

Change and the University



A Western Perspective

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The Themes of Our Times



- An **Age of Knowledge**, in which educated people and their ideas have become the strategic commodities determining prosperity, security, and social well-being.
- The **global** nature of our society.
- Rapidly evolving **information technology** that reshapes, strengthens, and accelerates the activities of knowledge driven organizations.
- **Networking**, the degree to which cooperation and collaboration among individuals and institutions are replacing more formal social structures such as governments and states.

The Challenges Facing Our Universities



- Changing social-cultural roles
- Structural problems
- Economic problems
- Governance-management-politics

A response: “If you can’t give us money, give us freedom!”

Case study: The University of Michigan

State-supported --> state assisted --> state located --> state molested



My Approach

While it is important to respect the past and to understand the present, it is also important to explore the future.

In my remarks, I will begin by reviewing the state of higher education in the United States, similar to much of the West. However I will move rapidly on to consider possibilities for the future of the university.

University of Michigan



- First truly public university in United States
- Constitutional autonomy
- Nation's largest university (single campus)
 - 37,000 students; 4,500 faculty, 25,000 staff \$3.0 billion/year;
 - 3 million m² of facilities
 - Campuses in Europe, Hong Kong, Korea, Brazil, cyberspace
- Nation's leading research university(\$500 million/year)
- Some other features:
 - First university hospital (1 million patients a year, \$1.2 billion/year)
 - Developed and managed the Internet (now Internet2)
 - Michigan Football Stadium: 111,000 seats (always filled!)

UM Schools and Colleges



- Architecture
- Art and Design
- Business Administration
- Dentistry
- Education
- Engineering
- Graduate programs
- Information
- Kinesiology
- Law
- Humanities
- Medicine
- Music
- Natural Resources
- Nursing
- Pharmacy
- Public Health
- Public Policy
- Sciences
- Social Work

The Evolution of U.S. Higher Education



1700s-1800s	Colonial colleges (elite, private)
1860s	Land-grant state universities
1900s	Normal colleges, technical colleges
1950s	Research universities, community colleges
1970s	State university systems
2000 and beyond	For-profit U, cyber U, global U, ...

United States Higher Education “System”



AAU-Class Research Universities (60)

Research Universities (115)

Doctoral Universities (111)

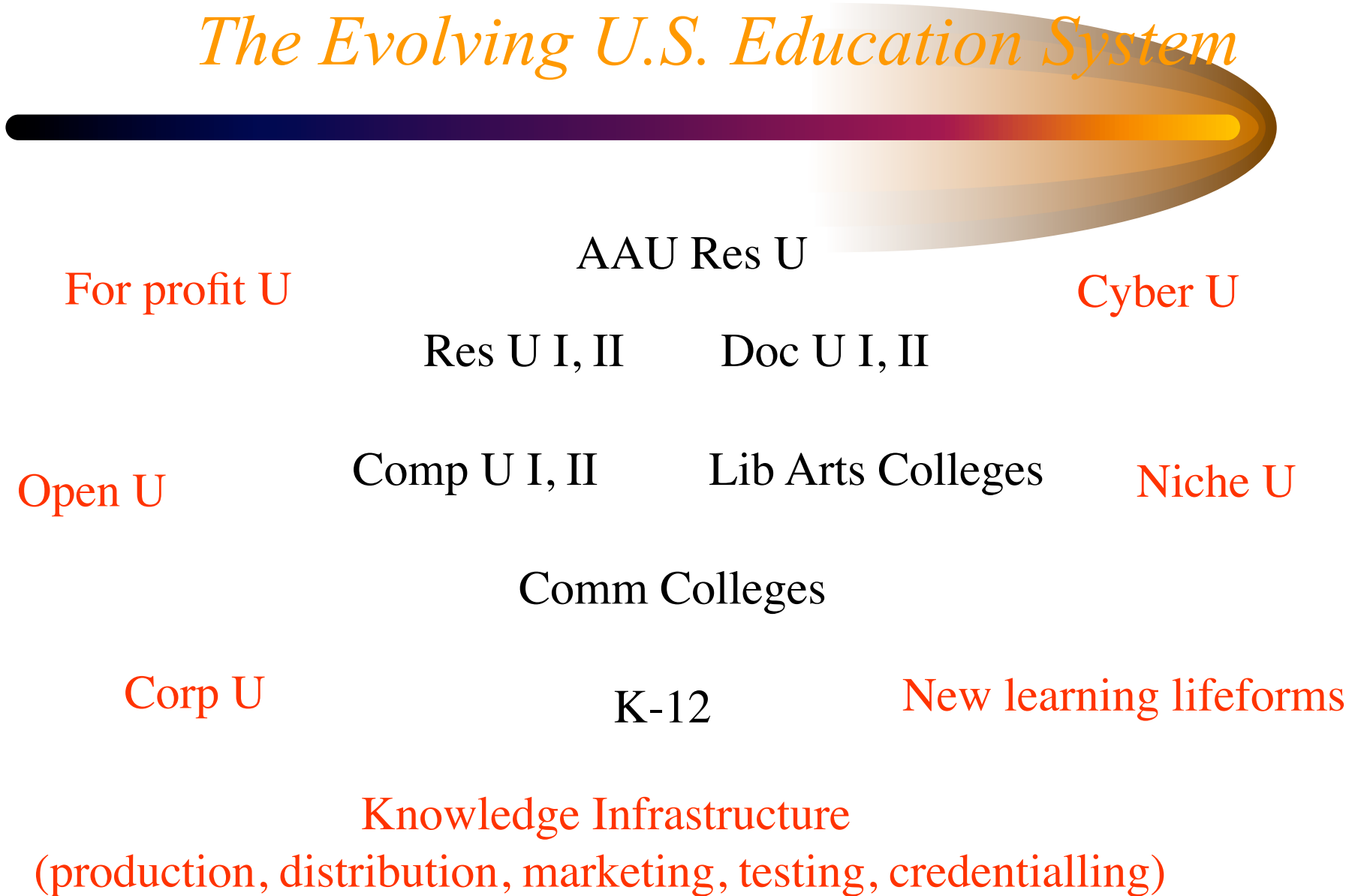
Comprehensive Universities (529)

Baccalaureate Colleges (637)

Two-Year Colleges (1,471)

Total U.S. Colleges and Universities: 3,595

The Evolving U.S. Education System



Some Other Characteristics of the U.S. System of Higher Education



- 65% of high school graduates attend college
- 15 million students enrolled in 3,595 universities
- 80% of students enrolled in “public” universities
- \$185 billion spent on U.S. higher education
 - \$50 billion in federal student financial aid
 - \$15 billion in federal research grants
 - \$40 billion in state (regional) appropriations
 - \$80 billion in tuition, gifts, business activities, etc.

The Current Situation in the United State

(How things really work!)



The Federal Role: no ministry, no system, no controls, ... no policy

- Student financial aid (\$50 B/y) aimed at access and mass education
grants --> loans -->tax credits --> markets
- Research (\$15 B/y) aimed at basic research and “strategic” research
grants to individual faculty members and groups
merit-based, peer reviewed stressing quality
- Health Care aimed at treatment of elderly and indigent in university hospitals
- Federal tax policy: universities are classified as “non-profit” and not taxed;
liberal tax deductions for “charitable giving” and research support

Note: The federal government gives money to people, not universities!
(students, faculty researchers, doctors , donors)

The Role of the States



There is great diversity in how the states approach higher education:

- Rigid Systems, characterized by strong central planning
New York, Wisconsin, North Carolina, Maryland
Statewide university systems and governing boards
- Anarchy - no system, no coordination, no policy
Michigan Pennsylvania, Ohio
- Hybrids: California (U. of California, California State University)
- Private Colleges and Universities: Harvard, Stanford, MIT, Caltech

Governance on the Campuses



In theory, American universities operate with “shared governance”, among the governing boards (appointed or elected), the administration (president), and the faculty (elected faculty senate).

In practice, much of the power rests with the deans of various schools and colleges (law, medicine, science, engineering, ...)

A variety of management styles, ranging from centralized control and allocation of resources to highly decentralized systems (the “every tub on its own bottom style of Harvard). Many large universities are moving to a hybrid system known as “responsibility center management” in which each dean is responsible for generating the funds to pay for the operation of their school.

The Role of Markets



- For students (particularly the best)
- For faculty (particularly the best)
- For public funds (research grants, state appropriations)
- For private funds (gifts, commercial)
- For everything and everybody

In a sense, Michigan competes not only with UC-Berkeley, Harvard, and MIT, but also with Oxford and Cambridge, not to mention IBM and Microsoft!

Some lessons learned from the United States experience



University quality and agility are inversely proportional to governance (federal, state, faculty).

Anarchy seems to work best!

University quality and agility are directly correlated with market pressures, faculty incentives, and the freedom for faculty to respond as individuals to the marketplace!

Two quotes...



“Thirty years from now the big university campuses will be relics. Universities won’t survive. It is as large a change as when we first got the printed book.”

Peter Drucker

“If you believe that an institution that has survived for a millennium cannot disappear in just a few decades, just ask yourself what has happened to the family farm.”

William Wulf

“I wonder at times if we are not like the dinosaurs, looking up at the sky at the approaching comet and wondering whether it has an implication for our future.”

Frank Rhodes

Two contrasting futures



Scenario 1: A **dark, market-driven future** in which strong market forces drive a major restructuring of the higher education enterprise, driving the system toward the mediocrity that has characterized other mass media markets such as television and journalism.

Scenario 2: A **society of learning**, in which all our citizens are provided 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 Forces of Change



- Financial imperatives
- Changing societal needs
- Technology
- Market forces

Financial Imperatives



- Increasing societal demand for university services (education, research, service)
- Increasing costs of educational activities
- Declining public support
- Public resistance to increasing prices
- Inability to re-engineering cost structure

Concern: The current paradigms for conducting, distributing, and financing higher education may not be able to adapt to the demands and realities of our times

Changing Societal Needs



- 30% increase in traditional students
- Education needs of high-performance workplace
- The “plug and play” generation
- “Just-in-case” to “just-in-time” to “just-for-you” learning
- Student to learner to consumer

Another issue ...



Over half the world's population is under 20, including two billion teenagers!!! Yet higher education in most of the world is mired in a crisis of access, cost, and flexibility. The United States may have the world's strongest university system, but our high-cost, campus-based paradigms and our belief that quality in education is linked to exclusivity of access and extravagance of resources is irrelevant to the rest of the world.

Concern: There are many signs that the current paradigms are no longer adequate for meeting growing and changing societal needs.

Technology



Since universities are knowledge-driven organizations, it is logical that they would be greatly affected by the rapid advances in knowledge media (computers, networks, etc.)

We have already seen this in administration and research.

But the most profound impact could be on education, as technology removes the constraints of space, time, reality (and perhaps monopoly ...)

Concern: The current paradigm of the university may not be capable of responding to the opportunities or the challenges of the digital age.

A Detour: The Evolution of Computers

Mainframes (Big Iron)

...IBM, CDC, Amdahl
...Proprietary software
...FORTRAN, COBOL
...Batch, time-sharing

Minicomputers

...DEC, Data Gen, HP
...PDP, Vax
...C, Unix

Microcomputers

...Hand calculators
...TRS, Apple, IBM
...Hobby kits -> PCs

Supercomputers

...Vector processors
...Cray, IBM, Fujitsu
...Parallel processors
...Massively parallel

Networking

...LANs, Ethernet
...Client-server systems
...Arpanet, NSFnet, Internet

Batch → *Time-sharing* → *Personal* → *Collaborative*

Some Theorems of the Digital Age



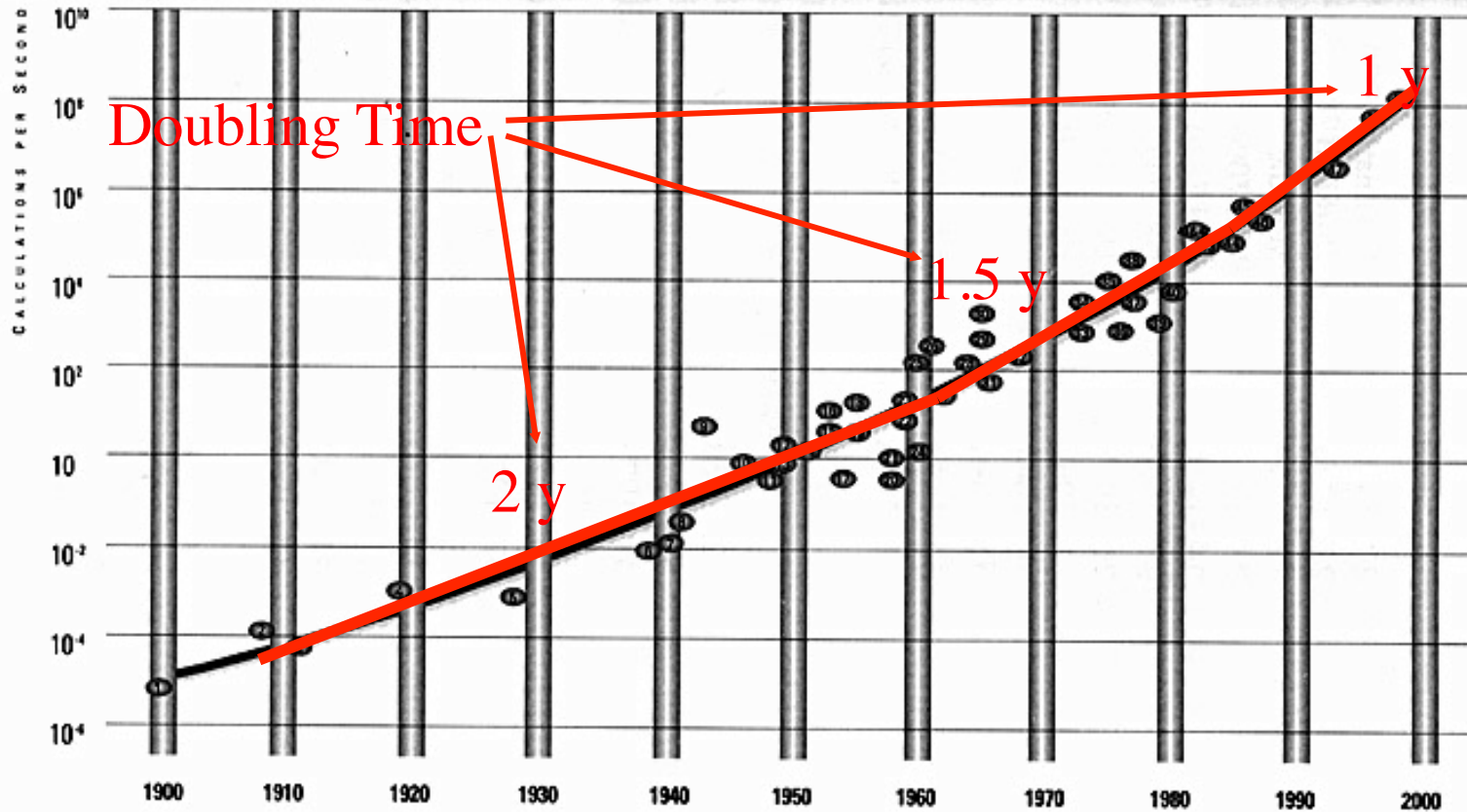
Moore's Law: The power of computing for a given price doubles every 18 months. In ten years, the power of the technology increases by a factor of 100.

Metcalf's Law: The usefulness of a network increases as the square of the number of users.

Moore's Second Law: The cost of the manufacturing facility for chip production also doubles every 18 months.

The Evolution of Computing

\$1,000 OF COMPUTING BUYS



Some Examples



- Speed
 - MHz to GHz (Merced) to THz to Peta Hz
- Memory
 - MB (RAM) to GB (CD,DVD) to TB (holographic)
- Bandwidth
 - Kb/s (modem) to Mb/s (Ethernet) to Gb/s
 - Internet (Project Abilene): 10 Gb/s
- Networks
 - Copper to fiber to cellular to Iridium to Teledysec

Computer-Mediated Human Interaction



- 1-D
 - Text, e-mail, chatrooms, telephony
- 2-D
 - Graphics, video, WWW, multimedia
- 3-D
 - Virtual reality, distributed virtual environments
 - MUDs and MOOs, avatars, telepresence
 - Virtual communities and organizations

Another Way to Look at It ...



A “communications” technology that is increasing in power by a factor of 1,000 every decade will soon allow any degree of fidelity that one wishes. All of the senses will be capable of being reproduced at a distance ... sight, sound, touch, taste, smell ... through intelligence interfaces.

At some point, we will see a merging of

- ...natural and artificial intelligence

- ...reality and virtual reality

- ...carbon and silicon ...

Evolution of the Net



- Already beyond human comprehension
- Incorporates ideas and mediates interactions among millions of people
- 100 million today; more than 1 billion in 2001
- Internet II, Project Abilene

A Case Study: the University



Missions: teaching, research, service?

Alternative: **Creating, preserving, integrating, transferring, and applying knowledge.**

The University: A **“knowledge server”**, providing knowledge services in whatever form is needed by society.

Note: The fundamental knowledge roles of the university have not changed over time, but their realizations certainly have.



Research

- Simulating reality
- Collaboratories: the virtual laboratory
- Changing nature of research
 - Disciplinary to interdisciplinary
 - Individual to team
 - “Small think” to “big think”
- Analysis to creativity
 - Tools: materials, lifeforms, intelligences
 - Law, business, medicine to art, architecture, engineering

Teaching to learning



- Student to learner
 - Classroom to environment for interactive, collaborative learning
 - Faculty to designer, coach, Mr. Chips
- Classroom
 - Handicraft to commodity
 - Learning communities
 - Virtual, distributed environments
- Open learning
 - Teacher-centered to learner-centered
 - Student to learner to consumer
 - (Unleashing the power of the marketplace!)

The Impact of Technology



- The digital generation will demand interactive, collaborative, nonlinear learning.
- Faculty will have to become designers of learning experiences, motivators of active learning.
- A transition to open learning environments, in which strong market forces challenge the traditional university monopolies.



Scenario 1

A massive restructuring of the higher
education industry

or

Swept away by the tsunami of market forces

The current monopoly



Universities operate with a monopoly sustained by geography and credentialing authority.

But this is being challenged by

- demand that cannot be met by status quo
- antiquated cost structures
- information technology
- open learning environments

Restructuring



Hypothesis: Higher education today is about where the health care industry was a decade ago, in the early stages of a major restructuring.

However, unlike other industries such as energy, telecommunications, and health care that were restructured by market forces after deregulation, the global knowledge and learning industry is being restructured by emerging information technology, that releases education from the constraints of space, time, and credentialing.

A quote from a venture capital prospectus



“As a result, we believe education represents the most fertile new market for investors in many years. It has a combination of large size (approximately the same size as health care), disgruntled users, lower utilization of technology, and the highest strategic importance of any activity in which this country engages Finally, existing managements are sleepy after years of monopoly.”

A possible future



- \$300 billion (\$3 trillion globally)
- 30 million students
- 200,000 faculty “facilitators”
- 50,000 faculty “content providers”
- 1,000 faculty “celebrity stars”

(compared to 800,000 current faculty serving a \$180 billion enterprise with 15 million students ...)

Some implications



- Unbundling
- A commodity marketplace
- Mergers, acquisitions, hostile takeovers
- New learning lifeforms
- An intellectual wasteland???



Scenario 2

A Society of Learning

or

Renewing the Social Contract

A Society of Learning



Since knowledge has become not only the wealth of nations but the key to one's personal prosperity and quality of life, 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.

Key Characteristics



- Learner-centered
- Affordable
- Lifelong learning
- A seamless web
- Interactive and collaborative
- Asynchronous and ubiquitous
- Diverse
- Intelligent and adaptive

Evolution or Revolution?



Many within the academy believe that “this too shall pass”.

Others acknowledge that change will occur, but within the current paradigm, i.e., evolutionary.

Some believe that both the dramatic nature and compressed time scales characterizing the changes of our times will drive not evolution but revolution.

Some even suggest that long before reform of the education system comes to any conclusion, the system itself will have collapsed.

The Key Policy Question



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?

Which of the two scenarios will be our future?

An Action Agenda



- Determine those key roles and values that must be protected and preserved during this period of transformation
 - Roles: education of the young, preservation of culture, research, critic of society, etc.
 - Values: academic freedom, a rational spirit of inquiry, excellence, etc.
- Listen carefully to society to learn and understand its changing needs, expectations, and perceptions of higher education.

An Action Agenda (continued)



- Prepare the academy for change, by removing unnecessary constraints, linking accountability with privilege, redefining tenure, and restructuring graduate education.
- Restructure university governance, particularly lay boards and shared governance models, to allow strong, visionary leadership.
- Development a new paradigm for financing higher education, balancing public and private support, implementing new cost structures, and enhancing productivity.

An Action Agenda (continued)



- Encourage experimentation with new paradigms of learning, research, and service by harvesting the best ideas from the academy (or elsewhere), implementing them on a sufficient scale to assess their impact, and disseminating the results.
- Place a far greater emphasis on building alliances among institutions that will allow individual institutions to focus on core competencies while relying on alliances to address the broader and diverse needs of society. Differentiation among institutions should be encouraged, while relying upon market forces rather than regulations to discourage duplication.

The Michigan Strategy



- We created a campus culture in which both excellence and innovation were our highest priorities;
- Restructured our finances so that we became, in effect, a privately supported public university;
- Dramatically increased the diversity of our campus community; and
- Launched major efforts to build a modern environment for teaching and research using the powerful tools of information technology.

Yet, with each transformation step, we became less certain that we could predict the future.

A Time for Experimentation



We came to the conclusion that in a world of such rapid and profound change, as we faced a future of such uncertainty, the most realistic near-term approach was 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, it seemed a more productive course to build several **prototypes of future learning institutions** as working experiments. In this way we could actively explore possible paths to the future.

The Michigan Experiments



- We altered very significantly the racial diversity of our students and faculty, thereby providing a laboratory for exploring the themes of the “**diverse university**”.
- We established campuses in Europe, Asia, and Latin America, linking them with robust information technology, to understand better the implications of becoming a “**world university**”.
- We launched major initiatives such as the Media Union (a sophisticated multimedia environment), a virtual university (the Michigan Virtual University), and played a key role in the management of the Internet to explore the “**cyberspace university**” theme.
- We launched new cross-disciplinary programs and built new community spaces that would draw students and faculty together as a model of the “**divisionless university.**”
- We placed a high priority on the visual and performing arts, integrating them with disciplines such as engineering and architecture, to better understand the challenges of the “**creative university**”.
- And we launched an array of other initiatives, programs, and ventures, all designed to explore the future.

The Michigan Philosophy



All of these efforts were driven by the grass-roots interests, abilities, and enthusiasm of faculty and students. Our approach as leaders of the institution was to encourage strongly a "let every flower bloom" philosophy, to respond to faculty and student proposals with "Wow! That sounds great! Let's see if we can work together to make it happen! And don't worry about the risk. If you don't fail from time to time, it is because you aren't aiming high enough!!!"

To be sure, some of these experiments were costly. Some were poorly understood and harshly criticized by those preferring the status quo. All ran a very high risk of failure, and some crashed in flames—albeit spectacularly. Yet, while such an exploratory approach was disconcerting to some and frustrating to others, fortunately there were many on our campus and beyond who viewed this phase as an exciting adventure. And all of these initiatives were important in understanding better the possible futures facing our university. All have had influence on the evolution of our university.

What will happen to other types of social institutions?



- Companies?
- Governments?
- Nation-states?
- Communities?
- New social “life-forms”?

Concluding Remarks



We have entered a period of significant change, driven by a limited resource base, changing societal needs, new technologies, and new competitors.

The most critical challenge before us is to develop the capacity for change.

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 rapid and radical change.

A Renaissance?



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 now 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 become the opportunity for a **renaissance** in higher education in the years ahead.