and service activities. Perhaps the university of the future will be far more integrated and less specialized through the use of a web of virtual structures which provide both horizontal and vertical integration among the disciplines and professions.

The University College: It seems clear that we need to develop a new paradigm for undergraduate education within the complex environment provided by a comprehensive research university. This “university college” should draw on the intellectual resources of the entire university: its scholars, libraries, museums, laboratories, graduate and professional programs, and its remarkable diversity of people, ideas, and endeavors.

The Catholepistemiad: Since education will increasingly require a lifetime commitment, perhaps the university should reinvent itself to span the entire continuum of education, from cradle to grave. It could form strategic alliances with other components of the educational system and commit itself to a lifetime of interaction with its students/graduates, providing them throughout their lives with the education necessary to meet their changing goals and needs.

The State-related, but World-supported, University: A university with a strong public character, but supported primarily through resources it must generate itself (e.g., tuition, federal grants, private giving, auxiliary enterprises), not through general purpose appropriations.

Of course, it is unlikely that our institutions will assume the form of any one of these models. But each paradigm has aspects that will almost certainly be a part of our character in the century ahead.



And each paradigm suggests the extraordinary nature of the transformations that would be required in our universities in the years ahead. Just as they have so many times in the past, it is clear that our institutions must continue to change and evolve if we are to continue to serve—and, indeed, remain relevant to—a rapidly changing world.

The Millennium Project

Historically, institutions as large, complex, and tradition-bound as the comprehensive American university have accomplished change through ad hoc mechanisms, e.g., buying change with additional resources or laboriously building the consensus necessary for grassroots support of change. We will need a more strategic approach for the type of institutional transformation necessary to move toward the major paradigm shifts that will likely characterize higher education in the years ahead, an approach capable of staying the course until the desired changes have occurred. Indeed, many institutions have already embarked on major transformation agendas similar to those characterizing the private sector. Some even use similar language as they refer to their efforts to “transform,” “restructure,” or even “re-invent” their institutions. Herein lies one of the great challenges to universities, since our various missions and our diverse array of constituencies give us a complexity far

Activities:

Seminars
 Workshops
 Courses
 Pollinating, Linkages
 Visiting Speakers
 Experiments
 Prototyping
 Demonstration Projects
 Student Projects
 Clearinghouse
 Home for Radicals
 Advocacy

**Project Areas:**

Paradigm Exploration
 ...Cyberspace University
 ...Creative University
 ...Divisionless University
 ...World University
 ...Uni-di-versity
 ...Catholepistemiad
 Knowledge Networks
 Virtual Universities
 New Media
 MOOs, Avatars,...
 Brainstorming, futuring
 Leadership Academy
 Strategic Alliances
 CR&D Division of UM

beyond that encountered in business or government. As a result, the process of institutional transformation is necessarily more complex.

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 far more effective 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 to explore academic colleges built around research themes at UC-San Diego and residential learning at UC-Santa Cruz in the 1960s are examples of this approach. However, the resource-limited 1990s are a much different time than 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 to better prototype and rapidly propagate successful efforts.

To this end, we have developed within the University of Michigan a concept we refer to as the Millennium Project aimed at providing an environment in which creative students and faculty can join with colleagues from beyond the campus to develop and test new paradigms of the university. In some ways, the Millennium Project would be the analogue to a corporate R&D laboratory, an incubation center where new paradigms concerning the fundamental missions of the university—teaching, research, service, extension—could be developed and tested. But it would also be aimed at developing a new culture, and spirit of excitement and adventure that would propagate to the University at large. In such an academic enterprise, we would hope to build a risk-tolerant culture in which students and faculty are strongly encouraged to “go for it,” in which failure is accepted as part of the learning process associated with ambitious goals rather than poor performance.

The Millennium Project will be launched on seed funding from the University for an initial five-year period (... to the year 2001 ... The Third Millennium ...) But we have already had strong interest in support from both the federal government and private foundations, and the Project could eventually evolve into a major national center or institute for the study of higher education.

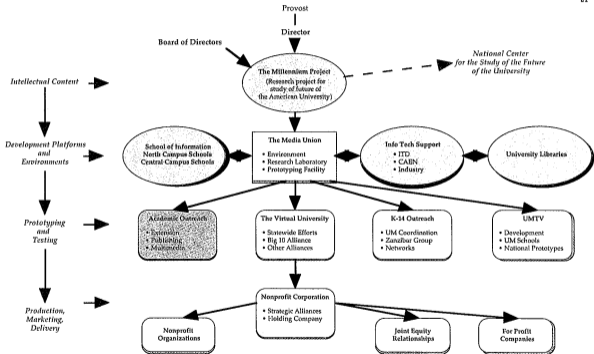
The Millennium Project will have both a physical and a virtual presence. It will be located in the Media Union, a major new academic complex recently completed on our North Campus. This exciting new center is designed both to explore and test many of the more exciting innovations that may well determine the character of the University in the years to come, including the use of information technology to provide students and faculty with access to the world, collective and interactive learning, and immersion in the cultural artifacts—the original sources—characterizing our civilization. The Media Union merges the creative aspects of disciplines across the entire campus, ranging from art, psychology, and architecture to engineering, philosophy, and biology. Inventive scholars will come together with powerful resources, entering a free-wheeling space where both ordinary and extraordinary people can do exceptional things. Michigan's portal to the rest of the world, the Media Union will reach out to the huge storehouses of information growing daily on the Web, while drawing national and international scholars and students into our campus conversations. New information technology will create a "virtual" community of thinkers, allowing face-to-face dialogue and collaboration across thousands of miles.

These physical facilities will be augmented by a virtual environment based on information technology and networks that would extend across and beyond the campus. As the prime contractor for NSFnet, the Internet backbone, the University of Michigan provides an exceptional environment for access to the "information superhighway." But we also have ongoing activities other than electronic infrastructure, such as an array of digital library projects, a University-wide interactive video system (UMTV) with over one hundred broadcasting channels available to students and faculty, collaboration-technology projects, and a set of broad linkages to hundreds of institutions both in this country and abroad.

Activities and Relationships

The interrelationship among these various roles is best illustrated by the diagram in the figure on the following page. This characterizes the Millennium Project as providing the intellectual content for a sequence of activities ranging from fundamental research to development to prototyping to actual production and delivery.

More specifically, the Millennium Project will explore various paradigms for the future of higher education within the extraordinary environment provided by the Media Union and



sustained through strong interactions with academic units—in particular, the School of Information and the North Campus schools and colleges; the Information Technology Division; and the University Libraries. There will be extensive interaction with other ongoing efforts such as academic outreach, K-14 education, UMTV, and new initiatives such as virtual universities. Finally, it seems likely that new organizations will be formed to take successful paradigms beyond the prototyping and testing stage, such as nonprofit corporations and alliances with for-profit companies.

The Millennium Project will work closely with a number of the academic outreach initiatives of the University. These include the development of so-called “virtual” or cyberspace universities at the state, national, and international level; exploring new methods for the delivery of educational services such as multimedia; and designing and launching a major new academy for the education of future academic leaders.

Concluding Remarks

If American higher education is to respond to the challenges, opportunities, and responsibilities before us, universities must develop the capacity to transform themselves into entirely new paradigms that can serve a rapidly changing society and a changed world.

We must unshackle the constraints that prevent our institutions from responding to the needs of a rapidly changing society; remove unnecessary processes and administrative structures; question existing premises and arrangements; and challenge, excite, and embolden members of our university communities to embark on this great adventure. Our challenge is to provide an environment in which such change is regarded not as threatening but rather as an exhilarating opportunity to engage in learning, in all its many forms, to better serve our world.

And the Millennium Project is intended to provide just such an environment ...

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