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The Historical Role of the Public University

"The function of the State University--stated Burton-- is to serve the state and through the state to serve the nation and the world."

To serve...perhaps the most unique theme of higher education in America...

For the bonds between the university and society are particularly strong in this country...

Historically our institutions have been responsible to, shaped by, and drawn their agendas from the communities that founded them...

Perhaps this is nowhere more apparent than in our State of Michigan and with its institutions...

For example, the founding principle of this institution, can be found in those familiar words from the Northwest Ordinance above Angell Hall: chiseled above Angell Hall:

"Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged."

And perhaps it was appropriate that Michigan

A state with seemingly infinite resources of fur, timber, iron, and copper...

A state with boundless confidence in the future...

Should play such a leadership role in developing the models of higher education which would later serve all of America.

For while the University of Michigan was not the first of the state universities, it nevertheless is commonly regarded as the model of the true public university, responsible and responsive to the needs of the people who founded and supported it, even as it sought to achieve quality equal to that of the most distinguished private institutions.

So too, our sister institution to the west, Michigan State University, was really the driving force stimulating the Morrill Act and it became the prototype of the great land grant university that has served America so well...

And our sister institution to the east, Wayne State University, has provided an important model of the urban university, seeking to serve the needs of one of our nation's great cities.

The State of Michigan, through these institutions and others which have arisen since, has provided a model of how higher education serves society through the triad mission of teaching, research, and public service.

These institutions grew up with our State...responding to the changing needs and aspirations of its people...

- i) First as Michigan tamed the frontier...
- ii) Then as it evolved through the industrial revolution into the manufacturing capital of the world...
- iii) As the population of our state surged following the war years...
- iv) And most recently, as Michigan has sought to strengthen and diversify its economic base.

Yet the strength of our State, its capacity to build and sustain such extraordinary institutions, lies not in looking to the past, but rather in its ability to look to the future...to take the actions and make the investments in the present that would yield prosperity and well-being for its people in the future.

Hence, as I assume the responsibilities of leading the University of Michigan, it seems appropriate that I look ahead... to suggest what some of the themes of our future will be...and how our academic institutions must respond.

Themes of the Future

Think about it for a moment...

The students we are educating today will spend most of their lives in the next century...they will be citizens of the 21st Century...

Yet we, their educators, are very much products of the 20th Century...

And our institution, the university of today, is in reality a product of the 19th Century!

The way we are organized into departments and colleges...our sequential approach to education... even the concept of courses and credit hours... all were introduced over a century ago.

And yet the American society we serve has changed dramatically during the past century and continues to change at an ever accelerating pace.

It is therefore both appropriate and important to ask the question: Is the University as we know it today really prepared to educate the citizens and serve the society of the 21st Century?

While it is always dangerous to attempt to predict the future, three themes seem likely to dominate:

- i) It will be a future in which our nation becomes a truly multicultural society, with a racial and ethnic diversity that will be extraordinary in our history...
- ii) It will be a future in which The United States will become "internationalized"... in which every one of our activities must be viewed within the broader context of an interdependent global community... as we become a "world nation", with ethnic ties to every part of the globe...
- iii) It will be a future in which we rapidly evolve from a resource- and labor-intensive society to a knowledge-intensive society, in which intellectual capital...educated people and their ideas...become the keys to our prosperity, security, and social well-being.

Let's consider for a moment the challenges these themes pose for our society and its institutions...and for our University.

Challenges

1. The Challenge of Demographic Change...

The United States is changing rapidly today...

When we hear references to the demographic changes occurring in our nation, however, we first tend to focus on the aging of our population.

It is indeed true that the baby boomers are now entering middle age, and their generation has been followed by a baby bust... in which the number of young adults will be declining over the remainder of this century by roughly 20%.

The rapid increase in the average age of the American population is being driven primarily by the huge increase in the number of middle-age Americans as the baby boom grows up.

But this has followed on the heels of a significant growth in the 1980s in the number of senior Americans.

Indeed, today there are more people over the age of 65 than teenagers in this country, and this situation is certain to continue for the remainder of our lives.

Further, the growth rate in both our population and workforce is declining to the lowest level in our nation's history.

The United States will simply not be a nation of youth again in our lifetimes.

And this fact poses a most serious challenge to institutions such as universities which have traditionally

served the young.
Yet, there is a far more profound change occurring in the population of our nation.
The United States is rapidly becoming the most pluralistic, multicultural nation on earth.
By 2000, one-third of college age students will be Black or Hispanic...
By 2000, 47% of our school children (K-12) will be Hispanic or Black (today 25% are)
In the second half of 21st Century, Hispanics will likely become the largest population group in The United States
Those groups we refer to today as "minorities" will become the majority population of our nation in the century ahead...just as they are today throughout the world.
In this future, full participation of currently underrepresented minorities will be of increasing concern for reasons of equity and social justice.
But, in addition, this objective will be the key to the future strength and prosperity of America, since our nation cannot afford to waste the human talent represented by its minority populations.
America cannot afford the loss of this human potential, cultural richness, and social leadership.
If we do not create a nation that mobilizes the talents of all our citizens, we are destined for a diminished role in the global community, increased social turbulence, and most tragically, we will have failed to fulfill the promise of democracy upon which this nation was founded.

What are the implications for Michigan?

Many of us have become firmly convinced that for Michigan to achieve excellence in teaching and research in the years ahead, for it to serve our state, our nation, and the world...we simply must achieve and sustain a campus community recognized for its racial and ethnic diversity.
We believe the University has a mandate to build a model of a pluralistic, multicultural community for our nation...an environment which is supportive of all individuals, regardless of race, creed, national origin, gender, or sexual preference...
Which values and respects and indeed, draws its intellectual strength from the rich diversity of peoples of different races, cultures, religions, nationalities, and beliefs.
It seems apparent that we cannot sustain the distinction of our University in the pluralistic world society that is our future without intellectual diversity and an openness to new perspectives and experiences.
Our challenge is not to make one group from many, to blend together all cultures into a homogeneous mixture...but to build from many varying cultural, racial, and ethnic groups a truly multicultural community in which we are bound together by a common core of values and beliefs.
In a very real sense, in our effort to build the multicultural university of the 21st Century, we are attempting to address the most urgent and difficult issue confronting our nation today.

All of us--faculty, staff, and students--must recognize that the challenge of diversity and pluralism is our personal challenge and our personal responsibility. In particular, let me clearly state now, at this, the beginning of my presidency, that my personal commitment to meeting this challenge is both intense and unwavering. I am determined that the University of Michigan achieve leadership in higher education by developing a model of what a pluralistic, multicultural university must be to serve America of the 21st Century -- and I urge each of you to join with me in the responding to this mandate!

2. The Internationalization of America

Every aspect of American life is becoming internationalized...

The signs are all about us...

Communications, travel, the arts and culture

Political security and interdependence...

Internationalization of commerce, capital, and labor...

Some facts of life:

The fact is that a truly domestic US economy has ceased to exist.

The market for nearly all significant industries has become world-wide

In slightly more than 5 years, US trade deficit has taken us from the world's largest creditor to its largest debtor nation.

Here in Michigan, in the heart of the Rust Belt, we have learned the painful lessons of the new global economic order...
...as key industries have fallen victim to intense competition from abroad...

our plants have closed...our cities have filled with the unemployed...and our social burdens have assumed staggering proportions...

The growing internationalization of America suggests that understanding cultures other than our own is necessary not only for personal enrichment and good citizenship in the global community, but indeed, necessary for our very survival as a nation...

But there is another important reason for our renewed attention to the international agenda of the University.

The US has become the destination of about half the world's immigrants
Probably 10 million this decade alone...

With falling fertility rates, immigration will soon become the main determinant of the variability in our population.

The United States is evolving into the first true "world nation", with economic and ethnic ties to all parts of the globe.

We are no longer self-sufficient or self-sustaining. We are not immune to the shocks of the world society. We have never been more dependent on other nations and other peoples.

What are the implications for Michigan?

Among the University's many responsibilities and priorities, one therefore must rank high our responsibility to develop and sustain programs which reflect this international perspective.

It is true that this University has a long tradition of involvement in international activities...indeed, our academic programs, our relationships with institutions abroad, the international representation among our students and faculty...all contribute in important ways to our institution.

If the UM is to fully participate in an increasingly interdependent world, it must begin to think more imaginatively, more aggressively, and more strategically about how to strengthen our role as a true international center of learning.

To assist us in this effort, we have recently asked Professor John Jackson of the Law School to join us as an Associate Vice President for Academic Affairs to help design an appropriate strategy for our international activities.

3. The Age of Knowledge

Looking back over history, one can identify certain abrupt changes, discontinuities, in the nature, the very fabric of our civilization...
The Renaissance, the Age of Discovery, the Industrial Revolution...
There are many who contend that our society today is once again undergoing such a dramatic shift in fundamental perspective and structure.
As Erich Bloch, Director of the National Science Foundation suggests, we are entering a new age, an "Age of Knowledge"
The signs are all about us.
Today we are evolving rapidly to a new post-industrial, knowledge-based society, just as a century ago our agrarian society evolved through the Industrial Revolution.
Our economy is switching steadily away from material and labor-intensive products and processes to those which depend upon knowledge as their primary ingredient.
A transition is occurring in which Intellectual capital--brainpower-- is replacing financial and physical capital as key to our strength, prosperity, and social well-being
This is having a profound impact on our social structure, culture, and economy.
There is also great intellectual change and ferment...
New ideas and concepts are exploding forth at ever increasing rates...
 We have ceased to accept that there is any coherent or unique core of wisdom that serves as the basis for new knowledge...
 We've seen simply too many instances in which a new concept has blown apart our traditional views of a field...
 We are increasingly surrounded by radical critiques of fundamental premises and scholarship...
In many fields, the knowledge base is doubling every few years...
 The typical college graduate of today will likely change careers several times during a lifetime...
 Hence a college education will only serve as the stepping stone to a process of lifelong education... and the ability to adapt to...indeed, to manage change...will become the most valuable skill of all.

What are the implications for Michigan?

As our society becomes ever more knowledge-intensive, and hence ever more dependent upon educated people and their ideas...
It will become ever more dependent upon research universities such as Michigan since we are one of the primary sources both of new knowledge and those who can apply it...
This will provide us with some unusual opportunities and responsibilities in the years ahead...as we are increasingly viewed as key players in

the age of knowledge that is this nation's future.

The Need for a New Paradigm

The future will indeed be a time of great challenge as we attempt to serve the pluralistic, knowledge-intensive, world nation that will be The United States of the 21st Century.

Many of us are becoming convinced that higher education in America will be facing a period of challenge and change similar to that of a century ago, when the great land-grant universities were born in a response to the industrial age...and in a response to a profound democratic impulse to extend the benefits of learning to all of society.

Indeed, many in recent years have suggested that there is a need for a paradigm shift in the nature of higher education in the years ahead.

But I suspect that such a change in the paradigm of the research university will not be gradual and evolutionary... but rather of a more dramatic and revolutionary nature.

Further, rather than the paradigm serving as a model simply to permit replication, the new paradigm of the research university for the 21st Century will clearly be an object for further articulation, specification and refinement as the pace of change in our society accelerates.

And this will require, perhaps more than at any time in the recent history of higher education unusually strong leadership...leadership capable of identifying and articulating an exciting, challenging, and compelling mission for our institutions and then uniting our university communities...and those who support and depend upon us...in a common effort to pursue this mission.

A Heritage of Leadership

Who will determine the new paradigm for the research university in America?

Who will provide the leadership?

Why not the University of Michigan?

After all, in a very real sense, it was our University that developed the paradigm of the public university capable of responding to the needs of a rapidly changing America of the 19th century... a paradigm that still dominates higher education today. In a sense, we have been throughout our history the flagship of public higher education in America.

I believe that today our University is once again in an excellent position to assume a role of leadership in higher education... to develop a new model of what the research university must become to serve 21st Century America...

Several characteristics of the University suggest this role of leadership:

1. Michigan's Heritage of Leadership

Although Michigan was not the first of the state universities, it was the first to free itself of sectarian control and become a true public institution, governed by the people of the state.

So too, the organic act establishing the Michigan in 1837 was regarded as "the most advanced and effective plan for a state university, a model for all the state institutions of higher learning which were established subsequently."

From its founding, Michigan was identified with the most progressive forces in American higher education...

First to blend the classical curriculum with the German approach stressing faculty involvement in research and dedicated to

the preparation of future scholars.

First university in the West to pioneer in professional education, starting the Medical School in 1850, the Law School in 1859, and engineering courses in 1854

Among the first to introduce instruction in zoology and botany, modern languages, modern history, American literature, pharmacy, dentistry, speech, journalism, teacher education, forestry, bacteriology, naval architecture, aeronautical engineering, computer engineering...and even in my own field, nuclear engineering (with the associated Michigan Memorial Phoenix Project)

Beyond tradition, however, there are other characteristics of our University today which position us well for this role of leadership.

2. **Reputation** as the flagship of public higher education

A large, comprehensive, public, research university

A serious commitment to scholarship

Unusual breadth, rich diversity of academic disciplines, professional schools, social and cultural activities...

...our intellectual pluralism...

Unusual degree of participation of faculty and students in University decisions

Indeed, throughout its history, Michigan has been known for a spirit of democracy and tolerance among its students and faculty.

Harper's Weekly (1860):

"The most striking feature of the University is the broad and liberal spirit in which it does its work."

3. **People**

A faculty of great intellectual strength and unusual breadth

Student body of quality unsurpassed by any public institution

And, of course, that marvelous army of maize and blue alumni...

over 300,000 strong...indeed, one of every 1,000 Americans...

with a deep commitment to this institution.

4. **Resources**

While it is true that state support has not been strong in recent years, we nevertheless benefit from an unusually broad and balanced base of support from both the public and private sectors.

5. **Ability to control our own destiny**

Finally, we must never underestimate the importance of the fact that the University was created by the State Constitution itself...which establishes our Board of Regents as a coordinate branch of state government, with authority over the University exceeding that of the legislature, governor, and judiciary.

In a sense, we are almost unique among public institutions in having the ability to control our own destiny...

It is this rich set of characteristics that could well position the University to assume once again the leadership role it played in the 19th century by developing the new model for higher education appropriate for the needs of our state and nation in the 21st Century.

A Mission for the 21st Century: Leadership

In my roles over the past 20 years, first as a faculty member, then as dean, and most recently as provost, have become increasingly convinced that the University today faces a pivotal moment in its history... a fork in the road...

Taking the path in one direction will, with dedication

and commitment, preserve the University as a distinguished--indeed, a great--university, but only one among many such institutions.

However there is another path...a path that would require great vision and courage in addition to dedication and commitment...in which the University would seek not only to sustain its quality and distinction, but it would seek to achieve leadership as well.

I believe the University could...indeed **should**...embrace its heritage of leadership in public higher education...that the 1990s and beyond could be a time similar to that extraordinary period in the late 19th century when the University of Michigan was a primary source for much of the innovation and leadership in higher education.

And what more exciting mission could we have than to accept this challenge by striving to develop a new model of the research university capable of responding to the changing needs of our state and our nation...

The challenge of making the University of Michigan the model for the University of the 21st Century.

Concerns...

Let me lay aside my hat as a university president...Instead I am going to put on a hat both as a scientist and engineer who has been working very hard over the past decade to strengthen the economy of this state...and also a hat as a member of the National Science Board, the principal source of R&D policy in this country, which has voiced very serious concerns about the future of our nation.

I am absolutely convinced that our State faces a very unusual period of challenge in the decade ahead...a watershed, in a sense, from which we can either emerge at a national leader...or as an also run...or perhaps even worse...as an Appalachia...

Quite frankly, the choice will be ours...whether we choose to continue our tendency of recent years to spend our resources only to meet the needs or desires of the moment...or whether we can develop the vision, courage, and discipline to invest in the future of this state...not just for this year or next...but for the next generation...our children...

Challenges: Some warning signs...

You all know the headlines

Familiar Ills which dominate the headlines

The budget deficit

The trade deficit

Displaced workers

Marginal Industries

The meltdown of the stock market

The bad news for Michigan is obvious...

Industries of great economic importance to our nation such as steel and automobiles have fallen victim to intense competition from abroad...

Plants have closed...our cities are filled with chronically unemployed...which may well exceed 10% along the I-75 corridor...

In Michigan we no longer worry about nuclear war and and the bomb because we believe that

"The odds are greater that America will be bought up by the Japanese than blown up by the Russians..."

The Rankings

Michigan's per capita income has now dropped below the national average...

Michigan has dropped to 20th in per capita income (and at \$15,393 is now slightly behind the national average of \$15,481)

Our unemployment rate consistently is at the top...

But the story becomes even more dismal when you look at our state's capacity...or perhaps I should say **willingness**...to invest in its future...

Our state has dropped from 5th in the nation in its support of public education to 35th...the bottom third!!!

Indeed, we have dropped to 32nd in tax revenue for higher ed--7.8% compared to 11.4% for California!

We are being outspent by 30 - 40% in state support per student...
Not simply by prosperous states like California...but by neighbors such as Indiana and Ohio!

In fact, the only area where we now lead the nation is in our prison system...
We are now investing more in prisons than in higher ed...that is, we spend more money putting people into jail than we do in keeping them out of jail!

We seem to have developed an "Eat dessert first, life is uncertain" attitude that is rapidly mortgaging the future of our children.

Paradox in attitude of public toward higher ed...

There is an increasing sense that in the knowledge-intensive world that is our future, research universities like Michigan will be absolutely essential to the future prosperity of this state

Note: Most of high tech developments center around university complexes. The health and vitality of these large university research complexes should be a focus of concern.

And yet our efforts to achieve excellence are generally met with charges of "elitism" and "arrogance"...almost as if we are doing something bad by trying to achieve quality.

We see ourselves caring about the future, but we are not preparing for it.

Clouds on the Horizon

Maintaining Michigan's competitive edge requires attention to our traditional strength -- people and research -- and a strong offensive strategy based on these resources.

Central theme is that education, broadly defined, will play a pivotal role in the coming economic transition and its impact on individuals.

Previous economic transformations were closely associated with major public investment in infrastructure such as railroads, canals, electric networks, and highways. In the coming economic transition, an equivalent infrastructure will be an educated population.

WARNING SIGN 1: Michigan is slipping

No question that we have lost lead in many areas
Industrial productivity and heavy manufacturing
Steel, durable goods, ...

Moreover, key activities such as product design, engineering, and software development increasingly are likely to be done overseas.

Whether automobiles or refrigerators, computers or microchips, nuclear power or energy transmission systems, the likelihood is increasing that the systems are assembled from components designed, engineered, manufactured, and shipped from all parts of the world.

US trade deficit is only a symptom of America's lagging competitiveness. It means that the US economy has been living beyond its means.

The most serious long term problem is low productivity growth, however. With productivity growing at less than 1% per year, the American standard of living is falling relative to those in most industrialized nations. Our wages are already below those in Europe and Japan.

Over the long haul productivity growth is the main determinant of trends in living standards, and no amount of fiscal ledgerdemain can obscure a basic weakness.

The necessity for lower wage growth in US is result of lagging US productivity--that is, a lower rate of growth in physical output per worker and a declining advantage in technology and quality.

To do this, all the major inputs into our economy--quality of workforce, amount of capital investment, level of technology, and skills of managers--must be as good as the equivalent inputs going into the economics of our major competitors.

Key input, however, is quality of the workforce.

Our principal competitors are simply producing workers better capable of absorbing modern production skills. The lack of these skills is preventing us from achieving the productivity gains that we should be getting.

WARNING SIGN 2: We are seriously underinvesting in research and education...

Indeed, a recent SRI study has indicated quite clearly that we are underinvesting in our "knowledge infrastructure" by at least 30% to 40%.

Interestingly enough, studies performed by both the Democratic administration and the Republican Senate agree with this prognosis...and yet nothing has happened...and we slip even further behind!

WARNING SIGN 3: A Serious Skilled Manpower Shortage

Traditional source of S&E college students is declining

25%-30% falloff in HS graduates by 1992

Assuming that same fraction (4.8%) choose to enter skilled, professions (a very conservative assumption), we could end up with a cumulative shortfall of over 100,000 positions by the year 2000.

Note: Composition of college age population is also changing...

By 2020 30% will be composed of Blacks and hispanics...

students who have not traditionally chosen S&E careers.

Indeed, by the turn of the century, over 50% of K-12 students will be Black or Hispanic.

The fastest growing pool of youths has the lowest participation rate in college and the highest dropout rate in high schools -- not the mention the least likelihood to study science and math.

NOTE: We must make special efforts to expand participation by these groups...not just because that is

good social policy, but because we cannot afford to waste their talents!

WARNING SIGN 4: Labor force of Michigan is becoming obsolete!

The education of the Michigan workforce is inadequate to the demands of the next century.

Each year, 700,000 drop out of HS and 700,000 graduate without functional literacy;

1,000,000 immigrants must be added to this.

Hence each year we have 2.5 million persons entering our complex economy annually with limited language and work skills

Yet our adult functional illiteracy rate is 13%--our high school graduate rate is down to 72%--and our high school graduates perform poorly relative to students in the rest of the world.

Michigan is undergoing dramatic change in industry...

Away from low-skill, blue-collar workers

The factory of the future will have NO low skill workers

Statistical quality control and just-in-time inventory systems require production workers with mathematical abilities that are far beyond the present level.

Unskilled labor will lose relevance in a world dominated by microelectronics, computers, and automation.

An example: Expert systems

The "expert system" craftsman...

About 45% of the job growth between 1980 and 1986 was in professional and managerial occupations, and almost 50% of the new jobs created between 1983 and 1986 went to people with at least 3 years of college.

Of the net increase of 25 M jobs to be created by 2000, 40% will be professional or technical positions; 58% will be marketing and sales, administrative or supervisory.

Serious concern:

1. The present generation of blue-collar workers does not have the formal education to be retrained!!!
2. Little sign that education system is adapting to this future.

Key input, however, is quality of the workforce.

Our principal competitors are simply producing workers better capable of absorbing modern production skills. The lack of these skills is preventing us from achieving the productivity gains that we should be getting.

In the past few decades we have neglected education's collective economic function. Whatever its individual payoff, it determines the human quality of the team on which every American plays.

It is bad enough to face the prospect of a significant fraction of our labor force becoming permanently unemployable because of an inadequate education. Do we want to condemn their children...OUR children...to a similar fate? Can we afford it?

The economic challenge, in simplest terms, requires upgrading the skills of 25 million American workers by 40% by the end of the century. A strong back and willing hands will no longer suffice.

The State of Michigan Response

What should be the response of Michigan to the challenge of change -- to the Age of Knowledge in a Global Economy...

The handwriting is on the wall...

Taxes, trade, and fiscal policies influence economic competitiveness. But in the long run, a strong base of science and engineering research and education is more important.

Maintaining Michigan's competitive edge requires attention to our traditional strength -- people and research -- and a strong offensive strategy based on these resources.

People -- not equipment or buildings -- are the source of creativity.

They generate the knowledge that makes the technological innovation possible. They are the workforce that makes society run.

As we look to the knowledge-intensive future of Michigan, we recognize as have so many other states that it will be our great research universities that will hold the key to our collective prosperity.

Importance of Research Universities

Importance of world-class research universities

Look around:

New England: --> MIT

Bay area-Silicon Valley --> Stanford & UCB

Southern California --> Caltech

Austin --> U. Texas

Why?:

Through research produce knowledge necessary for competitiveness

Produce talented professionals to implement new knowledge

Attract "risk capital" through massive federal R&D support

Key to knowledge transfer

Traditional: graduates, publications

Entrepreneurs

Startups

Development of Unique State-University Partnership

Universities must commit themselves to:

Strategically realigning activities into key thrust areas of major importance to State...

Attracting leading scientists, engineers, and professionals to staff these programs...

Developing new mechanisms for technology transfer...

State government must commit itself to:

Establishing higher education in general and the state's research universities as a high priority

Providing seed resources to sustain key thrust areas

Developing novel institutions to act as catalysts in these activities

University of Michigan Actions

The University must view itself as a partner with state government, business, industry, and labor in addressing the needs of the State of Michigan.

Key:

Began to think and act strategically...how to better position ourselves

Hence, we chose as our thrust areas...

Complex manufacturing systems

Machine Intelligence

Advanced electronics and optics technology

Information Technology

Health Sciences

Applied Social Sciences

Other steps

1. Recruiting key engineers and scientists

2. Modifying ways we interact with outside world...

Strengthened interactions with industry

3. Intellectual property policies

4. Michigan Information Technology Network...

Cultural Changes

Reaffirmation of the importance of individual achievement, of excellence...We have once again recognized the ability of talented people to do great things -- if we will only get out of their way and let them!

Importance of establishing an intense, entrepreneurial environment...a no-holds barred, go-for-it culture...in which individual initiative, achievement, and the quest for excellence are dominant elements

Already clear evidence of payoff...

1. Darling of the national press...
Hardly a week goes by without some reference to the phenomena occurring in "Automation Alley"...from Warren to Ann Arbor... an area now clearly identified as the hot spot of action in technology for the next two decades...
California dreamin'
Places like Silicon Valley and Route 128 are buzzing about Michigan...we are now raiding their best talent...
We've become a showplace: Bobby Inman, Governors,...
2. University's federal research increased by 25% each of the past two years to over \$200 million per year.
Industrially sponsored research has increased by 50%
Engineering research has more than doubled, to over \$40 million per year.
3. Research Excellence Fund has created nationally recognized centers in:
Complex manufacturing technology
NSF believes we now have best faculty in nation in these areas
Machine intelligence
Advanced electronics
Information technology
These programs already have attracted three major national research centers funded at \$27 M.
4. Beginning to win a few...
Howard Hughes Research Institute
DOD URIs (lion's share)
High Speed Electronics and Optics (Army)
Ship Propulsion and Hydrodynamics (Navy)
Expres
NASA Center of Excellence for Space Commercialization
National Center for Manufacturing Science
NSFnet
NASA ERC (Remote Sensing)
IBM/DEC/Apollo/Apple/Northern Telecom/....
Many other smaller activities
Several other major initiatives presently brewing...
too early to announce, however
5. National Image
U.S. News and World Report...
UM was ranked 8th in the nation in the quality of its UG education-- UM and Berkeley were only public universities in the top 10...along with schools like Stanford, Harvard, Yale, and Princeton
Professional Schools:
Law: 3rd
Engineering: 6th
Business: 7th
Medicine: 11th
6. Confidence in University, buoyed by the new priority given by higher education by the state, have enable use to attract to our faculty many

- of the world's leading scholars and teachers, scientists and engineers.
7. And, at the same time, the University has continued to leverage the state's investment, attracting \$2 from outside the state for every \$1 in state appropriation. Moreover, activities of our graduates and applications of our research have an impact on state's economy that totals in the billions of dollars.
 8. The growth of a \$4 B industry in industrial automation in the Detroit-Ann Arbor corridor has been traced directly to UM!
 9. In 8 states bordering the Great Lakes, there are 16,000 companies producing high tech equipment, including robotics, optics, biomedicine, computer software, and electronics.

BUT, Michigan's efforts have just begun...

Perhaps the most ominous dark cloud on the horizon of all is the increasing evidence that our state has not yet awakened to the nature of the investments it must make.

While we all give the "age of knowledge" lip service, the evidence suggests that in reality, we long for a return to the agricultural and manufacturing economies that once made us reach...

We continue to invest as if these were the future...and we lose...

Over the past 10 years, high tech states such as California, New Jersey, Massachusetts, and New York have seen real dollar increases in higher education appropriations of roughly 20 to 30%. In sharp contrast, over this period Michigan has declined by 4.5%...

We still have far to go to counteract the crippling deterioration of public support experienced in the 1970s and 1980s.

1. While Michigan ranks 5th in tax revenue, we rank only 32th in appropriations per student and only 37th in percentage of total appropriations allocated to higher education.
2. SRI Study suggests that we presently are underinvesting by as much as 30% in the knowledge infrastructure necessary to secure our state's future leadership and prosperity.

If we fail to increase the rate of investment, Michigan will not only risk falling behind other midwestern states, but regions such as California and New England will pull even farther ahead...and pull our industry with them!

Certainly these states are prosperous...but they are also investing substantially more of their resources in higher education...in preparation for a knowledge-based future...than are we.

Indeed, one measure of the importance of higher education in the state budget is the ratio of tax dollars per enrollment ratio... a measure by which Michigan ranks 47th in the nation!

It seems clear that higher education faces a serious challenge in Michigan. Our present level of public support is clearly inadequate to maintain a system that is competitive on a national basis.

We are attempting to compete in this knowledge-intensive future with an underfunded public system of higher education... and no private capacity (such as a Stanford, MIT, or Caltech).

Only the autonomy granted to our public universities have allowed them to "overachieve" their public support through higher tuition and other sources of financial support.

This has given public higher education in Michigan some capacity to face the devastating impact of the past decade...but it is rapidly losing this capacity...and there seems little doubt that the quality of our system will probably be gone in the next 10 to 20 years if the present trends of inadequate state support coupled with tuition constraints continue.

And what will then happen to Michigan. We will become a "have not" state, competing in low wage industries in dying industries. We will have rejected the age of knowledge!

Indeed,
Intense international competition, turbulent markets, rapid technological change present new challenges to our future.
To stand still...to fail to make the investments in our research universities so necessary for tomorrow...is to lose the race for future prosperity and well-being of our citizens.
We really have no choice but to forge ahead, to pick up the pace, and to increase these investments in order to secure once again the position of leadership to which our state has long been accustomed.

The Dangers...

Is our state willing to make the investments necessary today...
to build the prosperity we desire for tomorrow?
Education always falls at the bottom of the list of social needs.
Even though surveys indicate public supports education, this has yet to be translated into priorities.
Every other social need seems to come before the education of the youth...
Is this because of an aging electorate?
Is it the "Me Generation" of the 1960s now growing up into mature Yuppiehood?
No. Rather it is the fact that for many years now we simply have not been willing to invest in our future...and the future of our children...
We have chosen instead to mortgage this future to pay for mistakes made in our past.
Six-month planning horizon...desire for immediate results...inability to identify the investments which have to be made today to yield the objectives for tomorrow.
The old T-shirt expression: "Eat dessert first, life is uncertain" reflects our present tax policy.
The attitude we have taken toward our most precious resource, our youth, is both callous and alarming.
I simply cannot accept the excuse that "we can no longer afford this investment in the educational opportunities we offer our youth".
To be sure, the immense social needs for welfare assistance, medical care, prisons, and all of the other programs that drain our tax dollars are compelling.
However, by choosing to meet these needs with resources taken away from our system of public education rather than through reforms in our tax structure or political system, we have in reality mortgaged our future by withdrawing the educational opportunities from our youth.
Michigan has had a long tradition of wealth and a caring attitude for its populace. But it seems clear that if priorities are not changed, Michigan will become poorer and poorer and finally it will not be able to meet the "caring needs" of its people. It will then have become a "have not" state.
We seem to have forgotten the commitments and sacrifices that past generations of citizens have made to build educational institutions of exceptional quality -- institutions that have provided many of us for years with unsurpassed educational opportunities.
All human societies embody to endow their children with an enlarged and enriched culture, for transmission to their successors.
If it is not to be our young people and their work that will gain us a secure place among nations and our better life for our citizens, then what will it be instead? And if we fail to invest adequately in the successor generation, then what kind of caretakers of our heritage and theirs will

they turn out to be?

We are a nation that has always believed deeply in generational improvement--in the prospect that things will be better for our children.

Americans must put aside their suspicions and answer that call, because the result of failure will be that 40 years from now a generation will stand where we are today and know that things are, for the very first time in history, worse that they were for their fathers and mothers.

We simply must re-establish the importance of both our personal and public investments in education, in the future of our children, in our own future, at the local level if Michigan -- indeed, if our nation -- is to face the challenge of the age of knowledge.

A different way to look at it:

The Investment in Human Capital...

The real issue here is not the investment in education... it is the priority that we as a nation place on investing in our children.

We should feel both embarrassed and ashamed for robbing our youth to pay for our own excesses...

But let's take the cynical view that responsibility and stewardship will simply not be a compelling enough argument to reprioritize the importance of investing in human capital...in our youth.

There is another viewpoint, however...

If we do not invest in the youth of today, they will not become a sufficiently productive workforce to keep the checks coming to those of us who retire in future years!!!

By 2000, there will be only three workers to support each retiree...and one of these will be minority!

Look at it another way...which is the better investment...

\$3000/y to keep a preschool kid on track

\$5000/y to achieve a strong K-12 education

\$10,000/y to sustain strong college education

or \$30,000/y to put someone in jail...

The Need for a New Coalition

Somehow we must reprioritize the agenda of this state...

To shift away from our present myopic policies of addressing only the needs and desires of the moment
And, instead, to begin to make some of the key investments necessary for the long term...

The key investments in people in general...and in our children in particular...

This is not just the worry of local communities or state government or public institutions

It is everybody's concern!

Leaders in the private and public sector are going to have to step forward and unit behind this initiative.

We must learn to build new coalitions involving the public and private sectors...state government, education, business, industry, and labor...to develop an agenda appropriate to secure the future of our children, our state, and our country.

Michigan still has the opportunity to regain economic leadership.

We still are blessed with abundant natural resources, a people of great strength, and a system of higher education of a quality envied by the rest of the nation...albeit sustained by "overachievement" in the face of inadequate state support.

But, the writing is on the wall...

The future of our state is being lost rapidly
through serious underinvestment in our
most valuable resource, our youth...