

Physics

Last time...

Somewhat over a year ago when I was invited as Dean of Engineering to talk to you, I chose the topic of:

"Tripping across the Boundary of Science and Engineering"...

My comments at that time focused on several issues from my perspective as Dean of Engineering...

1. Pressures forcing convergence of basic and applied sciences...

Time-scale of research, development, implementation

Cross-disciplinary nature of important problems

Federal Trends: emphasis on macro, systems

NSF-NSB: ERCs, "big engineering" like "big physics"

Pushing engineering away from single-investigator activities toward cross-disciplinary team research

Intellectual Questions:

Engineering \Leftrightarrow Applied Science \Leftrightarrow Basic Science

Science \rightarrow Engineering \rightarrow Systems \rightarrow Society

2. Importance of bonds between physics and engineering

Common needs of sciences

Generic concerns

Faculty

Facilities

Support Staff

Importance of sponsored research

Strategy for Strengthening the Bonds

Recruiting strategies

Major investments: "quantum engineering institute": CAEOT

Strengthening the Bonds: Engineering \Leftrightarrow LS&A

Applied Physics

Applied Mathematics

Biotechnology, Bioengineering

Information Sciences

Earth and Planetary Sciences

Computational Science and Engineering

College of Engineering and Applied Science???

3. Importance of science to University

Other models: Stanford, Princeton, Illinois, Minnesota

Science is where most of new knowledge is...

History, social sciences just rearrange, codify knowledge

Scientists discover new knowledge; engineers apply it!

"Physics is research; everything else is needle-point"

4. What we could do to enhance the priority of science at UM
Topic for this time will continue this dialog...but from the perspective
of Provost...

"The Sciences at Michigan: Chapter II: Jason Lives!"

What is a "Provost"?

Dictionary: Latin: propositus... "the one in charge..."

1. chief dignitary of a collegiate or cathedral chapter
2. chief magistrate of a Scottish burgh
3. a high-ranking university administrative officer
4. the keeper of a prison

Oh, yes...it comes after "provolone"...the big cheese

At Michigan:

1. Provost is the one who says "No" ...
...so the President can say yes!
2. President leads, Provost pushes...
3. President determines direction, Provost determines pace

So why did I leave my comfy home in Engineering?

I do not have an unusual streak of masochism...

Nor do I have an unusually high threshold for pain

Nore was it HTS's persuasiveness alone, although that
was certainly a factor...

Rather, I sensed the University at a stage remarkably
similar to my own College of Engineering when I
was sentenced to 5 years of hard labor as Dean
in 1981.

A time of opportunity, responsibility, and challenge

Opportunities

1. Reputation as the flagship of public higher education
2. People
A faculty of great intellectual strength and unusual breadth
Student body of quality unsurpassed by any public institution
Quality x quantity = #1
Largest alumni body in US (1 out of every 1,000 Americans)
3. Resources
Prosperous state, with the potential for greater support
Federal support...learning how to play game better
Private support...Campaign for Michigan
4. Ability to control our own destiny
Best of public and private worlds

Public support - \$200 M/y -- \$4 B endowment

Greater than Harvard and Texas

Autonomy of private institution

Summary of Opportunities:

Believe UM faces opportunities unmatched by another other institution in this nation...

The opportunity is there...

But then so are some important responsibilities!

Responsibilities

To our students

The "raw material" entering this institution today is the most valuable resource of our nation...

Truly extraordinary quality and commitment.

We must be responsible stewards and provide the "value-added" of an outstanding education.

Incidentally, despite the fact I'm an engineer, I am firmly committed to the importance of a broad and liberal education...including some science, of course...

To our faculty

Hired over 900 new faculty in past 5 years

Salaries to asst and assoc prof the best

Getting the best!

And we owe them the opportunity to develop their exceptional talents to the fullest by providing them with the environment, support, and encouragement to push to the limits of their abilities.

To our State and nation

We are a public institution, after all...and as such, we have an important responsibility to our state and nation.

Challenges:

It is a time of unusual opportunity, to be sure. But, if we are to grasp these opportunities while meeting our responsibilities, I believe we must face several important challenges.

These challenges are no so much concerned with resources state funding or physical facilities or such.

Rather they are concerned with the very nature of what we believe the University is...and what we wish it to be.

These are challenges of excellence!

1. Picking up the pace a bit...
 - To build a level of intensity and expectation to settle for nothing less than the best in the performance of faculty, students, and programs
 - The thundering herd...the hoofbeats behind us
 - Excellence sets us apart...
 - provides the visibility to attract resources
 - We must shake off that extraordinary intolerance of extreme excellence which seems to plague midwestern institutions... and set our course for achieving the best.
2. Focusing resources to achieve excellence...
 - Should not try to be all things to all people...
 - The time of continual increases in public support ended more than a decade ago.
 - Quality should dominate breadth and capacity...
 - Build "spires" of excellence
3. Highest priority: academic excellence
 - UM's reputation and quality will be based on its activities in instruction and scholarship...
 - Academic excellence must be our highest priority...
4. Changing intellectual currents...
 - Intellectual leadership...
 - demands pushing to the forefront of discovery
 - working on the exponential part of the knowledge curve
 - Shift to a change-oriented, risk-taking culture
 - Relish change!!!
 - Stress bold, new initiatives...
 - Draw knowledge curve...
 - Defy the deification of disciplines
 - New knowledge created at interfaces...
 - At turbulent mixing, collision of disciplines
5. A sense of community, collegiality
 - Resist "centrifical" forces on strong disciplines...
 - Pull people together...

Strategic Leadership

So how do we respond to this time of opportunity, responsibility, and challenge?

I suggest that we do not "respond"...as we have all too often in the past, but that we seize the initiative by taking action to determine our own destiny.

All too often in the past, we have tended to respond to external pressures, opportunities, needs, rather than taking control of our own destiny. We have been blown in one direction or another by winds from outside. It is now time that we grasp the wheel firmly to steer the University in a direction appropriate for the future.

To seize the opportunities, to face the responsibilities, and to meet the challenges before us, the University should initiate a process capable of determining both a direction and a strategy capable of guiding it into the 21st Century.

In a sense, I propose that we initiate a process of "strategic leadership" that first addresses the question about "what" we want this University to be -- what our values, goals, priorities, and objectives should be.

We should approach our future "strategically" rather than merely position ourselves to respond.

Mention University Record:

Strategic Planning Process

University Initiatives Fund

New Initiatives:

Presidential Initiatives Fund

Undergraduate Initiatives Fund

Minority Program

Other initiatives

Information Technology

Graduate Education

Intellectual property policies

"The Sciences at Michigan: Chapter II: Jason Lives"

Micro, macro, mega, and meta...

Micro: slave to the in-out box

Macro: responding to requests from units

Mega: responding to external pressures (state and nation)

Meta: "strategic" leadership

Micro = "people"

All too often we approach challenge at the micro-level...

"All we need to strengthen sciences at Michigan is more money, buildings, postdocs,..."

Miss the forest for the trees...

Academic institutions are profoundly people-dependent

The key to excellence is attracting and

retaining outstanding students, faculty, and staff, and providing them with the environment and encouragement to push to the limits of their abilities, and then getting out of their way!

We should strive for an entrepreneurial, change-oriented, risk-taking culture...

Which stresses excellence, achievement, and excitement...which removes constraints from talented people and encourages them to "go for it"!

Macro = "programs"

General Concerns

Sciences have not be a priority at UM

Physical sciences have not been adequately rep among UM admin

While UM has emphasized soc & med sciences, we've been passed

Critical momentum is needed to sustain

One you've achieved this, self-supporting

Stanford, MIT, Caltech, CMU, Berkeley

Illinois, Minnesota (note both tied to engineering...)

Sciences immersed in LS&A mentality

(cannot expect hum-soc sci model will build strong sciences)

Particularly critical on equipment & support staff

Importance of sponsored research not recognized

UM has been dominated by "observational" approach of the social sciences

to merely watch and analyze and reflect. Those institutions moving most rapidly, doing new things, are led by the sciences...

by people used to discovering new knowledge and applying it... of actually creating something new!

Political

Trends at UM: social sciences -> health sciences -> sciences

Eng & Science must work together to reestablish priority at UM

Together we can win this; divided we both go down

But what are real problems???

1. Many of our programs became heavily inbred during 50s and 60s...
2. Trapped in tradition rather than moving in new directions...
"The most dangerous thing of all is a successful past..."
3. Face it, gang, the fact that you were unable to establish yourself as a University priority for the past two decades is your own damn

fault...Good, aggressive people will demand
and get major resources...they don't need "gifts"...

Mega = "External Factors"

National science policy...

NSF focus on "human resources"

Big science (SSC) vs. world

NSB Task Force on quality of UG S&E education

Messages to physics

Role of undergraduate education

NSB study

Laboratory problems?? Sure.

But, for some reason, basic sciences have lost interest
in undergraduate education...

Pipeline problem is real!!!

Meta = "Strategic Issues"

University Strategic Planning

Review Strategic Leadership Plan

Strategic Initiatives

Innovative, cross-disciplinary research

Undergraduate education

Minority student/faculty recruitment and retention

Downstream

Research incentives

Graduate education

So what is to be done?

1. Establish strong ties among sciences within LS&A
Physics, Chemistry, Astronomy, Mathematics, Biology, Geology,...
A Grand Unification of Science at Michigan
"Superstrings..."
2. Get some of your people working further down on knowledge curve
3. Respond to challenges of excellence! Build peaks of excellence!
Focus your resources...
4. Establish strong ties to other units...
Engineering
Medicine
Others

Time for you to work now...

I've talked long enough!

Let's turn the tables...

I believe we all accept the fact that the science at Michigan -- and

Physics in particular -- needs to become a priority...and regain the distinction it held for so long.

What actions do you think are necessary for this goal to be accomplished?