

RESEARCH AT KU: MOVING AHEAD!

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I am pleased to respond to Dr. Martin Apple's opening remarks at this sixth annual research policy meeting sponsored by the Merrill Advanced Studies Center. This is my fifth opportunity to speak at these important meetings. I wish to emphasize our gratitude to Fred and Virginia Merrill for their continuing support of these sessions.

I want to talk about our university's response to the post 9-11 American situation, but first, I will review a few macro-level statistics about the research enterprise at the University of Kansas (KU) in order to set the framework from which 9-11 responses can occur.

The first portion of my talk involves research performance measures – a theme at last year's Merrill Conference. You will recall that Joan Lorden from the University of Alabama - Birmingham discussed them in some detail. I'll mention three kinds of performance measures:

- Research, development and training expenditures (RDT)
- Research rankings
- Research market share

Then I will touch briefly on post 9-11 by means of quotations from John Marburger and Rita Colwell. I'll conclude with a report on a recent KU-Midwest Research Institute bio-defense workshop that we initiated and co-organized.

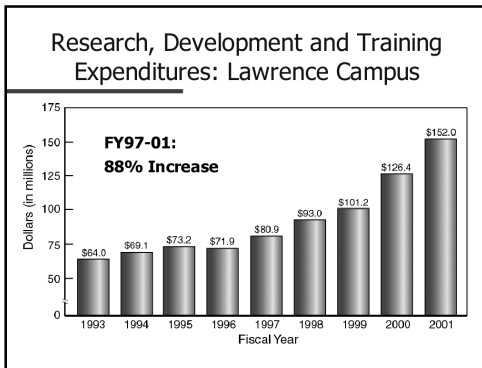
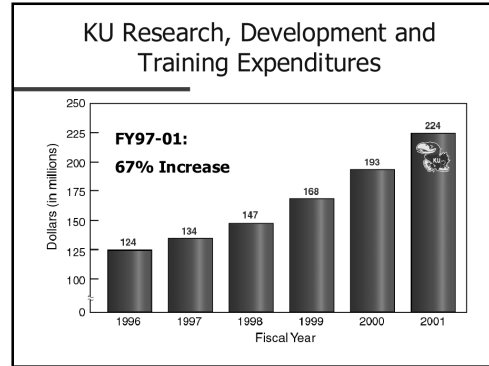
Performance Measures: Research
<ul style="list-style-type: none">• Absolute measures<ul style="list-style-type: none">– Research, dev. & training expenditures– Totality of research enterprise<ul style="list-style-type: none">α Economic development• Relative measures<ul style="list-style-type: none">– Rankings– Market share<ul style="list-style-type: none">α Both based on federal R&D S&E expenditures

Academic research is multi-dimensional and thus requires a variety of measures. These measures are of two types, either absolute or relative. At KU, we use one principal absolute measure, namely, research, development and training expenditures. This measure involves the totality of the research enterprise. Economic development numbers, such as the number of jobs provided in a ripple effect, stem from this RDT number.

We use two principal relative measures: rankings and market share. Both are based on federal research and development (R&D) expenditures in science and engineering. These expenditure numbers, collected by the National Science Foundation (NSF), are the “gold standard” for rankings because they represent peer-reviewed research.

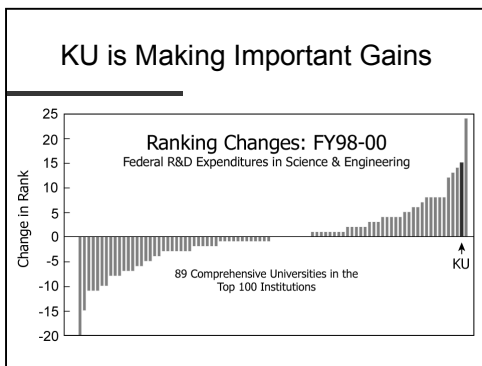
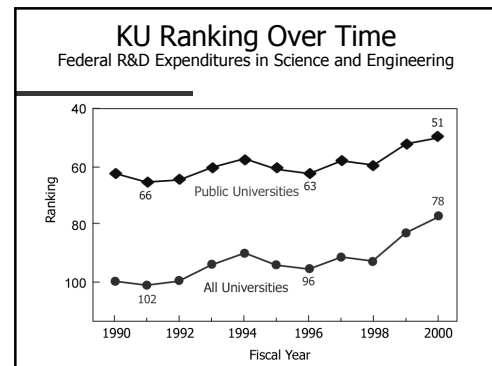
For fiscal year 2001, our RDT expenditure figure is \$224 million. The methodology used to obtain this number is the same as the NSF methodology used for rankings, but it is also applied to non-science and engineering and to training projects.

Our RDT expenditure can be used to estimate economic impacts such as the number of jobs produced by the ripple effect of KU research. The U.S. Department of Commerce says that, in Kansas, \$1 million of academic R&D produces over 42 jobs; hence \$224 million produces almost 9,500 jobs.



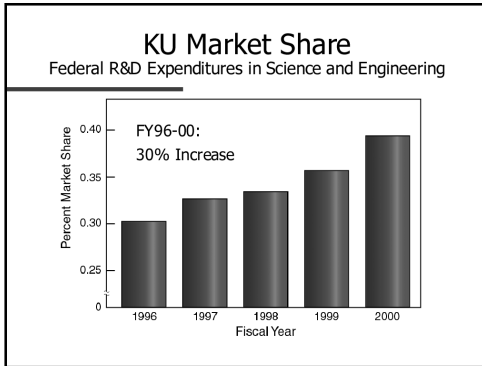
KU’s RDT number has increased by 2/3 in the four years from FY 1997-2001 – a significant increase. The RDT expenditure numbers for the Lawrence campus have almost doubled over the four-year lifespan of the KU Center for Research (KUCR) from \$81 million to \$152 million. This is a spectacular increase.

The first relative measure is our ranking based on federal research and development expenditures in science and engineering. Based on this national “gold standard,” KU has risen rapidly since KUCR’s inception on July 1, 1997.



KU’s rise in the rankings has taken place very recently. Over the last two fiscal years for which rankings are available – FY 1998 to 2000 – KU jumped in the rankings 15 positions from 93rd to 78th. **This jump is the second largest among comprehensive universities in the top 100.**

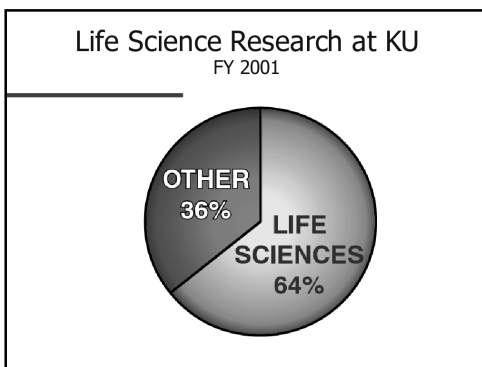
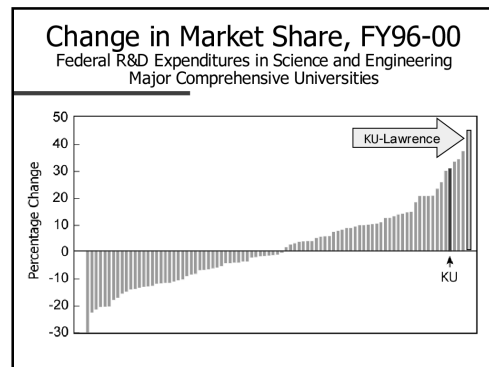
A university could be improving in the quality of its research, but not move up in dollars because of federal funding changes or state problems. Another reason for not moving up in the rankings is that the mountain becomes steeper nearer the top. Thus, another useful measure of research progress can be “market share.”



Market share refers to the proportion of federal expenditures spent by an institution. By this relative measure, KU has increased by 30% during the five years from fiscal year 1996 through 2000. Note that, by definition, the average change in market share for a given university is zero. Thus, a 30% increase is significant.

In fact, the market share increase by the KU Lawrence campus has exceeded the increase in market share of all 100 top universities!

<u>Institution</u>	<u>% increase</u>
KU – Lawrence campus	43.8
U of Illinois - Chicago	36.7
U of Colorado	33.8
U of Missouri - Columbia	32.9
KU	30.3
Washington U	29.5



Life sciences is the national research topic most in favor today. For example, the National Institutes of Health (NIH) budget has doubled over the past five years and is now five times the NSF budget. KU’s life science research funding is a significant part of our portfolio, representing 64% of the total.

KU Life Sciences Research Rankings FY99 vs. FY00		
	FY-1999	FY-2000
Federal expenditures	\$39 million	\$47 million
Ranking among public universities	44 th	43 rd
Rank among all universities	74 th	71 st
Places gained among all universities	10 places (FY95-99)	15 places (FY97-00)
Public universities with larger ranking increase	6	1

During the four years, fiscal years 1997 to 2000, KU rose 15 positions in federal expenditures in the life sciences, which was the second largest jump in the nation. (The University of South Florida jumped 25 places.)

Our improvement in life science funding has paralleled our improvement in overall research funding.

KU ranked 35th among comprehensive public universities in federally sponsored life sciences research expenditures in FY 2000. KU's rate of increase in federally sponsored life sciences research expenditures from fiscal years 1996 - 2000 was the *highest in the country* among the nation's top 50 comprehensive public universities.

Federal Research Expenditures KU Life Sciences						
Fiscal Year	All Institutions		KU Total		Lawrence Campus	
	Amount	% Change	Amount	% Change	Amount	% Change
1996	7,388,936	---	25,069	---	5,265	---
1997	7,761,199	5.0	28,565	13.9	7,130	35.4
1998	8,330,474	7.3	28,377	-0.7	8,062	13.1
1999	8,942,577	7.3	38,866	37.0	14,770	83.2
2000	10,059,880	12.5	46,879	20.6	18,044	22.2
2001	---	---	54,887	17.1	24,441	25.3
1996-00		36.1		87.0		242.7

Source: National Science Foundation and KU Center for Research

- KU ranked 35th in federally sponsored life science research expenditures among comprehensive public universities in FY2000.
- KU was **number one** in federal life science research growth rate among the nation's top 50 comprehensive public universities from FY 1996 to FY 2000.

Science at a Time of National Emergency
<ul style="list-style-type: none"> • Historical perspective • Vannevar Bush during WWII <p>"Science has a simple faith, which transcends utility...It is the faith that it is the privilege of man to learn to understand, and that this is his mission. If we abandon that mission under stress we shall abandon it forever, for stress will not cease. Knowledge for the sake of understanding, not merely to prevail, that is the essence of our being."</p>

The theme of this Merrill Center conference is "Science at a Time of National Emergency." Humans tend to think that all things begin with them, without history. Here are Vannevar Bush's words spoken in 1943 at the height of fighting in World War II (called to my attention by our University of Missouri colleague, Rob Hall, Interim Vice Provost for Research):

"Science has a simple faith, which transcends utility...It is the faith that it is the privilege of man to learn to understand, and that this is his mission. If we abandon that mission under stress we shall abandon it forever, for stress will not cease. Knowledge for the sake of understanding, not merely to prevail, that is the essence of our being."

On November 7, 2001, NSF Director Rita Colwell spoke at the Woodrow Wilson International Center for Scholars in Washington, D.C. Several quotes from her speech follow. The first one emphasizes the need for all of us to join in on this post 9-11 agenda and the need to remember history.

"Science: Before and After
September 11"

- Rita Colwell, Director, NSF:
"At this time of uncertainty, the need for all of you is greater than ever before. Your experience wisdom, research, and measured debate can bring both historical context and analytical order to precipitate public discussion and debate."

Dr. Colwell quoted the late Rep. George Brown (of California) in a speech at the National Academy of Sciences in 1994. "We must have a research system that arches and bends with society's goals." Emphasizing the need for prediction, in the form of an "anticipatory perspective in our research," Colwell went on to say: "The alternative of not being at the forefront of knowledge is the alternative of being left behind."

Colwell also broached the topic of under-represented groups in science and engineering fields. We are all aware of the need to provide supportive environments in order to encourage women and minorities to enter these fields.

Now, extrapolating beyond Colwell's words, here is another thought: universities and businesses are beginning to complain and gear up in order to deal with SEVIS (the Student and Exchange Visitor Information System) and the tracking of international students. This increased security is necessitated by concerns over these students' national loyalty. If loyalty is to become a criteria for admittance to our science and engineering programs, we should pay heed to a sizeable group of minority citizens whose loyalty to this country, on average, is readily apparent.

Rita Colwell Speech
(continued)

- George Brown (at NAS, 1994): "We must have...a research system that arches and bends with society's goals."
- Colwell: The need for prediction, "anticipatory perspective."
- "The alternative of not being at the forefront of knowledge is the alternative of being left behind."

Rita Colwell Speech
(concluded)

"...our national need for scientists and engineers cannot possibly be fulfilled by the traditional white male population. We must focus on attracting women and our diverse minority populations to these professions."

The same minorities that are under-represented in science and engineering fields are vastly over-represented in our country's military branches. An FY99 Department of Defense report on social representation in U.S. military forces reveals that African-Americans provided 20% of our active duty personnel while they make up only 14% of the civilian population; the group labeled "Others," including American Indians, were 7% and 5%, respectively. Hispanics were

11% and 15%, respectively; hence, Anglos are 62% and 66%. What more loyal pool of untapped talent could be found than those minorities, those American citizens, who are currently under-represented in our science and engineering programs?

Of course, this is not a "quick fix" answer to the looming question of who will fill the ranks in our science and engineering programs, but it is one that every

“Under-represented....”

- International students vs. under-represented American minorities
- DoD report on social representation in US military for fy 99: African American and American Indian serve @ 50% more than Anglo population. Over-represented!
- Minorities form 30% of American population, 39% of US Army, 45% enlisted force.

state and local school board can begin addressing immediately. Curriculum experts in our Schools of Education should collaborate with scientists and engineers and with social scientists who understand minority cultures to develop programmatic content and appropriate teaching techniques for kindergarten through 12th grade education. Science and engineering faculty in the academy might also benefit from some

teaching tips. If our minority students have a firm foundation in the sciences, they will be more likely to enter undergraduate and graduate programs in science and engineering.

As I often like to say, a rising tide raises all boats. An additional positive point to this idea is that our majority white students will also benefit. Over time, newer educational programs will also encourage their participation in science and engineering programs.

Dr. John Marburger is the Director of the Office of Science and Technology Policy in the Executive Office of the President of the United States. Last month he gave a speech at a meeting of Martin Apple’s Council of Scientific Society Presidents.

John Marburger, Director, OSTP
CSSP Speech, May 2002

- Historical context
 - The Manhattan Project during WWII
 - Sputnik in 1957
- Tradition of Manhattan Project → university research
- War on terrorism and continuing need for investment in research

Terrorism: Role of Social Sciences

- CSSP meeting in December 2001, Martin Seligman, President of APA: “ ‘Terrorism’ is a social phenomenon.”
- AAAS Colloquium on S&T Policy, April, 2002, John Marburger, Director of OSTP: social science provides “structure and dimension to the (post 9/11) discussion” and should be systematically included.

Like Rita Colwell, Marburger began with a historical perspective on American federal science funding and progress. He said, “the modern era of federal science policy begins with World War II and the remarkable contributions the sciences made to the war effort.” He went on to cite Sputnik in 1957 as a second epochal event.

Marburger spoke about our current war on terrorism, noting that much of the needed science already exists and remains to be suitably implemented. He went on to say that this does not mean we should slow the investment in science: “The reason we have the needed technology at hand is that the forces of economic competitiveness and the desire to improve the quality of life for all people has driven science and technology in the right direction to address terrorism issues.”

Given the Merrill Center’s position in KU’s Life Span Institute, which focuses on the social sciences, I raise the very illuminating comment from Martin

Seligman, President of the American Psychological Association. At the December 2001 CSSP meeting, Marty Seligman pointed out that the goal of “terrorism” is to cause social upheaval. Terrorism per se does not seek mass physical destruction except as a means towards this end. As with all great insights, this is obvious after it is pointed out to you.

KU Response to Post 9/11

- Two levels of response
 - Individual/small group research proposals
 - Institutional level
- Institutional level: KU-MRI alliance

University faculty, the same as other American citizens, wish to contribute to the antiterrorism effort.

KU research is now sufficiently robust that there is much to contribute. There have been many individual and group research proposals to this end. At the institutional level, we decided to work with the Midwest Research Institute within our KU-MRI Alliance for two reasons: MRI’s own

expertise in science and their expertise in dealing with a broad range of federal projects.

We sponsored a “bio-defense” workshop under the KU-MRI alliance. The 40 invited participants spent a day discussing our “in-house” areas of expertise and their possible matches to national interests. The principal topics that emerged were vaccines, biosensors and public health. This is a continuing effort and a second workshop will be held this fall.

KU-MRI Bio-Defense Workshop

- Workshop held 1/25/02 with 40 invited participants.
- Principal topics that emerged:
 - Vaccines
 - Biosensors
 - Public Health

Senator Pat Roberts - KS
NASULGC Meeting 11/01

- “Our job ahead is not easy. It requires courage, hard work and leadership. I pledge my support for your efforts...
A renewed commitment today to our institutions of higher education and especially to science, engineering and technology research is a commitment to our nation’s future.”

I conclude with two quotations from our own Senator Pat Roberts. The first is from his invited address at last fall’s annual meeting of NASULGC, the National Association of State Universities and Land Grant Colleges.

The Senator spoke about post 9-11 and university research, finishing up with this statement:

“A renewed commitment today to our institutions of higher education and especially to science, engineering and technology research is a commitment to our nation’s future.”

Senator Roberts was invited to address the AAAS, the American Association for the Advancement of Science, at its Science and Technology Policy Colloquium in April, 2002. Let me conclude my remarks by quoting the Senator's words on that gala occasion:

"I believe strongly in the need for engineering, science and technology research as a tool to improve the quality of life for all Americans. And after September 11th, this research is not only vital for thriving in an economically competitive world, it must be vigorously pursued. We will respond like the United States has to previous global events such as the Cold War and Sputnik."

Senator Pat Roberts - KS
AAAS S&T Policy 4/02

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