

## KEYNOTE ADDRESS

### THE RESEARCH MISSION OF PUBLIC UNIVERSITIES

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Thank you for inviting me to talk with you about issues related to our research mission. I have taught, conducted years of laboratory-based research, and been an administrator at four flagship research universities, so I have seen many ways that research programs can flourish as well as decline. I would like to start our discussion by presenting my own views on what all of us need to observe as we work toward advancing our universities by expanding our research programs and external funding. We all have opportunities that we can target for growth and encouragement. The world outside our universities looks to us for innovation. This is true at the regional, state, and national levels. In addition to being attuned to our own ambitions and possibilities, we always need to be aware of the expectations we face.

My remarks will focus on several critical themes:

- 1) Making sure that we have appropriate support systems for our aspirations;
- 2) Understanding the current funding environment and its vulnerabilities;
- 3) Identifying where we can advance our research mission in new ways;
- 4) Recognizing the complexity involved in ramping up the research component of a university, from staffing to infrastructure;
- 5) Communicating, internally and externally, the value we provide to our nation as it works to meet the challenges of remaining competitive and innovative in the global arena.

External funding for research has become a vital part of our success as prominent public universities, even allowing us to change the ways we teach undergraduates and involve them in research projects. This participation is also an important hallmark for our country – it led to our pre-eminence in science, technology, and innovation in the latter half of the twentieth century. At some institutions, such as the University of Michigan, external funding for our research activities far exceeds the appropriation we receive from the state. Access to these revenue streams has been very beneficial in terms of building the strength

and visibility of our academic departments, especially in medicine, life and physical sciences, and engineering. Of course, no research program just happens – virtually all prominent centers and departments develop their programs as the result of faculty initiative and institutional support.

I first want to underscore the need to make sure you have the support systems in place to allow research programs to flourish. As a former faculty researcher, I can assure you that individual faculty members sometimes find that the internal grant offices in a university impede, more than assist, in processing and administering external grants. Of course, all universities must be attuned to the importance of rigorous monitoring of external awards and the complex regulatory environment within which we need to function. But we need to make sure that our grant officers act more as facilitators than as gatekeepers.

Young faculty members need help in preparing competitive grant proposals and in understanding the mechanics of their initial grants, so that they will be successful in conducting their work and becoming competitive for the next grant. All faculty members, but especially new ones, need help in learning how to build and administer budgets. They need specific instructions regarding the regulatory environment, and they need clear advice about obtaining necessary approvals (such as testing on animals or human subjects) well in advance of their submission deadlines.

Institutions can make a distinct difference regarding the likelihood of success for a grant. Some universities conduct “boot camps” for new researchers. Others help create support groups to read and critique each others’ grants. We need to make sure grant offices are open late and grant officers are available at grant deadlines. Just providing a pick-up service for faculty at the last minute will be greatly appreciated by a nervous and tired professor – whether new or seasoned. Grant officers can be enormously helpful in putting together boiler-plate information for program projects and center grants. All grant offices should regularly conduct customer satisfaction surveys – just to see how they are doing.

Faculty also may need guidance in terms of reaching out to agencies; they need to be encouraged to contact staff at external funding organizations, and often need help in learning to do that effectively. The advance knowledge they acquire by discussing their ideas with a project officer can make the difference between a good but unfunded grant application and successful grant funding. In fact, some private organizations do require a pre-review stage, and applicants need to be advised of this as soon as possible by your grant officers. Faculty need to understand that they have a responsibility to inform themselves, but they also need to know that funding agencies wish to identify great ideas and people, too. This exchange of information can be productive.

Sometimes, faculty or units wish to compete for classified research projects. The world of classified research brings its own set of regulatory criteria and related issues at campuses where openness is highly valued. If your faculty members want to pursue this specialized area, you may wish to consider setting up a separate organization where the work will actually occur, so that your university has an arms-length relationship to the project and funding agency. Establishing such an entity may be complicated, and will require a significant amount of advice from your own experts in external research.

Your sponsored program administrative staff must be up to date and aware of the trends in funding and the logistics of funding agencies, so that they can smooth over the hurdles that new faculty members are sure to encounter – as well as the changes in funding systems that mid-career faculty members will discover in requesting renewed or new funding. As you look at the programs you might want to build through adding faculty members and staff, be sure you have appropriate administrative support. Even if you want to increase funding by encouraging current faculty members to become more active, you may need to add administrative staff in your grant and contract units to deal with the increase in workload. You do not want to have your faculty members stumble because of lack of institutional support.

Second, you should make sure, as an institution, that you understand where the opportunities and vulnerabilities exist in external funding agencies. Your grant and contract staff may be aware of trends, but you will also need to have academically-based administrators who are involved in that world to keep close watch on trends. Depending on priorities in federal-level budgeting, almost all agencies go through cycles of increased and decreased spending. These cycles are apparent to those who are close to the agencies and involved in their professional organizations – the more broadly involved your faculty are in a variety of professional activities, the better informed they will be regarding the large-scale picture. For example, NIH funding has grown dramatically over the past five years. Currently, it is in a steady-state mode that is creating a shock to the system. There are also opportunities that occur – such as the current emphasis on defense spending, which extends to research in bio-defense and anti-terrorism programs. Because this is a priority for our country right now, the funding opportunities have become more profuse – but, of course, that also means that the competition for that external funding has become much more vigorous.

Like federal agencies, private funding organizations also wax and wane in terms of their ability to provide funding, often depending on the value of their endowments, which can fluctuate. They frequently will establish priorities and initiatives about which we need to be aware. I am going to talk about one of our newer programs at the University of Michigan that has taken advantage of an opportunity offered by decisions of a private foundation. Again, the more

connected your staff and faculty have become professionally, the more aware they will be of the opportunities that present themselves.

All of us have faced budget constraints in the past few years. One area that is often cut is faculty travel to conferences. To our public audiences, travel may seem wasteful and cutting travel expenditures can make for good press coverage. But be careful, in making local budget decisions, that you are not making small savings that could have a larger adverse impact if your faculty becomes less engaged in the national academic community. It is critically important for your faculty members to be part of the scholarly networks of professional organizations, so that they are hearing about trends and opportunities in their field along with their colleagues from other institutions. When your faculty present talks at a conference, it is likely that someone in the audience may be part of a review process for that research. This is another important way for faculty to become known and to create a positive impression for their work.

Third, identify the areas where your institutions might promote research and external funding. As you consider this point, you will need to look at your own local politics as well as the broader national picture. It is not enough to tell a university faculty that research is a priority and that you, as administrators, are strongly encouraging your faculty members to explore new and expanded research portfolios by pursuing external funding more aggressively. You will need to provide institutional incentives as well, and you probably will need to target some areas for special treatment. Identifying the programs with the greatest opportunities and then making the case for promoting those units will be complicated. One of the examples I am going to discuss with you is the Life Sciences Institute at the University of Michigan, which is providing us with great visibility, but which also has generated a set of local issues on our campus.

Sometimes, the best opportunities may not lie in your most prominent departments – as I noted earlier, national trends in funding may dictate that a less prominent department could be positioned for a great leap forward. Only you and your campuses are in a position to judge what those might be. But as you know, it takes great finesse to present and explain the reasons for your priorities. No matter what you choose, there is a strong case to be made for increased prominence in one unit leading to higher visibility for the entire institution, and therefore to a greater ability to recruit faculty and attract funding to other areas of the university.

One of the associate deans at our Medical School, Ray Ruddon, formerly was an administrator at the University of Nebraska Medical Center (as Director of the Eppley Cancer Center), and he told me about the ways Nebraska had focused on research priorities in medicine. Nebraska established a National Cancer Institute-designated basic research center by focusing on pancreatic cancer and lymphoma, and increased the activity to a level that allowed the

center to become a clinical NCI-designated center. Kansas seems to be taking the same approach. Ray told me that the University of Kansas is also doing this with cancer research, to create a research base of a size that will move it toward consideration as an NCI-designated research center. But as you know, if you have been working in this area, your research base does need to increase to a significant size to receive that initial designation.

Another opportunity for identification of programs is the agenda of your own state. Tying your research and broader academic mission to the economic climate of the state is a critical piece of local politics – and I know that most or all of you have been making that case to your legislatures. Many states are looking to the biotechnology industry to revitalize their economies, and are setting up funding that ranges from a few million dollars to hundreds of millions of dollars to jump-start enterprises in biotechnology. The competition for faculty in these fields has become fierce as a result, and you likely will need to provide significant institutional support as well if you want to take advantage of the new priorities of your states.

I mentioned that you will need to provide some institutional incentives to help faculty members increase their success in obtaining external funding. Let me address some of these incentives within the context of hiring new faculty members. The incentives I am highlighting do not pertain only to new faculty; you may want to explore these ideas as you seek to retain current faculty and to stimulate new research activity. I know you will have more ideas as well, which we can delve into during the discussion period.

When I was running a research program, I especially appreciated the flexibility I was sometimes provided when I won external awards that paid part of my salary. As an incentive, the University of Kentucky permitted me to use the released salary funds in a way that best suited my research projects. This is the sort of accommodation that a university can provide, which makes professional life more agreeable, without any additional cost to the university.

Some of you have established very successful programs in other areas. For example, I know that Kansas State University has made a priority of the nomination and preparation of undergraduates for Rhodes, Marshall, Truman, and Goldwater Scholar programs. Your focus on these programs and on your students' success has had tremendous results. This is a great testament to the value of a focused effort. In seeking to generate greater success in research funding, I wonder if all of us might do more in preparing our faculty members for the application process and competition of external funding agencies. If we brought the techniques of Kansas State University to this arena, we would certainly have faculty better prepared to face the process, and likely would have better success rates as a result.

Fourth, consider the large-scale infrastructure of ongoing costs involved in building major research programs. Increased faculty activity will lead to new needs in staffing, in student support, and in physical space. I want to provide you with two examples of newer programs at the University of Michigan that have been planned and built with a significant component of external funding.

You may have heard of our Life Sciences Institute (LSI). It has become a centerpiece of our campus, and is having a profound impact on not only our research programs, but also our instructional programs. The Life Sciences Institute was conceived at a time when the state had committed \$1 billion over twenty years to the Life Sciences Corridor, in 1999. Michigan had decided to position itself as a leader in the life sciences, and created this funding by dedicating a significant portion of its tobacco company settlement to the Life Sciences Corridor. The state planned to provide competitive awards to universities and industry, and the University of Michigan began to position itself to attract funding from this state-wide initiative.

Seeing the broader scientific interest in building the field of the life sciences, the University decided to create the Life Sciences Institute with a combination of permanent endowment and seed funding from the University. We also committed to a considerable infrastructure program, and have opened the first two buildings dedicated to the Life Sciences Institute – a research building and a commons that contains extensive meeting and office space. Our third building, which will complete this complex, will be devoted to undergraduate teaching in the sciences. We designed the laboratory space to enhance the interdisciplinary activity the Institute is intended to foster; the laboratories do not have walls, so that there is a natural interaction among the scientists. We have appointed a number of faculty members to the Institute – some were already prominent scientists on our faculty, and others have been hired specifically to be part of this Institute. All are hired into academic departments, but have an appointment to the LSI. Because a large portion of the initial funding was one-time seed money, we have an expectation that the LSI will largely be funded through external research grants and private donations once it is fully staffed.

As you are well aware, hiring in the life sciences has become very competitive, because so many states have seen that biotechnology is a field that will be burgeoning over the next few decades. This competitive atmosphere has made hiring the best scientists very challenging, even with all the resources we can provide.

We have also had to deal with a disturbing shift in the state commitment over the past two years – the \$50 million per year has been scaled back to \$25 million per year, and the former Life Science Corridor has become the “Technology Tri-Corridor,” now including automotive technology as well as technology related to homeland security. There has been substantial resistance from the academic and industrial scientific community about this reduced funding

and trifurcation of focus, and there is hope that the life sciences will re-emerge as a state funding priority. I have pointed out that employment in the life sciences has seen substantial growth, with 33,000 new jobs in this field in Michigan since 1998.

LSI was created and sustained because of institutional prioritization and support, taking advantage of a state and national trend to support the life sciences. Even though the state priority has become less promising, we have maintained our own commitment to the life sciences, and our core faculty is moving toward our goal of self-sustaining external funding.

Another example of external funding and a new research program is our Department of Biomedical Engineering (BME), located in the College of Engineering. It was founded by faculty members Matthew O'Donnell (who is currently chair), John Faulkner, Steve Goldstein, and Charles Kane. BME is an example of a program that was established by the confluence of three essential factors: the critical need for coordination between the fields of engineering and medicine; the relentless persistence of several faculty members with vision and initiative; and the serendipity of a unique funding opportunity.

The defined field of biomedical engineering is fairly recent, and many programs, like our own, started in other departments. Some bioengineering centers started and continue to reside in medical schools, while others, like Michigan's, were founded and still reside in colleges of engineering. Our unit in bioengineering started as a Ph.D. program, comprised of faculty members from both the College of Engineering and the Medical School, but with no faculty members who were appointed in biomedical engineering. There was a need for this program because the medical faculty wanted to work with students who had expertise in engineering – and the engineering faculty wanted its students to have more exposure to the health sciences.

There were few actual departments of bioengineering even fifteen years ago. Most scientists and engineers in this field were in small research programs. Much of the research pertained to tissues and organs – developing technology for kidney devices, etc. The field began to change dramatically when medical science began to explore structures at the cell and molecular levels. Then the engineers began to develop protocols from the perspective of their own field: to make models in order to predict behavior, and to design tools to facilitate this research. At this point, in the early 1990's, students who worked on these projects needed substantial background in both engineering and life science. And at this moment, a funding organization – the Whitaker Foundation – increased its funding of bioengineering, particularly in the establishment of departments.

In 1996, the Whitaker Foundation decided to expend all of its capital in the next ten years, ending in 2006, with the bulk of its funds being devoted to the

creation of departments in bioengineering. The University of Michigan was one of the recipients of a large grant, which allowed it to establish a Department of Bioengineering, increase the faculty size to 12 core faculty, from two, and to create an undergraduate program in bioengineering, which has just graduated its first class of exceptional students in 2004. The new faculty members have brought extensive research funding to the University. The senior faculty have targeted pre-tenure faculty who have already won their first grants, thereby promising a high success rate of external funding. By placing such an emphasis on funded research, the department has increased its external research expenditures by over 100% in two years' time.

This story is different from the LSI creation because it developed as a result of faculty initiative. The faculty members involved would be the first to say that they had to swim upstream to create this department. There is a moral to this particular story – that we need to learn to recognize not only when our faculty members have the zeal to make a project succeed, but also when they or we, as administrators, can target the external resources that will make their vision a reality, leading to even greater prominence for their College and University. And finally, as I stated at the outset, we also need to be attentive to larger challenges, such as global issues where we can make significant contributions, and for which targeted funding is often available.

We have a value to offer our states and our nation, and we need to remember to make that case to our external audiences as well as to our own campus constituencies. I am currently working with the National Innovation Initiative, which is part of the national Council on Competitiveness, an organization that encourages leaders of universities and business to develop ideas for economic prosperity. Our nation is facing a challenge about how best to position itself for prosperity in this century. We need to remain a global leader for innovation, providing a competitive advantage for creation of jobs, products, and new industries. This Initiative is tackling the question of the changing nature of innovation, which has itself been transformed because of geographical, economic, and workforce pressures. We need not only to increase our research activity, but to create new types of leaders, new ways of thinking, and new capacity to deliver ideas and products.

Our universities are competing against each other for funding – in a healthy way – and as a nation, we are competing to maintain and intensify our position as a leader in producing ideas and products. This is a challenge our universities are ideally equipped to tackle – we have brilliant minds across many disciplines, and we have scientists, engineers, and social scientists who can help translate our ideals and theories into pragmatic outcomes.

In summary, my own suggestions for enhancing research and external funding focus on the practical components necessary for research to flourish: having appropriate support systems for our faculty members; understanding the



positive and negative nature of the funding environment; identifying the best programs to target for growth and support; and taking into account the complexity of staffing, funding, and infrastructure involved in the world of funded research. At the same time, we need to recognize that we represent more than research programs – we have a wonderful opportunity to convey our values broadly through our research and the solutions we can offer the world.