

Executive summary

The Task for Leadership: Sustaining Research Excellence in Uncertain Times

James Moeser, Chancellor Emeritus, University of North Carolina at Chapel Hill

- Lower the walls of the silos to facilitate inter-disciplinary work. Create inter- and multi-disciplinary research clusters to address large problems.
- The greater the attempt, the greater the reward, and the greater risk for failure. Fear of failure often leads to the greatest failure of leadership – the failure to act.
- In developing institutional strategic objectives, one must always begin with an honest institutional assessment. I strongly believe in setting high goals, but those goals need to be grounded in reality.
- Facilities matter. We are, indeed, in an arms race. Good research facilities are a magnet for faculty and graduate students.
- Faculty have to be recruited in clusters in order to create major new initiatives, in addition to traditional departmental replacement hires. This requires an over-all architecture for strategic investment.
- Strong support from the state for research can leverage stronger federal and private support. We must never apologize for research, but rather celebrate it and find ways to connect it to people's lives.
- Public support for faculty compensation is vital. Faculty compensation is the most critical area of national competition. Everything hangs on the quality of the faculty.
- To be successful in big science, institutions need to think strategically, placing bets by allocating resources where there may be a big return. The major responsibility of top leadership is to set a vision and to be the cheer-leader-in-chief in articulating that vision to the university's many constituencies.
- A culture of entrepreneurship is a critical value. Success in economic development and job creation is the best argument for continued support for research. Avoid the traps. Don't overplay this hand. This must not be the only metric of success. The funding stream from licensing is not the goal.
- A great research university must maintain a balance, an equilibrium, between those areas that garner major external funding, and those that never will. It is a primary responsibility of top leadership to maintain areas of strength in key areas of the arts, humanities, and social sciences. *This takes vision and courage.*

Lingchi and the Modern Research University

Harvey Perlman, Chancellor, University of Nebraska-Lincoln

- Public universities are among the many public services feeling budget restraints in an era where there is little taste for raising taxes. At the University of Nebraska-Lincoln during the period when I've been Chancellor, we have been asked to address seven different budget reductions.
- Going forward, we can continue to do what we do with less resources—that is become more efficient, or we can find additional sources of revenue—that is become more entrepreneurial. Either approach presents risks to the core values of higher education, but failing to do either may present even greater risks.
- Beyond intensifying our efforts in recruitment, both within and outside Nebraska, we see some additional sources of enrollment growth, such as on-line education and a greater percentage of paying foreign students. Could we structure a curriculum and a financial aid system that would allow us to charge higher tuition for a more intense experience?
- There is no question that the costs associated with different disciplines is differentiated. There remains, however, a traditional theme of trying to facilitate student choice at the undergraduate level by removing financial considerations. It seems likely that differentiated tuition will be part of the landscape of higher education as we go forward.
- The university's role in the research enterprise seems to me to be evolving into bearing the most significant and uncertain risks associated with innovation. All of the resource pressures facing public universities continue to erode our ability to bear these risks. To sustain our research enterprise we increasingly seek partnerships with private sector companies whose tendencies are to push us further toward the applied end of the research spectrum.
- I remain confident that research universities will continue to adapt and evolve as external resource constraints require. I remain optimistic that deep in the American psyche there is an understanding of the importance of the research university to the country's survival.

Response

Bernadette Gray-Little, Chancellor, University of Kansas

- National public research universities are asked to generate and spin off research, train the workforce, drive the economy, enhance quality of life, and keep this country competitive in the world. That's a tall order, especially during a time when we're facing new challenges.
- Some of our challenges are financial. At KU we have had two big cuts over the last two years that totaled more than \$40 million when the mandates are factored in. This situation is faced by research universities around the nation. In many instances their financial situations are more dire than ours.

- Both of our speakers' comments point to the need to focus, to carve out areas of excellence, and to be hard-nosed in setting a course and staying on it. At the same time, there is a need to think big and be expansive, but to not try and do too many things at once.
- That forces difficult decisions, especially when it comes to allocation of resources such as money and time. That will require us to expect more of our incoming students, but also more of ourselves as recruiters, teachers and mentors. It will also require us to take a hard look at everything, from advising to our general education requirements.
- We also must address the challenge of graduate education, particularly how we provide funding to our doctoral students that allows them to succeed in the many roles we ask them to take on. And we must increase our scholarly output, but not just in research areas that are grant-based. The full spectrum of scholarly and creative activities must be promoted.
- Before we can even move forward on increasing our output, we have to do a better job of measuring it. Current measures like grant awards or papers don't give a complete picture. And without a complete picture, we can't identify the departments that need to improve their performance, or identify those units that are doing a good job and can serve as models.
- And as we deal with these challenges, we are at the same time seeking to convince parents, students, legislators, business leaders, alumni, donors and others of the importance of public research universities to the future of the nation and the prosperity of our states. I think both Dr. Moeser and Dr. Perlman would agree that it is a surprisingly difficult task.

Building Synergies

Jeffrey Vitter, Provost and Executive Vice Chancellor, University of Kansas

- The foundation for much of our current economy is basic fundamental research performed many years earlier by our universities, without immediate payoff. The prosperity of our grandchildren and great grandchildren will depend upon the seeds of innovation that we lay today — in our universities.
- Solutions to the grand challenges we face in society — energy, health, sustainability, and human relations — will require deep expertise from multiple disciplines. One of the fundamental roles and responsibilities the Federal government has is to nurture and sustain basic fundamental research. The reason is clear: **the horizon of fundamental research stretches too far into the future to rely on corporations to fund it.**
- Synergy is fundamental to research and, consequently, society. As James Moeser elucidated, many challenging problems that confront society — such as sustaining both economic vitality and a healthy environment, meeting the energy challenges of the future, exploiting information without falling prey to it, and resolving centuries of animosity in

the Middle East — are inherently cross-disciplinary, requiring deep and synergistic advances from several disciplines.

- It is important to embrace a dual philosophy of excellence — excellence in cross-disciplinary collaborations as well as in core disciplines. We should not limit creativity to traditionally valued forms of research. Instead, let us find creative ways to unleash faculty and student creativity to discover amazing new forms of knowledge and wisdom.
- Another fundamental responsibility that universities have is to apply the fruits of their labor — knowledge — for the direct benefit of society. This integral connection to the community provides yet another example of synergy — traditionally referred to as “service” or “outreach,” and increasingly referred to as “engagement.” Engagement to me means a partnership between the university and the outside community. I use the term community in the broad sense to mean any or all of the local region, state, nation, and world.
- Synergy truly plays a fundamental role in research scholarship in a number of ways and at a variety of levels. One of the greatest synergies of all is the potential to work globally with colleagues across the world to apply our collectively rich diversity of backgrounds and perspectives toward the solution of problems that affect us all. To take full advantage of these opportunities, we need to remove barriers for synergistic collaboration. We need to provide infrastructure, to develop a culture that values different forms of creativity and scholarship, including nontraditional, and to create productive partnerships — whether it is with communities, government, businesses and corporations, foreign nations, and, of course, other universities.

Lemons to lemonade: Finding new opportunities in a challenging time

April C. Mason, Provost, Kansas State University

- As Provost and Senior Vice President, I have identified a number of strategies to increase research and development expenditures that I share with this group. These strategies will not surprise any in this room; however I do want to highlight the University’s unique opportunity with each strategy and describe how I feel these strategies are helpful to all public research institutions.
- Diversify funding sources: The public research university must have a deep, diverse portfolio of funding sources. Federal grants have traditionally been the key to funding research on our campuses. However, finding other funding sources is also essential. State contracts, block grant competitions, foundations, and industry grants and contracts must be added to funding portfolios. The successful university is the one that diversifies and stays current on funding criteria.
- Collaborate: Technology has assisted greatly in making distance collaboration easier. Funded projects of the future will be collaborations, multi-disciplinary efforts, multi-institutional projects with no room for silos. This type of work is not without difficulties for our faculty. University officials should be responsive to the organizational needs of

large multi-institutional research proposals, as the complications these types of projects bring is high.

- Build on strengths: The universities represented at the Merrill conference are similar in many ways, but have individual strengths and expertise. Today is the time to capitalize on those unique strengths. At K-State we have been able to build on the strengths of our veterinary medical research. The investments made in an already recognized strong area are strategic and heighten the status of that area.
- Grow where planted: There are unique opportunities each university can enjoy solely as a result of where it is physically located or where we have historically invested. K-State enjoys a number of strengths that arise from both place and historical investment. K-State has built on the areas of wheat and beef production to become national and international leaders. These two areas of agriculture are essential to the economy of the state. Partnerships with the industry, industry organizations, state agriculture and local producers are key to a sustainable crop and animal production system.
- Be opportunistic: K-State invested strategically in the Biosecurity Research Center, Pat Roberts Hall, with its high level animal and plant disease research facilities. This facility was expensive to build and is expensive to maintain. It has, however, been central to the competition for the NBAF facility and the attraction of many new investments in the Manhattan area. The focus of research on infectious diseases continues to grow.
- Hire well: The hiring of new faculty to become the university of tomorrow is more and more critical. The faculty we recruit today will need to be competitive in the ever changing research arena. They will need to stay relevant in the classroom as well as in the laboratory, studio or library. We as administrators invest time, energy and resources in each new hire. We want to invest well for the future. As resources allow us to hire, we need to build on strengths and form synergies for success. After the hire we need to mentor for the continued success of each and every faculty member.
- Today's environment is one of competition for limited resources, declining state and federal funding and escalating infrastructure needs. We will need to work together to share strategies and opportunities to control our own future in this changing world. The truly great resource we all have are people who are passionate about their work and the discovery of new knowledge in an educational setting. With that resource we are well prepared for any uncertain future.

Integration of Infrastructure and Process for Enhancement of the Research Mission of the University of Missouri

James English, Professor, University of Missouri

- University research communities are highly diverse both in areas of scholarship and approaches to investigation. The University of Missouri community is typical of this complexity and includes more than 1,900 faculty and instructors associated with 286 degree programs.

- The basis for success of the university's research mission is effective integration of institutional resources (including physical and human) and support processes. At the University of Missouri these support resources are provided at multiple administrative levels, including the department, college, and the Office of Research at the campus level.
- Support for faculty research can be informal through peer mentoring or formal through a variety of administrative mechanisms that provide equipment, technical expertise, funding opportunities and administrative assistance. Examples of formal support include funding opportunities provided through the Research Council, and equipment and technical expertise provided by the Research Cores and Centers within the Office of Research.
- There is a need to constantly assess the quality of resources directed to support the research mission and any needs for enhancement. An example of this is the annual evaluation by the University of Missouri's Office of Research of its Master Plant for Research and Technology Development.

Building Infrastructure to Enhance Integration of Research and Education

Beth Montelone, Associate Dean of the College of Arts and Crafts, Kansas State University

- One way to sustain and enhance the research mission of a public university is to link it to other components of the overall mission of that institution. If research and scholarly activity can be coupled to the instructional or land grant aspects of the institution, it helps to illustrate the value of research to all components of the overall mission.
- A perusal of grant solicitations reveals some words and phrases currently in vogue that suggest the directions in which funding agencies think that the research enterprise should be heading. Among these are: Collaboration, Innovation, Integration, Interdisciplinary/multi-disciplinary, and Assessment/evaluation.
- The barriers to collaborative and interdisciplinary research within K-State include its traditionally decentralized culture, which vests extensive power in departments, as well as regulations of the Kansas Board of Regents regarding student enrollment minima for graduate programs.
- Nonetheless, progress has been made in recent years at K-State toward the national trends promoting collaboration and interdisciplinary work. These include an internally funded research support program as well as other programmatic efforts to link isolated education and outreach efforts and provide central resources to facilitate linking research and education.
- The K-State Targeted Excellence (TE) program solicited proposals during five evaluation cycles from 2003-04 through 2007-08. This program was funded from tuition monies and managed jointly by the K-State Provost's Office and Vice President for Research Office. It was intended to "enhance those programs (primarily inter-disciplinary) with the most promise of elevating the university's stature."

- A total of 29 distinct projects were funded over the lifetime of the program; some represented relatively small investments to initiate projects (ca. \$100,000), while others were large collaborative awards of \$2M over multiple years.
- Some of the projects established using TE funding have subsequently been developed into major extramurally funded projects. Many of these are interdisciplinary in nature. Other projects focused on promoting collaboration among faculty members and across units at K-State, while some collaborative initiatives have emphasized linkages outside the university.
- Under a shared vision of broadening participation in STEM disciplines and integrating research and education, we proposed developing an institutional infrastructure to increase the synergy among existing programs, support assessment efforts that identify practices best suited to the economic and social climate within which K-State operates, broaden STEM faculty involvement in collaborative activity and innovative programming, and guide programmatic/policy decisions at departmental, college, and university-wide levels.

The Institute of Advancing Medical Innovation (IAMI): Stepping into the future of academic research and entrepreneurship

G. Sitta Sittampalam, Professor of Pharmacology, Toxicology, and Therapeutics; Deputy Director, IAMI, University of Kansas Medical Center

Scott Weir, Professor of Pharmacology, Toxicology, and Therapeutics; Director, IAMI, University of Kansas Medical Center

Michael Hughes, Project Director, IAMI, University of Kansas Medical Center

- Academic research in science and technology has been one of the main drivers in economic development, prosperity and dramatic improvement in public health in the developed countries. The Institute for Advancing Medical Innovations (IAMI) currently in place at the University of Kansas (KU) is a bold step to promote translational research in Kansas and the Kansas City region. We anticipate that this effort in partnership with the Kauffman Foundation, Kansas Biosciences Authority (KBA) and regional animal and bioscience industry will promote entrepreneurship and economic development.
- IAMI supports Proof-of-Concept (POC) projects in drug discovery and delivery along with innovative approaches to drug-device development that can lead to commercialization through start up companies based on research funded at KU. Partnerships will be encouraged with national and international universities, companies and philanthropic organizations to deliver life-saving products to patients. Revenues from these activities will be used to fund translational research at KU and the Kansas City region. As part of this effort, IAMI will provide training and mentoring for faculty and students on entrepreneurship, business development, intellectual property management and venture funding in collaboration with the KU Business School and the University of Kansas Center for Technology Commercialization (KUCTC).
- Many discoveries may have benefits for patients and the public and require rigorous research development activities before commercialization. In the past, this aspect of

translational research was generally not funded by federal agencies or philanthropic research organizations, but carried out by multinational corporations and biotechnology companies based on academic publications. Projects at this stage are too early for venture capital investment and too advanced for basic research funding. IAMI targets the translational research activities with specific milestone-based funding and project management support from industry experienced project managers and adjunct faculty.

- Academic research supported by federal agencies have narrowly focused on basic and applied science and technology that results in publications and serves the educational missions of our universities. However, there is very little funding or infrastructure that supports translational research and promotes entrepreneurship, commercialization and job creation. Traditionally, the discoveries from academia have been exploited by multinational corporations and biotech industries concentrated in a small number of regional centers. More and more, local and state governments are recognizing job creation potential and its impact on economic development in their backyard - IAMI is an example of this desire to exploit academic innovations.
- IAMI is an innovative idea to support faculty entrepreneurs and local and regional economy by leveraging industrial expertise to commercialize discoveries at KU. By encouraging partnerships between researchers at both campuses and providing project management expertise, process re-engineering and training, we are fostering a culture of collaboration and innovation. An ultimate challenge in creating such models in the academic environment is its sustainability over the long term and its impact on the local and national economies.

Positioning the University in the World of Higher Education Research

Brian Foster, Provost, University of Missouri

- MU began a process to identify the competitive assets that could be the foundation for long-term initiatives to position the university for increased impact. A task force was formed by the provost to frame the process, identify potential strategic advantages, and to seed a broader discussion with faculty, deans, alumni, students, staff, and others.
- There was broad agreement that we would not create new “silos”, but rather each initiative would be associated with a network of MU faculty, centers, departments, staff, core facilities, and external collaborators. The networks would be guided by a facilitator whose charge is to bring people and organizations together in productive collaborations.
- There was also broad agreement that the network for each initiative would be very inclusive: the initiatives were framed specifically to allow this breadth of participation. Each of the five initiatives can readily include participants in humanities, physical sciences, engineering, biological sciences, professions (medicine, veterinary medicine, law), business, education, journalism, social sciences, agricultural disciplines, and others.
- The five initiatives are: One Health, One Medicine, Food for the Future, Media of the Future, Sustainable Energy, and Understanding and Managing Disruptive and Transformational Technologies. MU already has considerable strength in these five areas.

Our goal is to strengthen these broad areas in ways that enhance MU's impact and stature.

- Targeted conferences, workshops, symposia, and other events bring potential partners together for relevant interaction. The relationships formed at the events themselves support the research networks and greatly enhance the vitality of campus intellectual life. A diverse set of people at MU are using state-of-the-art network analysis techniques to model our collaborative networks and the potential relationships that could be brought into the networks.
- A key objective of the implementation for the five initiatives is to make the walls of existing silos very penetrable. The goal is NOT to eliminate or compromise the disciplines, but to bring them together in productive, synergistic ways.
- The facilitators for the Mizzou Advantage are focused not just on making relations among collaborators, but also on constructing robust network structures that are not vulnerable to loss of a single key individual or two. Critical support comes in important functional areas: support for event coordination, professional support for writing grant proposals, and additionally, the five initiative areas are such that they may provide opportunities for major gifts from donors who want to "change the world" in an area for which they have a strong passion.

The Quest for NCI Designation and the Power of Vision and Focus

Barbara Atkinson, Executive Vice Chancellor, University of Kansas Medical Center

- The University of Kansas Medical Center has been building a National Cancer Institute (NCI)-designated Cancer Center. We had already begun this effort when, in September 2005, then-University of Kansas Chancellor Robert Hemenway announced that attaining NCI designation for our cancer center was the University's number-one priority.
- The University of Kansas Medical Center had been working on cancer since 1969. During the early 1970s, the NCI awarded us funding to investigate the feasibility of establishing a clinical cancer research center in Kansas. By the 1990s, the University of Kansas Cancer Center (KUCC) was experiencing steady growth in terms of funding and pioneering research. Such growth warranted formalizing the KUCC's research arm as the Kansas Cancer Institute.
- Three things would make The University of Kansas Cancer Center unique: 1) our expertise in drug discovery, development and delivery; 2) our strong research in cancer prevention and control; and 3) the development of a community-based approach to cancer research through the creation of the Midwest Cancer Alliance.
- In 2004, we recruited our Center's first full-time director, Roy A. Jensen, MD, a nationally recognized breast cancer researcher and pathologist from the NCI-designated Vanderbilt-Ingram Cancer Center. In early 2006, Dr. Scott Weir joined The University of Kansas Cancer Center. With \$8.1 million from the Kauffman Foundation and a challenge match of

\$8 million from KU Endowment, we were able to create the Institute for Advancing Medical Innovation, which Dr. Weir now leads.

- In 2007, we formed The Midwest Cancer Alliance to bring cutting-edge clinical trials, the latest prevention and screening tools and continuing education opportunities to a region-wide network of hospitals and health care organizations. We wanted to advance the quality and reach of cancer prevention, early detection, treatment and survivorship methods.
- Leading this effort is Gary Doolittle, MD, another native Kansan with deep connections to the rural parts of our state. People throughout the state have great affection for Dr. Doolittle, who brings health care to remote places in Kansas via telemedicine, twice-a-month trips to conduct an oncology outreach clinic at Hays Medical Center in western Kansas and monthly visits to the Horton oncology outreach clinic in the Northeast corner of the state.
- Strong in the knowledge that our Cancer Center is distinguished by these three unique and valuable elements, we proceeded to tell our story over and over again as we set about finding the resources necessary for NCI designation. The NCI has invited us to apply as early as September 2011.
- Achieving NCI designation could create to 9,400 new jobs for the state, pump \$1.3 million dollars into our state's economy and almost double the amount of grant dollars for KU Cancer Center researchers. It would certainly bring a great deal of prestige to the University of Kansas. But most importantly, it would mean our families, friends and residents could stay in Kansas to get the highest quality cancer care in the country.

Focus on the Enterprising Researcher to Sustain Research Universities

Kimberly Espy, Associate Vice Chancellor for Research, University of Nebraska-Lincoln

- From the perspective of the individual researcher, sustaining research universities is fundamentally about actions that initiate, enable, and enhance the research enterprise, coupled with those that reduce barriers that get in the way.
- Enabling researchers to be able to chase down a "hare-brained" idea, to debunk conventional thinking, to develop the alternative method or approach, which impacts national needs and transforms the field is the key feature of a vibrant, sustainable research university.
- Current practices for hiring faculty have not changed substantially in decades, and yet the availability of well researched, valid information on how to effectively recruit, select, and hire has burgeoned. In order to sustain the enterprise, updated hiring methods to directly assess the enterprising qualities of candidates, and more systematically consider these characteristics in selection, would benefit institutions broadly.

- In the last decades, the increased demands placed on faculty are not uniformly distributed. The expectations for service and teaching for faculty who are more focused on research largely has not changed. Apportioning faculty responsibilities to best fit skills and interests in a dynamic, flexible manner undergirds an enterprising, sustainable institution.
- Institutions can do a lot to minimize burden – by retaining adequate funds and providing staff for budget and proposal assistance. Providing full service help supports faculty, who are then less fettered by such concerns and have more time and energy to devote to doing research.
- Sustaining the research enterprise fosters interactions and collaborations among researchers from various disciplines, who have different perspectives, training and methods, but share a common commitment to the problem or question at hand.
- Graduate study is under subtle attack. Declining budgets result in reduced graduate assistantships, and inequities in the funding model make it more cost effective to hire a technician or post-doctoral fellow than train a graduate student. The system of graduate student support needs rethinking, with a greater partnership by the federal government. Sustainable models for graduate study is a key element of the research enterprise and strengthening researcher universities.
- The research university is a direct reflection of its enterprising faculty scholars. Working from the microcosm of the researcher is an important perspective to remember in considering efforts to sustain research universities.

Research and Imagination in the Twenty-First Century: Liberal Arts and Sciences

Danny Anderson, Dean, College of Liberal Arts and Science, University of Kansas

- Within the context of an international public research university like the University of Kansas, I see the work of the liberal arts and sciences as drivers of the imagination within our research mission. The liberal arts and sciences are foundational for sustaining and enhancing the research mission of public universities in the twenty-first century. And it is the imagination fostered by a liberal arts and sciences education that lays this foundation.
- The twenty-first century has begun with a conversation about higher education, mainly focusing on challenges and obstacles. In his inaugural address, President Barack Obama voiced the commitment to “transform our schools and colleges and universities to meet the demands of a new age.” Both the American Association of Universities (AAU) and the Association of Public and Land-Grant Universities (APLU) have weighed in on this conversation as it has related to research universities.
- While this conversation is robust, one topic is missing: the role of liberal arts and sciences within public research universities. The *Chronicle of Higher Education* in a special group of articles (5 March 2010) discussed “the new liberal arts” in private liberal arts college, regional state universities, online/for-profit institutions, and honors programs in large

state universities. In each of these cases, workforce development and rising enrollment in professional programs are the drivers behind the new liberal arts.

- In a large public research university, the college of liberal arts and sciences is usually the administrative cornerstone for the institution. It serves as a home for many of the general education goals. With the foundational importance that the liberal arts and sciences play in this role, it is crucial to understand how they foster the imagination needed to ensure prosperity in the future.
- Within a public research university, the liberal arts and sciences are the intellectual home for students who seek an education on how to think like researchers, how to test ideas - an education that pushes them to develop original solutions to complex problems, and that propels them to rely upon their imagination when visioning the world of the future.
- The role of the imagination—fostered through the liberal arts and sciences—is foundational for the goals of professional education. The global challenges in cross-cultural relations and understanding, demographic flows, security, energy, environment, communications, trade, and economic interconnections must be addressed by the imagination on the way to creating new realities.
- It is the goal of the liberal arts and sciences to propel and energize the imagination, to remove the limits to the content we can dream of creating. These dreams are crucial for our globe, but they are also crucial for our homes, for the quality of our everyday lives. The liberal arts and sciences are an intellectual home for the imagination, and through the imaginative acts we encourage, we bring our research home to improve our lives.

Reconsidering the Architecture of Research in the Public University

Jack C. Schultz, Director, Bond Life Sciences Center, University of Missouri

- The National Academies' report "Rising Above the Gathering Storm", issued in 2007, emphasized the need not only for preserving, but revitalizing the nation's investment in science and math education as well as in basic research. That need was reinforced in the University Leadership Council's National Best Practice report, "Competing in the Era of Big Bets" (Education Advisory Board, Washington, DC) which emphasized the importance of multidisciplinary research, especially during perilous economic times.
- The focus of the ULC's report, *Achieving scale in multidisciplinary research*, points to an important role for collaborative, interdisciplinary approaches to science in weathering economic storms. Solving most modern problems requires more kinds of expertise than single investigators can provide. The rules and laws governing networks, most of which apply to any kind of network, are also at work in forming and maintaining research teams. Multi-investigator research collaborations are social networks.
- Training has not kept pace with changes in modern life sciences research - the culture of research training continues to emphasize individual, independent work. The life sciences have always employed statistical and modeling approaches, yet today use of bioinformatics has become *de rigueur* in many areas of biology. Another skill set that is

almost never addressed in training researchers is the ability to communicate with diverse audiences, including the public. Failure to do this well has contributed to a growing public view that science and research comprise no more than another special interest group.

- How can we change a culture of independence to one that recognizes the value of cooperation and information exchange? A cultural shift like this requires the spread of new attitudes about how we work and what is useful. Identifying individuals with the attitude and resources that facilitate becoming a hub and placing them into a multidisciplinary environment can create a topology that facilitates collaboration. This is, of course, an aspect of what is commonly called mentoring.
- Physical proximity combined with attention to individual attitudes about collaboration, the composition of expertise and interests, and a mix of more- and less-experienced investigators is likely to maximize emergent, novel research outcomes. Willingness and ability to collaborate or at least work across disciplinary boundaries can be evaluated in new hires. Faculty and institutional promotion and tenure committees need to support collaborative research consistently.
- Locating researchers on the basis of problems to be solved or other common interests is a promising new idea on university campuses that could become a trend. Lunch areas or even cafes near research areas keep researchers nearby and encourage conversation. Designing meeting spaces of varying sizes into research facilities promotes both scheduled and opportunistic meetings. Developing a database that allows investigators to find each other, or organizers to assemble teams is vital. These need to be kept up to date and edited for consistency.
- Institutions must establish policies with respect to how coauthored products are evaluated, and see to it that these are enforced from department to campus-level committees. They must foster credit- and resource-sharing among academic units so that a win for one is a win for both. Institutions need to allow shared credit and double-counting on grants, and make sure that all units sharing in a success are acknowledged.

The University of Kansas Research Engagement Initiative

Steve Warren, Vice Chancellor for Research and Graduate Studies, University of Kansas

- Given their complexity and cost, the scholarship and creative activities conducted at research universities must over time be able to demonstrate a substantial impact on society to justify that their cost and “specialness” is worthy of meaningful levels of tangible support.
- In the fall of 2008, I led an effort at KU to determine the extent of research engagement by university faculty over the previous ten years. The analysis was limited to our history of obtaining external research funding during the previous decade (1998-2008). Our analysis revealed that during the previous decade, participation by faculty in grant supported research remained remarkably flat at approximately 50% of faculty. Our analyses also

indicated that participation by faculty in externally funded research was remarkably uneven within many departments, and for some departments overall external funding was lower than might be expected given the availability of federal programs to support research in their given disciplines.

- A natural implication of this data was that we could potentially achieve higher levels of research engagement on the Lawrence campus. Shortly thereafter Chancellor Gray-Little appointed 19 faculty members to serve on a Research Engagement Task Force. Our charge was straightforward: To identify appropriate measures of research engagement, and to suggest specific approaches to promote, increase, sustain, and recognize all types of research engagement by faculty.
- The final report of the task force was submitted to the Chancellor on March 24th, 2010. Consequently, KU has begun the process of creating a “comprehensive system for measuring research engagement” and all Deans on the Lawrence campus, and all Chairs at KUMC have been asked to submit their initial plan for sustaining and enhancing research engagement in their respective faculties.
- The overall goal of the research engagement initiative is to sustain highly-engaged departments and programs while substantially increasing the number of departments engaged at this level across the university. A sustained effort over many years will be required before the extent of our efforts to do this can be reasonably determined.

The Water for Food Institute at the University of Nebraska: Growing More Food with Less Water – an Opportunity for Collaboration

Prem S. Paul, Vice Chancellor for Research and Economic Development, University of Nebraska-Lincoln

Monica Norby, Assistant Vice Chancellor for Research, University of Nebraska-Lincoln

- By 2050, the world population is expected to increase 40 percent, and the demand for food will double. This escalating demand on agriculture to produce food, feed, fiber, and fuel will exert intense pressures on the quantity and quality of our water resources.
- The University of Nebraska recognized that there is a critical need for a focused global effort to bring together expertise from many disciplines, including basic and applied water and agricultural sciences and economic and behavioral sciences, to conduct research focused on producing more food per unit of water. To meet that need, the University is establishing the Water for Food Institute, a global research, education, and policy analysis institute committed to helping the world efficiently use its limited fresh water resources to ensure the food supply for current and future generations.
- Currently, more than 160 faculty at the University of Nebraska have expertise related to water and food. A faculty taskforce was formed to discuss issues related to water, map institutional expertise in those areas, and develop a vision for moving forward. As a first step, they recommended we hold an international conference to better learn about the challenges and to gather input from diverse experts in food and water on the need for

such an institute and the ways to organize it. The Future of Water for Food Conference was held in May, 2009.

- A main goal of the conference was to explore how a global institute addressing water and food security established at the University of Nebraska could develop the programs and partnerships to effectively address these issues. Additional information can be found in the *Proceedings of the Future of Water for Food Conference*, available at: <http://waterforfood.nebraska.edu>.
- On April 20, 2010, the University of Nebraska was fortunate to receive a \$50 million founding gift commitment from the Robert B. Daugherty Charitable Foundation to support the global Water for Food Institute. The Water for Food Institute will be a “distributed” institute, with a core group in Lincoln and partners throughout the region and the world. These partners may be from other universities, the public sector (foundations, government agencies, NGOs), and the private sector. The Water for Food Institute will be formally established by the University of Nebraska Board of Regents in October, 2010, and the search for an executive director is underway.
- The course the University of Nebraska pursued in developing and establishing the Water for Food Institute can serve as a potential model for thinking about and doing big things. To sustain and enhance our research mission in these challenging economic times, we cannot afford to narrow our thinking. A big idea like the Water for Food Institute offers a great opportunity for our neighboring universities, who also offer substantial expertise in the use of water for agriculture and a deep understanding of its importance, to partner with us in making a difference on this global issue.

Toward Opportunities for Regional Collaborations in Drug Discovery in the Midwest

Robert V. Duncan, Vice Chancellor for Research, University of Missouri

- We at MU propose a new regional collaboration in cloud bio-computing, shared core facility support, transgenic animal model development, and clinical trials that will compete successfully with other drug discovery activities elsewhere in the United States, and throughout the world.
- The region’s outstanding capabilities, coupled with the emergence of a new emphasis on regionalism, promise to create the environment necessary for this region to emerge as the point of choice for drug and human health care development world-wide within the next five years.
- Regional efforts will succeed over the competition if the complementary strengths across the Midwest Region are effectively brought together in a single, external marketing operation. Nothing will prevent each institution’s efforts to solicit other business alone simultaneously, but all institutions will need to agree not to interfere or compete with a particular deal that is being negotiated by the non-profit on behalf of all institutions.
- The development of high-end computing for computational drug discovery, interface data acquisition, management, for bioinformatics of massive amounts of genetic and proteomic

data, and applications individually to the advent of personalized medicine, are a current critical missing component of our efforts to develop a Midwest engine in drug discovery.

- Once a substantial capability in both bioscience cloud computing and in shared core laboratory facilities are established within the Midwest Region, the next step will be to get the leading investigators who are active in drug discovery at our various institutions and at KCALSI to meet at each other's locations with a very concentrated focus on how we can specifically build on each institution's strengths to make the Midwest Region more competitive than other locations across the United States for all aspects of drug discovery.
- The next step will be to take a comprehensive approach to define the Midwest Region as the optimal location for major drug discovery. The close collaborations that emerge from this effort will likely lead to new regional opportunities for additional work beyond drug discovery.

The Big Five at the University of Kansas Medical Center : Remaining Competitive in Today's Research Environment

Paul Terranova, Vice Chancellor for Research, University of Kansas Medical Center

- The term 'Big 5' was established as the five established research areas at the University of Kansas Medical Center and includes Cancer, Reproductive Sciences, Neurosciences, Kidney and Liver. Each of these areas is an established disease or organ-based Center or an Institute at the Medical Center.
- Each of the Big 5 has a founder and/or a director with significant accomplishments nationally and internationally and a desire to conceive and build new programs and grow existing programs.
- Each of the Big 5 has shared resources that support research programs within each Center/Institute as well as non-center/institute members throughout the university. Each of the Big 5 has program grants, including collaborative research projects such as U54, P01 and P50 and core based grants (P30). The collaborative research projects usually include the majority of project leaders from within the university but subcontracts are also signed with other collaborative universities.
- Each of the Big 5 is continually recruiting students through networking and advertisements at national and international meetings. Each of the Big 5 have consolidated space including laboratories, shared resources, offices and administrative area. Consolidated space promotes scientific interactions and the resulting collaborations can be significant in the form of joint grants and publications and sharing resources. Consolidated research and administration also increases the visibility of the center/institute within the university and for invited guests, e.g., seminar speakers, external advisors and review teams.
- Each of the Big 5 have nationally prominent scientists acting as External Advisory Board members. External advisory board members very helpful in reviewing program grants

prior to submission to the NIH or other granting agency. Each of the Big 5 has well-established collaborations within the center/institute and university as well as with other universities. Collaborations may be local, national, and international and involve students and faculty that have joint publications and grants and share technologies.

- Each of the Big 5 has a seminar program and an annual symposium/workshop. The seminar program and annual symposium increases the visibility of the center/institute, an invaluable component. Each of the Big 5 is involved in outreach that includes other centers/institutes and departments within the university, and the local, national, and international communities. Outreach has an educational component that provides information about the activities of the center/institute as well as a fund raising component to support specific initiatives.

Growing Sage

Susan Kemper, Roy A. Roberts Distinguished Professor of Psychology, University of Kansas

- Most discussions of research productivity and senior faculty start and end with a consideration of the implications of the elimination of mandatory retirement policies in 1994. Aging faculty are assumed to be nonproductive at best. To use an agrarian metaphor: to ensure a good crop, the assumption seems to be that we must plow under the sage to make room for the oats. I want to challenge this assumption.
- The “aging” of the professorate is not a result of faculty members ‘postponing’ retirement, but reflects ‘scarcity’ of young faculty members. Holden and Hansen (2000) as well as other surveys (Bland & Bergquist, 1997) have identified a number of demographic changes that affect the age distribution of faculty: our “young” faculty are 10 or more years older on average than those hired in the 1970s and 1980s.
- I would take issue with the assumption that older faculty members are ‘nonproductive’ and ‘noncreative.’ This view of the relationship between age and achievement is widely held and deeply entrenched, and owes a lot to a series of analyses by Lehman (1953) in the 1950s. His consistent finding was that achievement peaks in the 30s – somewhat earlier in some domains like chess, somewhat later in others like medicine.
- These data, and lots of more recent data both cross-sectional and longitudinal, have been more recently reanalyzed by Simonton (1997). He found that it is ‘career’ age, not chronological age, that determines research and creative productivity. Simonton’s point is that it is that 10 year investment that is critical, not the age at which you launch your career. Simonton has found that productivity peaks at career age of 22, so that if you enter a profession at chronological age of 30, you’ll hit your peak at age 52 and your output won’t zero-out until age 70.
- Gingras et al. (2008) looked longitudinally at the careers of 13,000 professors from Quebec. They show that “active” professors hit a peak rate of productivity in their 40s and sustain their rate of productivity throughout their 50s and 60s. Their impact is somewhat curvilinear, with their ‘best’ works coming both early and late in their careers.

- Shimamura, Berry, Mangels, Rustings, & Jurica (1995) assessed the performance of a panel of University of California, Berkeley faculty, between 30 and 71 years of age, on a battery of tests of memory and cognition. On the tests of learning and retention, they found that the older faculty members did just as well as the younger ones. Indeed, analyses of the relationship between age and job performance across a wide range of domains has found a zero relationship (Charness & Krampe, 2008).
- While we do need to plant and fertilize a crop of young faculty members, we shouldn't just plow under the old. The key to sustaining and enhancing research productivity lies with taking the long-view of research careers as extending well past attaining tenure. The age distribution of our faculties is shifting, in part reflecting global demographics and the 'extension of childhood' and the compression of morbidities as we adjust to the prospect of long lives.

Musings from the Research Infrastructure Task Force at Kansas State University

Chris Sorensen, Cortelyou-Rust Distinguished Professor of Physics, Kansas State University

- On January 19, 2010 President Schulz's formed the Research Infrastructure Task Force (RITF) composed of 14 faculty, administration and staff. He asked me to chair the Task force, and I readily accepted.
- A major, and not at all surprising, finding is: Kansas State University is a student-centered, land-grant university where some fraction of the faculty pursues RSCA to various degrees in their fields of specialty. The public perception of K-State retains the student-centered, land-grant descriptors and includes athletics. RSCA are largely ignored or not understood by the general public.
- The TF found that there has been an attitude that at K-State we do RSCA **too**, not that we do RSCA, and a general malaise exists that RSCA is not as important as undergraduate education and athletics. What to do about this dire situation? Here I propose a number of actions that could help greatly to remedy the situation.
- A **new culture** that advocates, expects and recognizes RSCA must be instilled from the top down, via the central administration, across all disciplines and units. This new culture must extend beyond the campus through the Foundation and the Alumni Association.
- Use our resources. Perhaps the greatest resource of any university is the faculty. The faculty have to be properly supported and used. We must encourage and augment collaboration. We must think and hire with an interdisciplinary, i.e., thematic, perspective. We must beware of territorial deans and department heads. We must build a university without walls!
- The Foundation and the Alumni Association are major resources typically tapped for undergraduate affairs and athletics. It's time to use their great networks and interpersonal abilities to promote the "rest" of the university. Finally, let us not forget the synergy that

exists in the best universities between teaching and the research, scholarship and creative activities enterprise.

- Yes, RSCA creates new knowledge for the good of our society. Yes, a viable RSCA enterprise at a university can give non-classroom experience to the students. In my opinion the greatest synergy comes from the fact that with a viable RSCA enterprise, our students can learn engineering from practicing engineers, poetry from real poets, business from experienced businessmen, and science from research scientists. The insights that these real practitioners have are invaluable and they cannot be found in the textbooks.

The Nebraska Center for Virology: Research, Training, Education, and Outreach

Charles Wood, Director, Nebraska Center for Virology, University of Nebraska-Lincoln

- Established in 2000 as a National Institutes of Health Center of Biomedical Research Excellence, The Nebraska Center for Virology (NCV) won a \$10.6 million, a five-year renewal grant from NIH/National Center for Research Resources in 2005, and was recently approved and funded for another five years of funding to support the infrastructure of the Center. The NCV provides infrastructure support for researchers at the University of Nebraska-Lincoln (UNL), the University of Nebraska Medical Center (UNMC), and Creighton University – Nebraska’s three major biomedical research institutions.
- Research carried out in the center focuses on viral diseases of humans, animals, and plants, which include AIDS, neurodegenerative diseases, and malignancies. The Center has 37 faculty members and is directed by Dr. Charles Wood, a molecular virologist, with co-directors Drs. Howard Gendelman and James Van Etten, and Associate Director Dr. Clinton Jones. A number of new scientists hired in the past seven years have expanded NCV research into the study of human papilloma virus, the Epstein Barr virus and vesicular stomatitis virus, and new arenas of HIV research.
- The NCV is broadening its international work, conducting extensive research programs in Zambia. As a part of this work, the Nebraska team has built a laboratory and clinic at the Teaching Hospital of the University of Zambia and developed close ties with scientists there.
- Training the next generation of virologists, both in the U.S. and abroad, is a critical component of the NCV’s mission and continues to grow. There is an ongoing highly successful program funded by the Fogarty International Program to train Zambian and Chinese researchers on AIDS and associated cancer viruses. The NCV has also established a research training program in comparative viral pathogenesis to recruit and train U.S. graduate students, particularly those from minority and underrepresented groups.
- The NCV’s educational mission extends beyond the scientific community. The Center’s work on HIV evolution is included in a National Science Foundation-funded project called Explore Evolution that includes a permanent exhibit at the Nebraska State Museum, traveling museum exhibits that are touring the U.S., and an outreach program

for 4-H students in five states. Another project, *World of Viruses*, recently funded by the NIH Science Education Partnerships Award program, is a multi-faceted educational outreach program that will feature NCV research in public radio documentaries and in “flexhibits” distributed through public libraries and to 4-H programs in 22 states.