Executive summary

Fulfilling our Promise in the 21st Century: Integrating Scholarship, Education and Innovation

Ruth Watkins, Provost and Senior Vice President, University of Utah

- Public research universities are powerful institutions. We have a central role in the generation and dissemination of knowledge, and our work shapes and reflects the priorities of society. We strive to prepare lifelong learners capable of thriving in the multiple careers they will likely pursue. We have the unique role of preparing future scholars who will generate knowledge, meet the needs of industry and the academy, and serve as leaders.
- At the same time, we face challenges as we redefine our role. New competitors have emerged, technological advances disrupt traditional educational models, and demographic shifts in high school graduates require change in our approaches to recruitment and enrollment. The cost of higher education has outpaced inflation, and a sharpened emphasis on accountability has required us to more honestly examine both our successes and our limitations.
- Among the most urgent issues we face as public universities are the rate of baccalaureate degree completion and time to degree. One or two of every five students beginning college at the institutions in our region leaves without earning the baccalaureate. However, the difference in outcomes for those who do complete the baccalaureate, compared to peers with high school and those with some college, is striking. ***Degrees matter***.
- Public research universities have a distinctive and exceptional opportunity to address the completion challenge. Four strategies for advancing undergraduate student success are: Creating proactive models of pathways to completion which match our present reality and meet student needs; connecting undergraduates with our scholarly efforts through involvement with research; employing data analytics to increase student success; and creating a makerspace to attract creative and talented students, and to actively engage these students through the completion of their degrees.

Reinforcing the Translational Bridge: Realizing the True Promise of Research Innovations

Alexandra Thomas, Clinical Professor, University of Iowa

- Debate has been ongoing regarding how to realize the potential of translational work. While gains have certainly been made, hurdles persist which prevent us from fully achieving this promise. There are many areas that we might focus on to harness the potential of translational research. I suggest three areas that we could invest in to more completely produce healthcare gains for society: reward all members on the bridge from the laboratory to the clinic, support and sustain women in science, and engage society.
- *Reward All Members on the Translational Bridge from the Laboratory to the Clinic:* Fully including clinicians in investigations is critical on several important fronts. Fundamental research which is linked to applied research is more readily supported by the public. Further, clinicians bring back the pertinent, unanswered questions about the treatments to their laboratory colleagues, and this two-way dialogue is vital to making translational medical research

relevant. Ways to value all members of the translational bridge include encouraging diverse research portfolios, reconsidering what is valued in promotion and tenure and revisiting how awards and leadership roles are distributed.

- *Support and Sustain Women in Science:* Barriers to fully including women in the scientific enterprise still exist. Supporting and sustaining women in science is critical; equal pay and comparable recognition with awards still needs to be attained. We also need to make science and the environments in which it is practiced comfortable for women. Finally, we could better understand career breaks for having a family and proportionally give credit. In this we are asking science to support families which further ensures our sustainability and helps all stakeholders.
- *Engage Society:* The ability to tell our story has never been more relevant than today, when funding is short and we need to engage society to garner support for the vital work of discovery. Scientists need to articulate the value of their work - this means when the media calls, embrace the chance to discuss our projects. While this is not innately comfortable for many of us, perhaps we should strive to make it more a part of our culture, especially at public universities?
- The shared goals of better health outcomes and improved global quality of life, held by all stakeholders in the research enterprise can help move us collectively toward this vision. We might further consider that the public universities in the Midwest are uniquely situated to act on these opportunities based on our rich traditions of community and collaboration.

Building a translational research program in Neurotology at the University of Kansas Medical Center

Hinrich Staecker, David and Marilyn Zamierowski Professor, University of Kansas Medical Center

Kevin Sykes, PhD, MPH, Clinical Research Director, Head and Neck Surgery, University of Kansas Medical Center

- The treatment of inner ear diseases such as hearing loss and balance disorders has been largely neglected by the pharmaceutical industry. Problems in drug development for the inner ear include difficulty of correct diagnosis, lack of real-time pathological evaluation and inability, to date, to turn years of basic science research into a clinical product.
- In the Division of Otology Neurotology at the University of Kansas Medical Center we have spent the last eight years developing a research program geared towards preclinical animal models of hearing and balance loss while in parallel developing a clinical trial infrastructure that can tackle hearing and balance clinical trials.
- This requires dedicated space and staffing, a good working relationship with the institutional research infrastructure and most of all, funding. Building this kind of program takes time but it becomes self-supporting through a range of funding mechanisms and has led to the development and implementation of the first human inner ear gene therapy trial at our institution.

Barriers to Clinical & Translational Research & Challenges of Investigator Initiated Multi-Center Clinical Trials

Laura Herbelin, BSc, CCRP – Research Instructor, Department of Neurology, University of Kansas Medical Center

Richard J. Barohn, MD – Chair, Department of Neurology; Gertrude and Dewey Ziegler Professor of Neurology; University Distinguished Professor; Director, Frontiers: The Heartland Institute for Clinical and Translational Research, Vice Chancellor for Research; President, Research Institute: University of Kansas Medical Center

- Clinical Translation Research (CTR) requires an idea, interest/desire, talent, training, time, a team, regulatory support, space, money and study participants. A large team is needed to conduct a clinical trial, whether single site or multisite. Many clinical trials require multiple sites, especially in rare disease research (the focus of our research), in which recruitment is a challenge due to the rarity of patients.
- Sites should be chosen based on patient population, and willingness to recruit. As a member of a consortium, you may gain a foothold in conducting clinical trials. Handling of the regulatory issues is a challenge for every multi-site study. Each site may have to submit to their own IRBs for approval. However, there have been recent strides made in utilizing a single IRB on multicenter trials and there is a huge momentum at the NIH and PCORI levels to utilize a single IRB.
- There has been recently a push by the FDA for investigator-initiated studies to monitor their own studies. The budgets for investigator initiated studies rarely have the capacity to fund a robust monitoring program. Our approach represents a compromise; we do remote monitoring and have sites send a selected number of study records for review. If they are deficient, a higher level of monitoring can be activated. At KUMC, we have innovative solutions for recruitment, including the Frontiers registry, The Pioneers Community Research Recruitment Registry, and the Healthcare Enterprise Repository for Ontological Narration (HERON).
- Adding sites outside the US border adds a layer of complexity. European Union regulations try to unify regulatory process for studies across Europe. Using international sites is expensive for a budget on an investigator initiated trial and this needs to be factored into the budget. There are significant barriers in carrying out a multicenter trial as the coordinating site. These barriers can be overcome but it takes personnel, infrastructure, time, training and money. Leading a multicenter study takes knowledge and skill, but the rewards are great.

Nebraska Innovation Studio: A University-Based Makerspace

Shane Farritor, David and Nancy Lederer Professor, Mechanical and Materials Engineering, University of Nebraska

- The University of Nebraska-Lincoln is creating a new makerspace called Nebraska Innovation Studio. Makerspaces are a growing trend across the world and some precedent for University makerspaces exists. A makerspace (sometimes referred to as a Fab Lab, Hobby Shop, or Hacker Space) is a community-oriented physical space where students and other members can build and create. The focus of a makerspace is on creativity, interdisciplinary collaboration, entrepreneurship, and education.

- Students from across campus and all community members will be allowed to join the Nebraska Innovation Studio and build their own original projects. Nebraska Innovation Studio is a both a physical space and a community. The physical space contains specialized tools & equipment (3D printers, laser cutters, computer controlled embroidery machines, machining centers, etc.) along with collaboration space that will allow students to create projects that they are passionate about.
- The community will provide specialized classes that will enable the students to physically realize their own innovations. These non-degree classes will expand and improve the student's education by allowing them to learn by doing. This experiential education will better show our students that the world is out there to be engaged and shaped.
- The Nebraska Innovation Studio will strongly contribute to the dynamic multi-disciplinary innovative culture that is a goal of UNL, and will allow for an innovative experiential student learning. It will foster entrepreneurship - there are multiple examples of new products created in makerspaces across the United States. In addition, it will be an attractive facility to encourage interactions between the University and the private sector. It will house expertise and equipment to quickly make prototypes to support the "fail fast & learn" model of innovation.

Creating and Sustaining Interdisciplinary Research Groups

Mary Rezac, Tim Taylor Professor of Chemical Engineering,
Kansas State University

- It is clear that from NSF funding trends, both the number and value of projects awarded to research teams have increased dramatically in the past decades. If academic research institutions are to compete successfully for these funds, they must support their faculty members and research staff in the development of functional and efficient research teams.
- T***here are real and perceived barriers to multi-disciplinary research within academia.*** In a 2004 study, the NAE concluded that there are multiple barriers to success of these research teams. It is interesting to note that the majority of the concerns relate to allocation of credit whether it be for considerations of promotion and tenure, publications, awards, or unit productivity. It would seem that active work to create a university culture that promotes and rewards members of interdisciplinary teams could go a long way to overcome these fears.
- The NAE study also surveyed principal investigators on what recommendations they would make to peers to facilitate interdisciplinary research projects. PIs believed that the single action to promote success was identification of a team leader. The leaders identified are individuals with sufficient subject area expertise to garner the respect of her or his peers while simultaneously having the managerial, organizational, motivational skills to put together and keep together a research team. Faculty members believe that leadership of interdisciplinary teams has negative consequences on short-term productivity. That leaves only full professors in a position to effectively lead large, multi-disciplinary research teams. Yet, 10 or more years into their careers, they may have received little or no training on how to succeed in this role.
- If we are to transition to this new era of interdisciplinary research team success, our organizations must develop mechanisms for identify, training, and truly rewarding team leaders.

A few mechanisms are provided for consideration: (1) provide an indirect cost return system that financially rewards the leader of a team project; (2) provide central support for personnel to support large, team projects with the completion of the reports and data collection frequent in these projects; (3) provide central support for evaluation of large, team projects; (4) develop and finance a university-wide research award that focuses on success as a team leader; (5) identify faculty members at all ranks with the skills and inclination to be successful team leaders, provide them with mentoring to improve their skills; (6) recognize the role of team leader in publicity and marketing materials.

Cuts and Guts: Public University Budget Hemorrhages

Don Steeples, Interim Dean, College of Liberal Arts & Sciences, University of Kansas

- Since 1963, in Kansas, tuition has risen 5X faster than board and room. Tuition for an undergraduate in 1963 was $107 for 17 hours of engineering courses at KSU. When adjusted for inflation, those 17 hours would cost $832 in 2015 dollars. In contrast, the actual cost in fall 2015 at KSU will be $4,660, an increase of more than five times the inflated cost.
- In Kansas, tuition has gone up 3X faster than the U.S. minimum wage. The minimum wage in the U.S. was $1.25 per hour in 1963 and in 2015 has increased to $7.25 per hour. In 1963, a student who worked for 651 hours at minimum wage could earn enough money for two semesters of tuition and of residence hall living at KSU. In 2015, a student would have to work **1,868 hours at minimum wage** to provide for two semesters of tuition and residence hall living.
- Since 2002, *b*ased on the Kansas experience, it seems reasonable to hypothesize that cuts in state-government funding for public universities across the U. S. have been mostly offset by tuition increases. Only two states (Alaska and North Dakota) increased funding per student between 2008 and 2013. In contrast, Arizona, Louisiana, and South Carolina decreased per-student funding by more than 40% between 2008 and 2013. During the same window of time, Kansas, Missouri, and Iowa all decreased per-student funding by between 20-30%; Nebraska decreased per-student funding by about 10%.
- Overall, state per-student funding is generally a picture of less per-student public financial support amid tuition increases. The tuition increases may or may not partially replace, totally replace, or exceed the cuts in public funding. However, decreased state support does not automatically mean tuition goes up. Louisiana and South Carolina cut per-student funding by more than 40%, but only increased tuition by about 14% and 21% respectively.

The American Research University and the Iowa Experience

Daniel Reed, Vice President for Research and Economic Development, University of Iowa

- Universities are challenged to adapt and respond while preserving their core values in the face of exponential change. The irreducible core values that define academia are: original scholarship and research, student education and training, and societal engagement and services. Reflecting shifting societal expectations, the University of Iowa has launched initiatives to assist its faculty, staff and students in scholarship and research, technology transfer, economic development, and societal engagement. Here are a few examples:
- **Outreach.** The University of Iowa Mobile Museum is designed to allow annual replacement and refresh of its contents, and includes displays on university research and scholarship as

well as Iowa history, both natural and cultural. The museum travels across Iowa, visiting schools, libraries, community events, and the state fair. This statewide outreach exposes K-12 students and Iowans to research breakthroughs and the university experience.

- **Research Metrics.** Working with other members of the Committee on Institutional Cooperation (CIC), the University of Iowa is analyzing its research expenditures to identify their direct and indirect impact on the state economy. By showing where research funds are spent, as well as the number of faculty, staff, and students employed by research grants and contracts, the UMETRICS data provides clear and compelling evidence of the economic impact of research funding.
- **Ideation Summits and Salons.** To encourage transdisciplinary scholarship and collaboration, the University of Iowa regularly hosts research summits and salon events that draw from the entire faculty. By facilitating discussion among scholars and researchers across the arts, humanities, social sciences, engineering, medicine and business, our goal is to foster broad collaborations.
- **Internal Funding Initiatives.** The University of Iowa's internal funding program is structured to enable scholars and researchers to explore new directions, ones where they may not have the experience or data to be competitive for external funds. It also places high priority on rewarding high risk, multidisciplinary collaborations such as those that might emerge from ideation summits. In addition, these initiatives support acquisition of new instrumentation and facilities.
- **Faculty Media Training.** To aid faculty in communication, the University hosts seminars on the art of presentation, targeting both research and public audiences. We also host cohorts of faculty for intensive media training, working with professional journalists and journalism faculty. These daylong seminars include the capture and critique of brief video descriptions of research, discussion about how to interact with journalists, and techniques for effective communication with lay audiences. Faculty members leave the seminar with a video succinctly describing their research and its broader relevance.

Shifting the Paradigm of Large-Scale Achievement Assessment or, Help! I'm Lost; Does Anyone Have a Map?

Neal Kingston, Professor, Department of Educational Psychology and
Director, Achievement and Assessment Institute, University of Kansas

- The Dynamic Learning Maps Alternate Assessment was developed at the University of Kansas Achievement and Assessment Institute, and is designed for students with significant cognitive disabilities. We began this work with the goal of improving instruction and assessment for students with significant cognitive disabilities, but there is no reason this approach would not work equally well for all students.
- We had a team of researchers scour research literature for studies about how students learn academic content in English Language Arts and Mathematics. We identified a large number of learning targets, or *nodes*– knowledge, skills, and aspects of cognition - foundational to both disciplines. These comprise the Dynamic Learning Maps.
- We have broken down the maps to smaller mini-maps containing essential elements. Each of these mini-maps is relatively easy for a teacher to comprehend, and any individual

teacher only needs to be able to use at most one hundred of the mini-maps to guide instruction.

- Assessments are developed based on the learning map as opposed to being based on a list of content specifications. After the tests are developed and administered, we use statistical models consistent with our learning map for the assessment. We are interested in which particular nodes a student mastered – a concept that relates directly to the map. The use of learning maps makes it much easier for teachers to personalize instruction. In addition, reports based on learning maps could be dynamic and show us student progress over time.

The Trouble (and Opportunities) With Ed Schools in the Research University

Christopher Morphew, Professor, College of Education, University of Iowa

- Ed School certification requirements present real constraints to the research capacity of Ed Schools. The pressure to meet state requirements in a timely manner gets in the way of opportunities that students in history and physics might have to engage in time-consuming research projects with faculty or pursue a second (or third) major.
- Ed Schools tend to hire experts in education rather than experts in specific disciplines. There are disadvantages, which include being overlooked by foundations and/or review panels at federal funding agencies that are quick to cede the high ground (and funding dollars) to economists or other scholars who have Ph.Ds. in academic disciplines.
- On the other hand, Ed Schools benefit from a multidisciplinary approach to research. Ed School professors, precisely because they are not trained in a single discipline, tend not to be trapped in the same methodologies and conceptual frameworks that might dominate a discipline. The recent growth in interest in schools and public education by large foundations like Gates is a second potential advantage for Ed Schools.
- Ed Schools are relatively inexpensive. Ed School researchers make less than their peers in the health sciences, business, and often less than faculty in natural and physical sciences. Start-up costs are less as well. Generally, expensive labs are not required. These cost advantages matter now and may matter more in the future.
- Ultimately, the trouble with Ed Schools is both real and a product of perception. The real part is a function of Ed Schools' longstanding links to historically marginalized populations and soft, applied problems. That is not likely to change. The perception part is something that Ed School and University leaders can do something about.

Social and Behavioral Sciences Research: Is now the time to invest?

Steve Goddard, Associate Vice Chancellor for Research,
University of Nebraska-Lincoln

- Funding for traditional disciplinary SBSR is becoming increasingly more competitive due to an increasing pool of applicants and decreases in SBSR federal funding. The result, as we see across the funding landscape, is lower federal funding rates. Research funding allocated to SBSR has remained a small proportion of the overall NSF research budget, declining from 4.9% in 1998 to 4.4% in 2014.
- The situation is dire for the smaller agencies that focus on SBSR. The Institute of Educational Sciences (IES), within the DoE, is likely to experience a significant cut (up to 27%). If the House has its way, ARHQ will be completely eliminated with its budget being zeroed out.

- Why do we conduct SBSR and what we hope to gain? Our long-term success in addressing major economic, health, energy, environmental and national security challenges depends on understanding the broader social, political and economic issues that serve as the context for addressing these matters. The answer to many of society's problems are known, the challenge is figuring out how to change behaviors to adopt solutions to the problems ailing our society.
- At UNL, we believe it is best to invest now, when the 'market is down', rather than wait until the 'market is hot'. We need to move from thinking of research defined by disciplinary boundaries and expertise to research foci that require the collaboration of researchers across disciplines, bringing diverse theoretical and methodological approaches to address a common research challenge.
- We believe SBSR will continue to play significant roles in addressing our societies biggest challenges. The growth opportunities, however, are in interdisciplinary and transdisiplinary team science approaches, rather than traditional single-investigator research projects. We are confident that our approach will position UNL as a leading institution in transdisciplinary social and behavioral science research.