Research Report to the Regents

Stephen Forrest, Vice President for Research
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Good afternoon. I'm here today to talk about the state of research and scholarship at the University over the past year, and to discuss the central role that U-M research can, and must play in the revival of the economy of the State of Michigan.

I view OVPR as being the advocate for what is possibly the largest constituency on campus – the research community. Our mission is to promote the discovery and dissemination of knowledge, to ensure that the highest standards of research integrity are upheld, and to commit our institution to solving the complex problems facing society today.

I would like to spend a few moments talking about the research landscape at U-M, and what we view as some of the problems and opportunities that are confronting us in the year ahead. You should have in your packets a summary of our research performance in FY07 that I will briefly summarize here.

The University of Michigan continues to have one of the largest and most successful research operations in the country. In FY07, the U-M spent $823 million dollars in support of research, scholarship and the creative arts. This represents about one-third of the University's non-hospital budget. Our research is supported primarily by the federal government, along with investments by the University, industry, foundations, and the State. Research spending grew by 3.3% over the previous year, which is satisfactory considering that federal funding, which comprises 72% of the total, has been relatively flat for several years. University support – an extremely important part of our success in obtaining external funding -- accounted for 16% of the year's spending, and industry sources provided 4.7% of the total.

But taking a closer look, the past funding model does not give us confidence for continued growth in the future. For example, Federal research grew by only 1.8% in FY07, and FY08 looks even more bleak, with the recent budget passage leaving NSF, DoE and NIH funding nearly flat or even decreased from FY07, continuing a 4-year trend. Hence, both the past and future trends suggest nearly flat, or even declining funding for the next year or two, and little elasticity that would allow U-M to grow significantly into the foreseeable future.

On the other hand, funding from industry was up by 15% from the previous year. While we do not know yet if this represents a fluctuation or a trend, it is nevertheless clear that industry research funding IS elastic, and presents a significant opportunity for growth of our research enterprise.

In these uncertain times, OVPR plays a vital role in providing ballast against sudden shifts in funding directions, as well as encouraging new areas of interdisciplinary research that can propel us into a leadership role in emerging fields. And while the bulk of our external support is for the Health and Natural Sciences, and Engineering, OVPR is equally committed to support research in the social sciences, as well as scholarship and creative activity in the arts and humanities.

Our primary contributions to these fields are reflected in our Faculty Grants and Awards program. In addition to providing bridging funds for externally supported but lapsed projects,

and many other seed programs, it also strongly supports projects in the arts. Indeed, one third of the total funding from this program was directed at supporting the arts and humanities, although the external funding brought in by these fields is less than 1% of our research volume. OVPR funds went to four dozen projects, from modest assistance with the production of a recording, to larger grants that made a performance, a conference, a publication, or an exhibit possible.

Another way that OVPR anticipates emerging opportunities is through its interdisciplinary units and institutes. Satisfying our energy requirements with carbon-neutral, renewable and secure sources presents what is possibly the largest challenge that has ever faced humankind. Establishment of the Michigan Memorial Phoenix Energy Institute in the Fall of 2006 is our contribution to meeting that challenge, bringing to bear the diverse disciplines from the natural sciences, engineering, and the social sciences. Both the National and State governments have recognized that the energy challenge provides us with a unique opportunity to rebuild our economy through establishment of a robust and diverse energy industry, while also helping to slow down the pace of climate change. MMPEI, under Director Gary Was, has taken a leadership role across campus, and with local industry, to get the Institute off to a rapid start this year.

Among the most significant accomplishments are the securing of the DTE Chair in Energy, winning a major DOE grant investigating the feasibility of plug-in hybrid automobiles, and supporting the submission of two large interdisciplinary block grant proposals to the National Science Foundation with energy as the theme.

In the year ahead, my office will work to coordinate MMPEI, the Graham Environmental Sustainability Institute, and several other related programs to greatly amplify their individual impacts. Faculty hiring at both the junior and senior levels is a particular focus of our efforts to significantly strengthen U-M's profile in areas such as energy storage, conservation, generation, and human impacts. President Coleman's recent announcement of our intention to hire 100 new faculty in interdisciplinary areas of research provides a unique opportunity for growth in both energy and sustainability.

OVPR must continually look ahead to anticipate areas where there is a substantial potential that can ensure that U-M is viewed as *the* premier research institution in the country. In this vein, we recently informed you of the establishment of the Institute for Research on Labor, Employment and the Economy, or IRLEE. With IRLEE, we are positioned to build a significant resource for analyzing and impacting the future of our changing regional economies and labor forces, leading ultimately to our increased influence in the economic directions taken by our community.

Looking even further, OVPR is exploring how to grow our already significant strengths in research on rare, or orphan diseases. With our rapidly expanding knowledge of the human genome, through the power of bioinformatics, we have an opportunity to revolutionize our ability to cure rare diseases that have been ignored, yet in their totality affect large numbers of the population. This builds on our recent hiring program for Pfizer employees affected by the plant closing one year ago. This program, coordinated with the Provost's office, has markedly strengthened our efforts in drug discovery, which is key to our efforts at finding cures for orphan diseases. In FY07, we have invested significant seed funds to support projects that encourage high-risk preliminary studies in this area. We will assess the outcomes of these projects in 2008, to evaluate their potential, and perhaps grow this effort in the years ahead.

One of the exciting features and strengths of U-M is its decentralization. This allows for great ideas to bubble "from the ground up", without undue interference by administrations which are often ill equipped to make effective decisions about the best future opportunities in research. Unfortunately, the decentralized model can also work against us. This is particularly true in areas where large, complex, and expensive shared resources are involved. An area of growing concern requiring urgent attention is Research Cyber-Infrastructure. This is the domain of computing that includes both computational hardware and software in support of research. Our current system of managing our distributed computing resources is inefficient, expensive, and often does not meet the needs of a first rate research enterprise. Indeed, without our attention, U-M stands to significantly lose ground among its peers in addressing the largest problems confronting science today, such as analyzing complex biological molecules, understanding the genomes of species, understanding the changes in global climate, and managing the explosion in digital databases in the social sciences and other fields.

To develop a plan to meet the daunting computational challenges of the next decade, OVPR in cooperation with the Provost, asked a group of knowledgeable faculty to recommend a path that would put us in a leadership position in this domain. Under the guidance of Professors Brian Athey and Sharon Glotzer, this group made several recommendations that are being reviewed by our two offices. I am optimistic that during 2008, we will be able to make further recommendations to you, to act on this pressing issue.

Finally, I want to turn to OVPR's role in encouraging a culture of risk and engagement with the industrial sector that has dominated much of our thinking in 2007. For U-M to realize its full potential as a first rate research institution, we *must* engage the broader society more than we already do.

By now, we are well aware of the economic situation that prevails in Michigan and the Great Lakes region. Our economy is, and has been primarily based on the manufacture of goods, most notably the automobile. Yet, the national economy is moving robustly toward a knowledge base. Globalization has taken a significant toll on our economic foundations. Peoples all over the world are motivated, talented, and have many of the skills that were once unique to the United States. For this reason, all jobs that we once took for granted are portable, and we find them moving out of our state at a remarkable pace. The result has been high unemployment, leading to a decline in population. We therefore face marginalization on the national scene, loss of representation in Congress, and a further erosion of our economic base.

In stark contrast to this rather dreary picture of the State of Michigan, Ann Arbor has all the appearance of a boom town, and the economic prospects of the university are more solid than ever. You see a dazzling array of exciting and very large construction projects on campus. Ann Arbor has a growing entrepreneurial base, and is widely recognized as a highly attractive community. At almost every level, it is apparent that the University of Michigan is a vibrant, world-leading institution of higher learning that is thriving as never before, existing in a town that seems to be running against the regional economic currents. So a natural response to this situation would be, "Why should we risk disrupting our success to address needs elsewhere in the state and region?"

There are many reasons why the status quo is simply not acceptable. We cannot delude ourselves into imagining that we will remain competitive in such a depressed regional economy. Other top tier research universities, from Cambridge University in the UK, to Stanford, MIT and

Berkeley in the US, are finding new ways to engage with industry in particular, and with the non-academic world in general. Hence, the University of Michigan has no choice but to strengthen its engagement to solidify our membership in the group of the best universities in the world.

With So, how do we quickly respond to these pressing societal needs? The University of Michigan, like all US universities in the 1960's to the 1990's, turned inward on itself, without paying much attention to the world around it. University cultures became hermetic, believing that the best scholarship and teaching could be accomplished in the absence of external pressures and economic demands. Today, the best and most forward looking of those universities – U-M among them -- are actively reversing these trends in response to circumstances that no longer make this attitude sustainable.

One imperfect measure of our effectiveness in working with industry is to examine the Office of Tech Transfer's performance for FY07, also summarized in the handout. Disclosures of new technologies were up by 14% in FY07. We also launched 7 start-ups, bringing to 62 the number of new companies formed over the last 7 years. All of this signals that we are moving in the right direction. But we must be cautious: these numbers are by no means indicative of all that we must do to improve our interactions with the business community.

To change our culture, we need to first understand what opportunities our particular landscape presents, and what cultural and administrative barriers exist. To address this, in the past year I assembled a group of administrators and faculty to conduct an analysis of our research and business practices, and to make recommendations that would lead to U-M becoming a recognized national leader in working with industry. I am pleased to report that the group did a terrific job in responding to this challenge, and have made several recommendations whose implementations are already underway. I will only summarize a few of the highlights of their recommendations, and some other actions that OVPR has taken over the last year to rapidly effect the cultural changes needed.

The first step was, with your help, to change the policy to allow the sharing of equity and royalties by inventors with direct connection to the companies holding licenses to their inventions. This incentive is critical to rewarding inventors for building companies that are the seeds of the knowledge-based revolution.

With the support of the Treasurer's Office, the Provost, and the Deans, the indirect cost rate for industrial contracts was brought down to match the rate we use for government grants. We also, for the first time, created cost-sharing for industry-sponsored research projects – again bringing industry-related research into alignment with practices long used to encourage work with the Federal government.

One of the most important outcomes of what we call the University of Michigan Innovation Initiative, is to ensure that the administration's share of licensing revenue is only used to encourage further interactions with the industrial sector. As in past practice, the largest share of licensing revenue goes to a combination of the inventor and his or her unit as a means for rewarding and incentivizing this type of research. The balance of the revenues comes to the central administration, split evenly between OVPR and the Provost. I am pleased to inform you that, with your vision, and with that of President Coleman and the Provost, we are committed to using all of the administration's share of licensing revenue to encourage and support even more

activity with the private sector. It is this revenue that provides cost sharing, development gap funds, and other incentives that my office uses to support further industry research.

Our Office of Technology Transfer and the Division of Research and Development Administration are well aware of this change in philosophy, and have become outstanding and imaginative partners in its implementation. A particular example of our progress is the completion of our recent agreement with the Ford Motor Company. According to Ed Krause, Ford's Liaison with U-M:

> "Seven years ago, Michigan was one of the more difficult schools to deal with, even for a company as close as Ford. It's the opposite of an entitlement mentality now ... And this is not lost on industry partners. Now I would say that Michigan is actually very much among the leaders, and has a chance to become the leader, as far as innovative ways of working with industry."

To move the culture yet further, we need to visibly recognize faculty for their work with the business sector. Thus, OVPR instituted the prestigious Distinguished University Innovator Award. Professor Mohammed Islam of the College of Engineering, was our first recipient. There is certainly no shortage of well deserving scholar/entrepreneurs at the University of Michigan. We just need to bring them out of hiding!

But we will only know that we have been truly successful in changing the university culture when working with industry -- whether through contract research with large companies, or starting up new ones out of the laboratory – is recognized as an important part of the tenure process. This will take time, but I have no doubt about its inevitability as long as you, the Regents, and the Administration, continue to vocally support it as a core university value.

Just last month, we took yet another large step in our efforts to connect to the private sector with the opening of the new Business Engagement Center, co-located with the Office of Tech Transfer and jointly managed by the Office of University Development, in temporary quarters on South University. The Center will provide a single, visible point of entry for business and industry interested in tapping university resources or collaborating on projects. It will also provide university entrepreneurs with mentoring and vital connections with the business community. This activity strengthens our relationship with Ann Arbor SPARK, with whom we work on a daily basis. A most important success of this relationship was our establishment, this year of the new wet lab space now filled almost entirely by U-M start-ups, and the recruitment of Aernnova, a Spanish aerospace company, to Ann Arbor.

I want to emphasize that our activities in promoting entrepreneurialism extends deep into our student community. Students are demanding this type of education and experience, and we are enthusiastically responding. For example, the College of Engineering recently established the Center for Entrepreneurship. Directed by Prof. Thomas Zurbuchen, this Center is designed to teach, encourage and assist students with entrepreneurial interests. OVPR is very supportive of this effort, and is co-sponsoring the Center's very highly attended activities which have tremendous payoff for our students, our faculty, and the university.

Finally, I want to mention U-M's leadership in the Michigan Innovation and Entrepreneurship Initiative, which President Coleman discussed in her address last November. Recognizing that our state economic transformation must involve the broadest range of players to be effective, this initiative establishes a partnership between <u>all</u> Michigan public universities and philanthropic foundations. Its goal is to establish and manage significant support for new

technology companies emerging from the several universities, while creating a sustainable culture of risk and entrepreneurship. In Michigan, it has proved to be especially difficult to find funding to fill the "gap" between research and application, making this initiative central to the State's economic revival. OVPR, along with the Offices of University Development, and Communications, is working with the foundation community and our partner universities to turn this dream into a reality. We are very grateful to the C. S. Mott Foundation for taking a leadership role by providing funds to start our path down the road of economic recovery.

In closing, I hope I have given you a view of the activities and initiatives that OVPR and the U-M research community have undertaken in the past year, and that we are planning in the year ahead. While we face a very challenging landscape in FY08, from an uncertain base of government funding, to a state economy that is in urgent need of restructuring, I believe that we are entering a period of unprecedented opportunity. Our university has the possibility to leverage this situation to become the undisputed leader in academic research connected to industry, and thereby provide opportunities for the community, the state and the region in which we live. We are limited only by our imaginations and energy. And, like any entrepreneur, we only plan for success, since failure is not an option!