

# Planning for Future Research in Public Universities in Uncertain Times

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Research will and must remain one of the core missions of our public universities. At the same time, public expectations—whether it's from our public citizenry or leadership—are changing regarding both what we do and how we do it. These changing expectations obviously can lead to uncertainty and challenges. But that has been the case forever, if we think about it. Today's uncertainties and challenges are not necessarily the same ones we faced ten, twenty, or a hundred years ago. But our public universities—one of the great achievements of American society—have always risen to the challenge of leading our communities, our states, our nation, and the world into new discovery. And we will continue to do so as we move further into the twenty-first century.

Let me start with a brief review of how the current climate for university research presents us with some significant challenges.

The first challenge is the muted projections for federal research funding. A quick graph in **Figure 1** below shows that even in the recent past—since

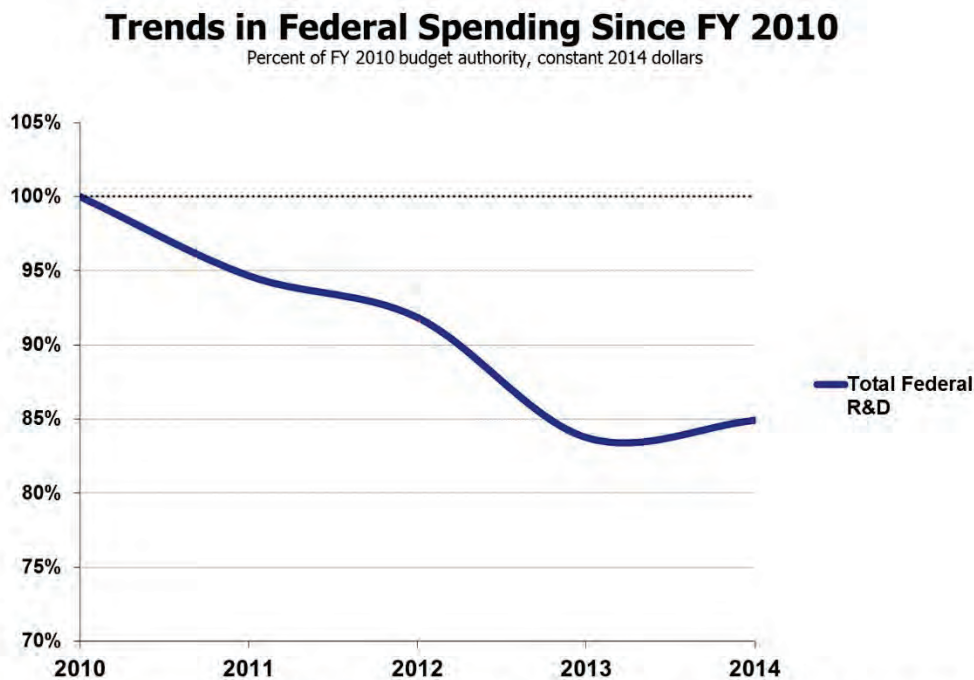


Figure 1 Source: AAAS presentation titled "Federal R&D in FY 2015: Context, Overview, Outlook" for the Council on Government Relations, 6/12/2014.

2010—total federal spending R&D spending has declined in constant 2014 dollars.

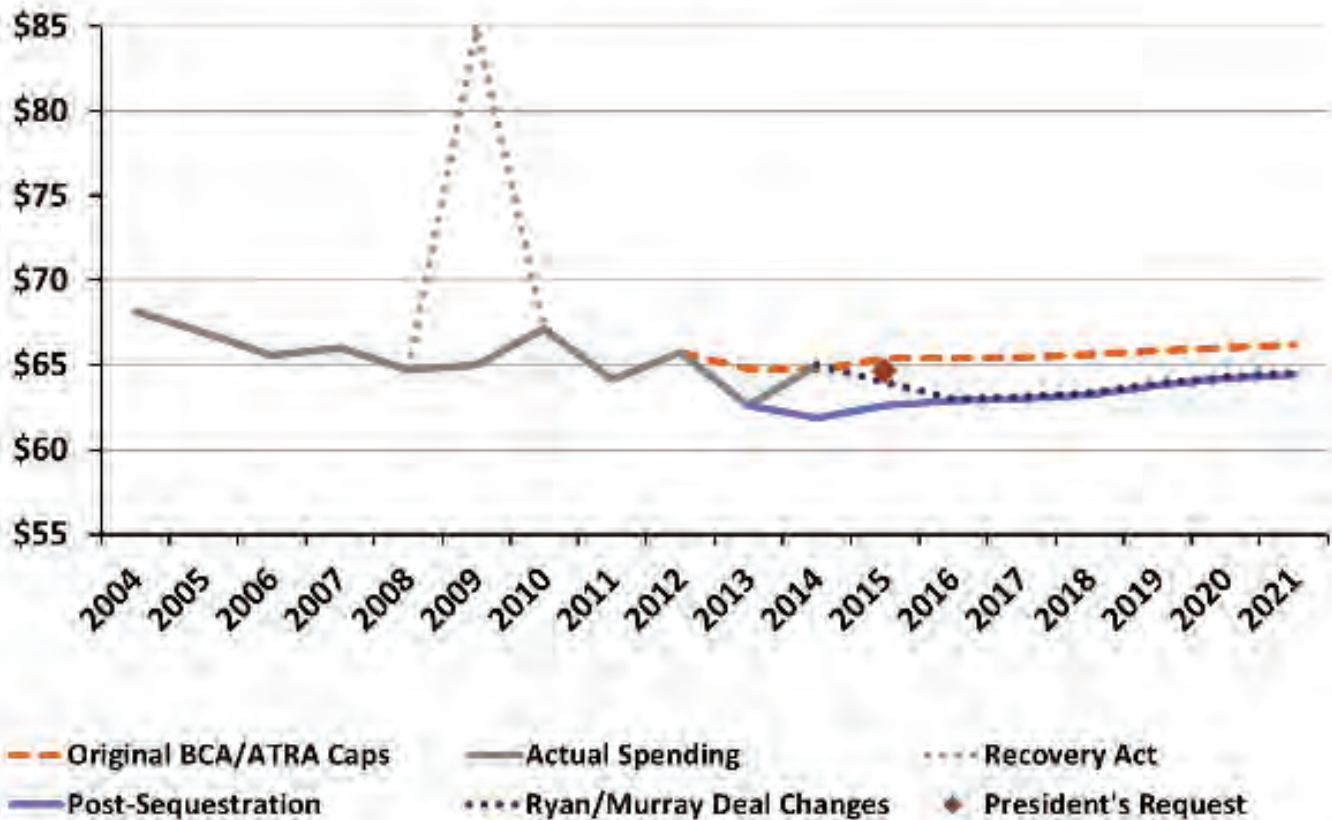
And as **Figure 2** from the American Association for the Advancement of Science clearly indicates, federal non-defense R&D dollars have in fact declined in the past ten years, and the prognosis for the future is pretty stagnant. Projecting relatively far into the future—to 2021—all likely scenarios—including the president’s request, the Budget Control Act and American Taxpayer Relief caps,

post-sequestration scenarios, and the Ryan/Murray Congressional proposal changes—are forecasted to have only very modest growth.

If we dig into some of the details of the FY15 base R&D budget, we see in **Figure 3** that many of our stalwart basic science federal funding programs—such as the National Institutes of Health and the National Science Foundation—are declining this year in constant dollars. This year, though, those doing research in en-

### Federal Nondefense R&D Under Various Scenarios

billions of constant 2014 dollars



Source: AAAS R&D reports and analyses of agency and legislative documents. Adjusted for inflation using deflators from the FY 2015 request. R&D includes conduct of R&D and R&D facilities. © AAAS 2014

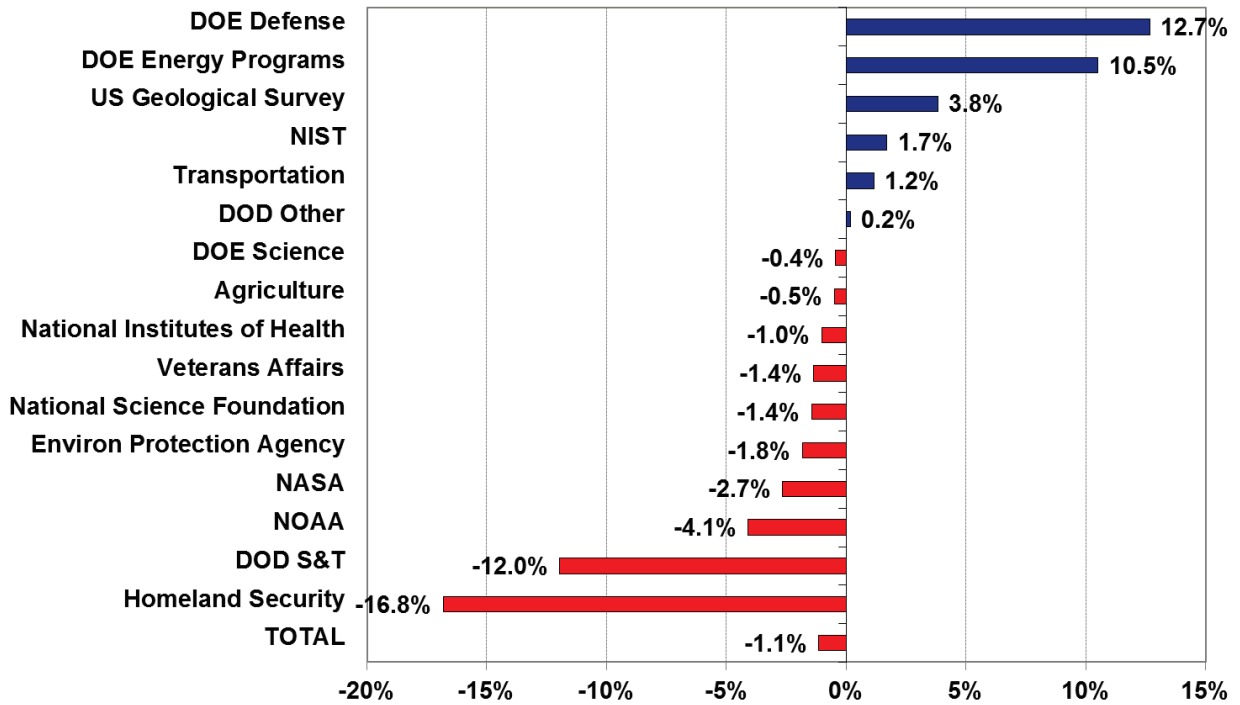
Figure 2 Source: AAAS presentation titled “Federal R&D in FY 2015: Context, Overview, Outlook” for the Council on Government Relations, 6/12/2014.

ergy, transportation, or advanced manufacturing will do better. All in all, the U.S. federal investment of nearly \$140 billion in R&D, including the Department of De-

China garners the most attention in discussions about upward R&D trends, and the numbers bear that out. **Figure 4** from AAAS showing Organization for

### R&D in the FY15 Base Budget

percent change from FY14, constant dollars



Source: AAAS analysis of the FY 2015 President's Budget. Does not include additional funding proposed via Opportunity, Growth, and Security Initiative. NOTE: Inflation is 1.7%. © 2014 AAAS

Figure 3 Source: AAAS presentation titled "Federal R&D in FY 2015: Context, Overview, Outlook" for the Council on Government Relations, 6/12/2014.

fense, remains a significant amount.

But this leads us to the second major challenge in the current research climate: international competition. While the United States' public investment in research over recent years has declined, remained stagnant, or increased only modestly—and will most likely continue on these trends for the foreseeable future—many of our international colleagues (and competitors) are enjoying major up-swings in federal research dollars.

Economic Co-operation and Development (OECD) data confirms that China has substantially increased its R&D spending. The graph depicts gross domestic expenditures in the government, business, and higher education sectors, all held constant in 2007 dollars. Clearly, in the past ten years, the United States once again has remained relatively stagnant while China has been aggressive and robust. The business sector has led this increase in China, whereas the US, although recovered from the recession,

has increased R&D expenditures much more modestly. In fact, US R&D expenditures in higher education are still down -1.3% from 2008. As with China, US increases have been mainly driven by business at 5.8%, and government remained modest at 1.0%.

South Korea (the darker blue line) has shot well past everyone.

I've focused on the national and international scenes here, but issues at the state level also are having significant impacts on the research at our public universities, our third challenge. Across the

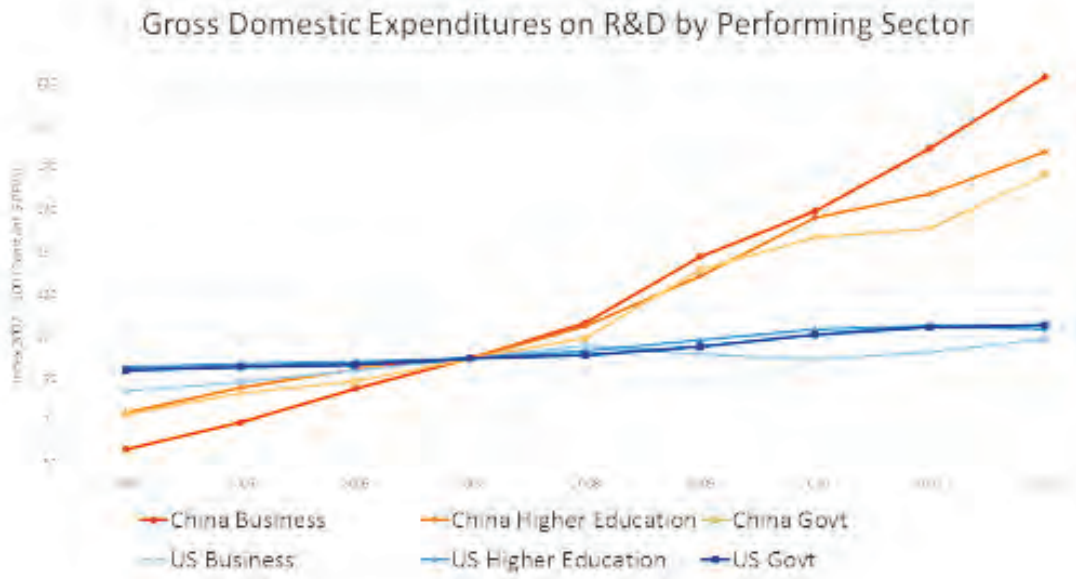


Figure 4 Source: OECD Main Science and Technology Indicators (MSTI) database.

If we expand our view to other OECD countries and other economies, we see a number of similar trends. **Figure 5** depicts research intensity—that is, R&D as a percentage of GDP—over a twenty-year period, from 1992 to 2012. For the first time, China’s R&D intensity (1.98%—the light blue line at the bottom) caught up with the European Union (1.97%—the green line) in 2012, having previously surpassed the United Kingdom and Canada in 2011. We can also see that, although itself declining some in recent years, Japan (the yellow line) remains well ahead of the United States (the red line) in research intensity, and

country, a number of state legislatures and university governing boards are re-examining the role of research in a state-supported institution, sometimes amidst great controversy. While often these controversies do not involve funding dollars to the extent that federal policy does, the climate for and definition of research can be significantly impacted. Usually these questions and/or controversies center on a university’s emphasis on teaching and a university’s role in state economic development.

Perhaps nowhere has the controversy been more heated than in the state of Texas. Texas is in the news again with

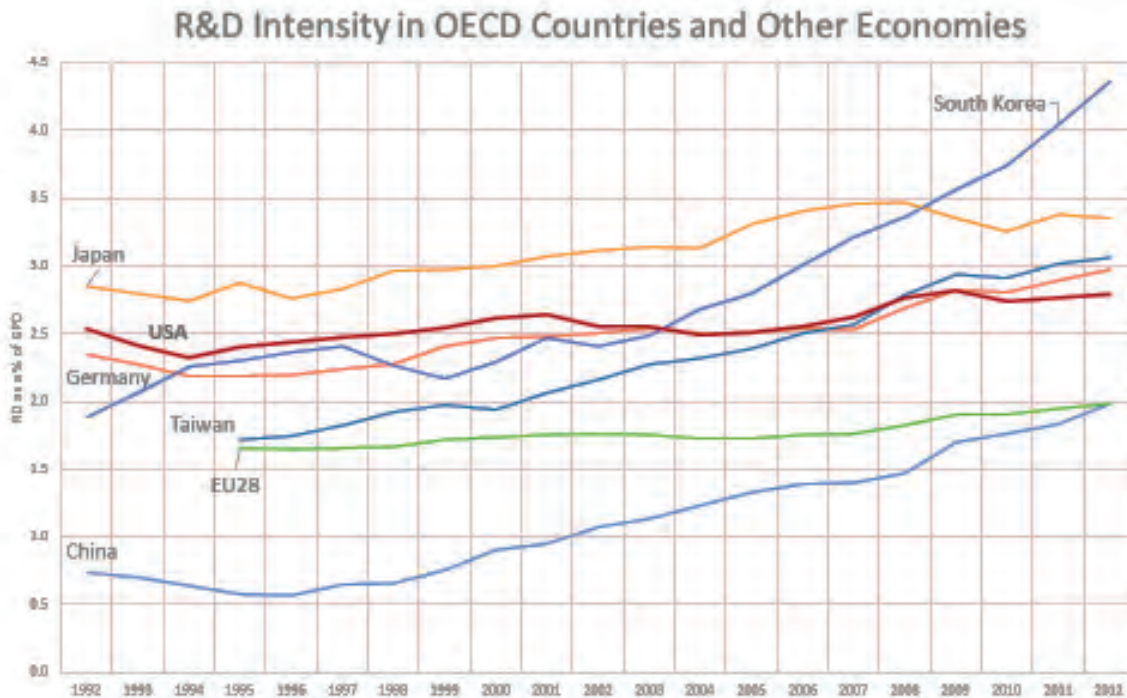


Figure 5 Source: OECD Main Science and Technology Indicators (MSTI) database.

the impending resignation of UT-Austin President Bill Powers (though he has gotten a year’s reprieve). Many issues are in play in Texas, but the controversies at hand in the Lone Star state revolve around disputes among Governor Rick Perry, the system governing boards, and the university campuses themselves.

Since 2010, controversy has swirled among the Texas A&M and UT systems thanks to higher education reforms recommended by the Texas Public Policy Foundation, a conservative research group that advocates departing from the traditional research-driven model for academia. The TPPF and its ideas were embraced by Governor Rick Perry and some of the Regents he appointed. The “Seven Breakthrough Solutions” generated by the Foundation include creating a new

accreditation system that would grade institutions on how effectively they deliver on promises to students, as well as splitting university budgets for teaching and research. Rick O’Donnell, a senior research fellow at the Texas Public Policy Foundation who had a short but fiery tenure as a special adviser to the UT board, went so far as to once write that academic research “has few tangible benefits.” In 2011, a collaborative plan did emerge called “A Framework for Advancing Excellence Throughout the University of Texas System,” and while it did not move as aggressively in the directions the Texas Public Policy Foundation, the governor, and Rick O’Donnell were advocating, it did include stronger emphasis on faculty teaching.

Economic issues play into many such controversies across the country, whether

it's the pressure for university activity to promote state economic development, or the pressure to link institutional and academic program funding to student job placement. A state experiencing the latter is Maine, where significant budget deficits at the public colleges and universities are leading to program eliminations. Many factions claim that that these cuts are often based on student career utility as opposed to academic merit.

Let me emphasize that I do not believe that research, economic development, teaching, and student success are mutually exclusive. I don't believe that, even in tough economic times, we need to sacrifice one for the other. In fact, at Iowa, we're finding ways to make sure these various parts of our mission are mutually supporting, and I'll discuss those later. But I do want to mention here that in Iowa, we too are experiencing pressure from our governor, legislature, and governing board in some of these arenas. Currently, we are in the midst of two Board of Regents initiatives—a system-wide transformation and efficiency review, and the implementation of a new performance-based funding model that places a heavy, though not exclusive, emphasis on enrollment of Iowa resident students. My approach is to work to use these board priorities to strengthen the university across the board rather than to fracture it. I am asking our university community, how can we best fulfill the full spectrum of our traditional academic mission, including research, and at the same time meet the expectations of our state's leaders?

Metaphorically, the public university research enterprise is in the midst of

its own kind of "climate change," especially in three major areas: state priorities, federal funding, and international competition. As with any kind of change, adaptability remains key. And as with climate change itself, complete reversal of the higher education research landscape is unlikely if not impossible at this point. Some level of adaptation is necessary. Of course, we hope that federal funding will increase again, that the United States will maintain leadership in a competitive international field, and that our institutions will continue to enjoy the support of our states' leaders and citizens. But even as our public universities remain committed to our core missions, we have always changed and adapted along with society at large—and led that change if we're doing our jobs right. Granted, this is a time of particular change and uncertainty. But we can navigate these times and come out stronger rather than weaker. But it will take vision, planning, and proactivity to be successful in the future that lies before us.

So how are we to rethink our approaches to the research enterprise in these uncertain times? I propose three broad areas in which we must think about playing a new game: 1) Research portfolio diversification, 2) new partnerships, and 3) interdisciplinary approaches. And as I discuss each of these, I will share with you some of the initiatives that we are undertaking at the University of Iowa as way of example.

First is diversifying our research portfolio. All of our institutions have their particular strengths and emphases. At the University of Iowa, while we have many areas of excellence and renown, many know us especially for our medical

and health care research, and for our world-class University of Iowa Hospitals and Clinics. Five of our eleven colleges are in health fields: the Carver College of Medicine, the College of Pharmacy, the College of Nursing, the College of Dentistry, and our newest college, the College of Public Health.

It should come as no surprise, then, that for many years, the National Institutes of Health has been our biggest research funder. But as **Figure 6** demonstrates, and as I noted before when discussing federal funding, those NIH dollars are decreasing. Since FY2010, NIH funding—represented on the chart by the grey bars and the black line—has decreased from 47% of Iowa’s total research funding to 38%, and it’s gone from \$219 million to \$163 million. Even so, the NIH remains Iowa’s single largest federal agency sponsoring our research. As you can also see from this chart, we have responded by shifting our portfolio more toward industry partners. Since FY2010,

industry funding has increased from 7% of Iowa’s total research dollars to 17%, from \$31 million to \$71 million.

One prominent example on our campus is our research on driver safety. The University of the Iowa is the home of the National Advanced Driving Simulator, the most sophisticated research-driving simulator in the world. Developed by the National Highway Traffic Safety Administration, NADS offers the world’s highest fidelity real-time driving simulation experience. The driving simulator has allowed us to leverage a growing partnership with Toyota. The University of Iowa Public Policy Center has recently received three grants totaling \$17.2 million as part of the Safety Research and Education Program established by the recent Toyota Economic Loss class action settlement in California.

Principal investigator Daniel McGehee, director of the Public Policy Center’s Human Factors and Vehicle Safety Research Program, has worked with Toyota

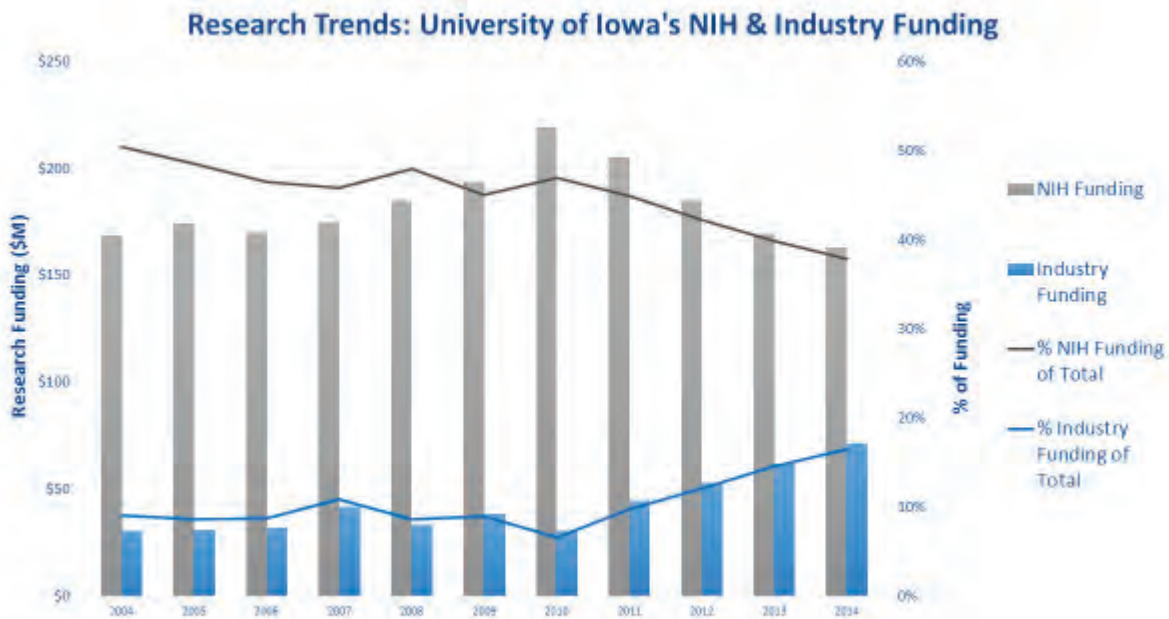


Figure 6

before, having this year finished a three-year, driving-safety-related contract from Toyota that examined foot behavior at the early stages of the driving sequence, such as vehicle entry, engine start-up, and gear selection. The projects resulting from the new Toyota grant will include an impressive array of multi- and interdisciplinary efforts, as well as new partnerships: a national survey on public perceptions of vehicle safety technologies as well as drivers' understanding and use of defensive driving techniques; a national education campaign growing out of the national survey, designed to reach 90 percent of U.S. adults multiple times (this education campaign is in partnership with the National Safety Council and Iowa City-based Digital Artefacts, a private multimedia firm); a study at the National Advanced Driving Simulator that examines replicating emergency events in a controlled and safe environment; a study in the Department of Neurology to measure and improve younger and older driver behavior when accelerating and decelerating; and an engineering analysis being conducted by NADS and the Department of Geography to determine if multiple car sensor systems can be used together to prevent certain types of crashes.

In addition to increased research funding from private industry, we at the UI have also broadened our relationship with the federal government—with the Department of Defense in particular. Our most prominent current projects under the auspices of the DOD involve Professor of Biomedical Engineering Karim Abdel-Malek's research on human modeling and simulation. Dr. Abdel-Malek is also the director of the College of Engineering's Center for Computer Aided Design,

which has played a prominent role in the Virtual Soldier Research program. With DOD as well as private industry funding, Dr. Abdel-Malek and the VSR have created Santos, a human modeling and simulation environment used by military and commercial clients to assess human factors in the design of equipment, armament, vehicles, and other large equipment.

Other Iowa researchers have also secured funding from the Department of Defense, such as Professor of Sociology Steven Hitlin, who has a special interest in values and morality. With nearly \$600,000 in funding from the DOD Office of Naval Research, Professor Hitlin is conducting a study called "Moral Schemas, Cultural Conflict, and Socio-Political Action."

The UI recognizes the tremendous potential of the Department of Defense as a research funding source, and we are taking a proactive approach to encourage more faculty and staff to explore the possibilities. For example, our Office of the Vice President for Research and Economic Development has presented informational sessions by Lewis-Burke Associates for researchers on DOD funding for health research. These sessions explain the complex DOD landscape for health research, review the trends and priorities across programs, and address such questions as how working with DOD differs from other research agencies, the best points of contact for faculty in approaching DOD, and what messages best resonate with DOD health officials.

The second area of playing a new game in our research mission is new partnerships. My previous comments on di-



versifying our research portfolios focused on new partners, but those that remain in our traditional areas of funding: government and industry. At Iowa, we're also expanding our thinking about what kinds of partnerships can move our research enterprise forward, including the nonprofit sector, the private sector outside of traditional industries, regional economic development entities, and entrepreneurship. Let me share a couple of examples of the first two—the nonprofit sector and the private sector—on our health sciences and health care campus at the University of Iowa.

The Fraternal Order of Eagles Diabetes Research Center is a historic partnership that was formally established in September 2008. This was the first time the University of Iowa had partnered with a nearly million-person international donor organization. And for the Fraternal Order of Eagles, it is the largest organization-wide project ever undertaken in the group's long history of giving to health-related causes.

The FOE and UI partnership began at the 2006 Eagles convention in Grinnell, Iowa. The then-Grand Worthy President-elect Bill Loffer proclaimed to Dr. John Stokes, a physician-scientist studying and treating kidney disease with UI Health Care and member of the Iowa City Eagles Aerie, that the Eagles should fund a diabetes research center to find a cure for this disease that affects one in three of Eagles members. (By the way, Dr. Stokes sadly has since passed away.) The timing for this proposal was fortuitous. The university was in the midst of planning the UI Institute for Biomedical Discovery—now the Pappajohn Institute—which would house high-quality, high-reward

interdisciplinary research for complex illnesses like diabetes.

Over the next two years, meetings between the Eagles and the UI led to a partnership that included a commitment by the Eagles to raise \$25 million and an agreement that the research center would be housed in the new Pappajohn Biomedical Discovery Institute building, which opened in 2014. The FOE gift funds endowed chairs and fellowships for diabetes researchers, provides seed grants for innovative research ideas, and helps recruit leading scientists in diabetes research and translational medicine.

In the years before the opening of the physical facility, the research center already accomplished much, including the first round of FOE Diabetes Research Center research grants to fund four innovative pilot projects by young investigators; the selection of the first FOE Diabetes Research Center Faculty Scholar, Dr. Christopher Adams, an endocrinologist and associate professor of internal medicine; and the hiring of our new Center Director, Dr. E. Dale Abel, a renowned diabetes expert.

It is the mutual goal of the Fraternal Order of Eagles and the University of Iowa to understand and ultimately cure diabetes by moving research findings into the clinical setting as quickly as possible. This unique partnership demonstrates how a shared vision between a service organization and a university research enterprise can create an entity that is both innovative and essential.

The University of Iowa established another unique partnership and received another incredible \$25 million gift in 2013. This gift from Stephen A. Wynn, chairman and CEO of Wynn Resorts,

Limited, of Las Vegas, was made to support the UI's Institute for Vision Research and to accelerate progress toward cures for rare, inherited retinal diseases. In Mr. Wynn's honor, the institute is now named the Stephen A. Wynn Institute for Vision Research.

The UI's ophthalmology program is one of the best in the country, and Mr. Wynn—who had no previous ties to the University of Iowa and himself suffers from the degenerative eye disease retinitis pigmentosa—recognized Iowa's excellence in this area of research. Mr. Wynn himself has said, "The army of clinicians and scientists at Iowa's Institute for Vision Research have uncovered many of the secrets of the genome and are now on the cusp of applying them in the clinic. I never dreamed that I would witness such breakthroughs in my lifetime, but the breakthroughs are now at hand."

One of the most unique results of this partnership, and one that put forward the University of Iowa name in an unprecedented way, happened in 2014. Lazier Partners Racing chose to bring awareness to the Wynn Institute at the Indianapolis 500. Buddy Lazier, the 1996 Indianapolis 500 winner and 2000 Verizon IndyCar Series champion, drove the No. 91 University of Iowa Stephen A. Wynn Institute for Vision Research car in the 2014 race.

I mentioned earlier that state economic development has become an increasingly important state priority for our public universities, and that is certainly true in Iowa. And as I mentioned earlier, we at Iowa are embracing that emphasis and moving full steam ahead by both re-energizing older and creating new programs.

In 2012, I hired a new vice president for research and soon added "economic development" to his title. Dan Reed's strong entrepreneurial perspective stems from a dual academic and industry background, with teaching, research, and leadership experience at the University of North Carolina, the University of Illinois, and Microsoft.

Along with our Associate Vice President for Economic Development David Hensley; our state economic development director David Conrad; and our government relations team, Vice President Reed has affirmed the university's commitment to, as he himself has said, "a new, more robust partnership with the citizens of Iowa, state and local organizations, and our sister universities, bringing all of our assets to bear on the challenges ahead in this rapidly changing, globalized world."

Dan has envisioned what he calls a new compact with our state to work in partnership in order to accelerate business and cultivate Iowa's workforce. The prongs of this compact include turning research ideas into innovative technologies for companies, creating startups and jobs, solving business problems, and providing business and IT training not only on campus but in communities across the state. I won't go into all the details or pieces of this ambitious economic development plan, but let me highlight a few initiatives.

Our region itself is thinking in new ways, and that includes a branding initiative called the Iowa Creative Corridor. This is a regional alliance in the Iowa City and Cedar Rapids area that, in the initiative's own language, is working to "connect, celebrate and support all those who

dream big, push boundaries, and create here. The 'Big Idea' is one region creating, living, building together and being a globally known magnet for creative people, families and commerce," with the goal of "an ever-thriving region, with residents building innovative organizations, participating in vibrant communities, and exuding so much pride that we're known around the world."

The Creative Corridor has been doing much to promote and encourage innovation and entrepreneurship through traditional and new social media, summits and other programs, and a "We Create Here" pride campaign. Along with the long-standing Iowa City Area Development Group, a more traditional but still highly innovative organization, our university research enterprise is building many more connections through community and corporate partnerships.

Our UI Partners initiative focuses on the direct business assistance piece mentioned earlier. We created UI Partners specifically to help small Iowa companies innovate and grow. We want to work directly with businesses to solve their information technology (IT) challenges, using practical insights and ideas drawn from university faculty, staff, and students. We also will provide free IT needs assessments for businesses, whether it be about creating websites, managing databases, e-commerce or general tech support, as well as general business planning. And we bring leading-edge informatics expertise and business training to organizations, startups, and established businesses, too. I mentioned again that aligning our research and economic development activities with student learning is beneficial from all directions, and UI

Partners also gives students opportunities to work on projects that allow them to build their résumés while connect with innovative Iowa businesses.

The University of Iowa is also eager to help create new startups and jobs in addition to providing support to existing businesses. This is the purpose of the UI Ventures initiative. This project works somewhat in the opposite direction of UI Partners in that we are working to bring funding, venture capital, mentors, executives, and entrepreneurs to the university in order to assist our faculty members, postdocs, and students in accelerating their own startups and entrepreneurial projects.

One other new initiative that brings UI expertise directly to Iowa communities is our planned engagement centers, co-located with Iowa's community colleges. We are creating the first one at home in Iowa City and are working on opening one in the near future in Council Bluffs in western Iowa. These integrated centers will leverage University of Iowa expertise and assets onsite to meet the needs of Iowa businesses and communities in such areas as information technology, leadership, entrepreneurship, and workforce development, training, and retention, all directed toward the specific needs of the local area. Our larger vision is to secure state funding in the future for a network of these engagement centers across the state.

Let us move to our third area of playing a new game: interdisciplinary approaches. I think we all understand that the problems confronting our world today are not one-dimensional. They are not always neatly mapped to traditional disciplines. The pressing issues, or grand

challenges, of our time—such as human health, climate change, and international conflict—require interdisciplinary approaches. We must break down the siloes we have often built within our institutions. Businesses and other types of organizations are doing it all the time these days, and we must continue to do so as research universities.

At Iowa, like a number of other institutions, we have proactively constructed interdisciplinary teams over the past few years in our faculty hiring through clusters. The primary objectives of the Cluster Hire Initiative are to (a) address important scientific and/or societal challenges; (b) promote multidisciplinary research, scholarship, and creative work; (c) advance undergraduate and graduate teaching and learning; (d) enhance community engagement and service; and (e) benefit the people of Iowa and beyond.

Our cluster hire initiative has developed on campus through a competitive process, building on our current strengths while also forging paths in new directions within those areas of strengths. Since we began the initiative, we have developed innovative clusters in a diverse array of subjects and have added a number of talented new faculty to our institution who effectively cross departments, programs, and colleges. These new cluster areas are water sustainability, public digital arts, public humanities in a digital world, the aging mind and brain, genetics, obesity, and informatics.

While not part of our cluster hire initiative, and while not a full-fledged dedicated faculty program, I would like to mention one other area where Iowa has done some innovative things in order to

capitalize on our strengths. As I mentioned earlier, we have a world-class academic medical center on our campus. That has led to some obvious strong cross-disciplinary work, such as in biomedical engineering, where, for example, we have become leaders in simulation, as I noted earlier.

But Iowa also has very strong humanities programs. For example, as “the Writing University,” we host the world-renowned Iowa Writer’s Workshop, the top nonfiction writing program in the country, and many other prominent writing programs. In recent years, then, medical humanities has become an innovative and successful area of development at the University of Iowa. I don’t have space to discuss these programs in detail, but just the list suggests the impressiveness of activity in this burgeoning area of inquiry: the Program in Bioethics and Humanities, a research and education consortium within our Carver College of Medicine; the Writing and Humanities Program in the Carver College of Medicine, which offers individual consultation on medical students’ writing, writing and medicine electives, extracurricular activities, writing contests, and more; the Humanities Distinction Track, an official credential available to our Carver College of Medicine students; the Medical Student Humanities Interest Group, which coordinates student-initiated activities; conferences and symposia, such as the annual conference (now in its ninth year) entitled “The Examined Life: Writing, Humanities, and Arts in Medicine,” and this year’s “Health Humanities: Building the Future of Research and Teaching” symposium, a working symposium through the UI’s Obermann Center for Advanced

Studies; and a professional creative writing journal, *The Examined Life*.

Of course, as we shift to more interdisciplinary work, we need to provide facilities that foster and facilitate it. One example on the UI campus is a new facility I mentioned before, the Pappajohn Biomedical Discovery Building, which, as I said, will house the Fraternal Order of Eagles Diabetes Research Center and other centers and groups. Writ large, the building houses the newly formed Pappajohn Biomedical Institute. Within the concept of “biomedical discovery” is the goal of breaking new scientific ground by pushing and crossing traditional disciplinary boundaries. This project houses generic wet laboratories with appropriate support space and core facilities to foster a new investigative model that allows interdisciplinary research teams to focus on specific research problems. The institute and building emphasize greater collaboration, exploring high-risk and high-yield questions, and making the bench-to-bedside nature of research even quicker and more effective than ever before. By enhancing clinical translation, we realize better treatments and outcomes for patients, and better lives for all.

As I suggested earlier, university research is not—if it ever was in the first place—a self-contained part of the academic enterprise. But especially in these changing times, we need to integrate research with the other two legs of our mission stool: teaching and service. And as we do so, we need to demonstrate to our publics the value of research to these other core missions. Many institutions are now using the language of the Kellogg Commission on the Future of State and Land-Grant Universities that recasts

our core missions in terms of learning, discovery, and engagement. None of our activities can any longer be conducted in isolation.

The links between graduate education and research are obvious, but we must also continue integrating the research enterprise into undergraduate education. I often tout the benefits of attending college at a research university with high school (and even younger!) audiences. Recent examples include a Rotary Youth Leadership camp in Grinnell, Iowa, and a group of students on campus in a program called the Secondary Student Training Program. The latter is a program run through our Belin-Blank International Center for Gifted Education and Talent Development, and it’s for tenth and eleventh graders interested in STEM areas. These talented young people are on campus for five weeks during the summer, conducting scientific research in university laboratories under the guidance of a faculty mentor. They also produce a research project/paper as a part of the program. Let me just share with you what I said to them:

The research university is a very special place. It is in the laboratory, the library, the faculty studios and offices of a research university where the most cutting-edge knowledge is created and discovered. A research university is doing its job best when that cutting-edge knowledge makes its way to the general public and into undergraduate classrooms. And I think a research university is achieving its pinnacle of success when undergraduates are actively engaged in

the research itself. So a research university is a great place for a college education!

Of course, the most direct and common way that our faculty research is shared with our undergraduates is when they present and discuss it in their classrooms. But young students need to be actively engaged in the research process, too, and we have to be sure to provide the infrastructure and encouragement to make it so. At Iowa and a number of other institutions, many undergraduate students have opportunities to work in labs and on research projects as interns, student employees, or undergraduate assistants, as well as through special projects, as our UI Honors students do.

At Iowa, though, we take extra steps to make sure these opportunities happen, that students are connected with them, and that students are supported and encouraged in their research activities and interests. The Iowa Center for Research by Undergraduates (ICRU) hosts numerous workshops and information sessions for students covering a range of research-related topics, and it serves as a clearinghouse for information on research opportunities across campus. ICRU staff also provide direct support to students interested in seeking research opportunities, and faculty and staff in search of student researchers. ICRU hosts bi-annual undergraduate research festivals, which provide an opportunity for undergraduate researchers to present their work. We also participate in the "Research at the Capitol" event, along with Iowa State University and the University of Northern Iowa, when students display their research in the State Capitol Rotunda in

Des Moines. ICRU also recognizes outstanding undergraduate researchers and faculty mentors with special awards. The program also provides research support and funding for students working with faculty, including the ICRU Research Fellows Program. Each year, 150 students are selected by mentors to work on research projects and receive \$2,000 to \$2,500 scholarships for doing so.

We also need to bring the big questions of our faculty and institutional research into the classroom in new, inquiry-based ways. At Iowa, we're doing that through our new TILE classrooms. TILE stands for Transform, Interact, Learn, Engage. Faculty need to be trained as TILE instructors, and the goals of the initiative are to transform teaching practices through lively interaction, enhanced learning, and increased faculty/student engagement. TILE instructors pursue student-centered, active learning for a classroom built around the issues of pedagogy, practice, and technology. Our TILE classrooms—of which we have several now on campus—are equipped with circular tables, laptops, flat screen monitors, multiple projectors, and whiteboards to encourage and support collaborative and engaged active learning. The faculty workstation is not at the front of the room, as with a traditional lecture-based classroom, but instead in the middle, creating a free-flowing learning environment where the lines between instructor and student are shared and blurred.

A new initiative that utilizes TILE classrooms to engage students with our faculty's research is what we're calling TILE-Constellation Courses. The first of these was offered this past academic year, called "Origins of Life in the Universe."

This year-long course involved six of our top faculty in physics and astronomy, biology, geosciences, and anthropology. The class emphasized inquiry-based activities to build success in critical thinking, teamwork, and effective written and oral communication. Topics presented included the origin of the universe, the biochemistry of life, the origin of life on Earth, the evolution of life on Earth, the origins of humans, and the prospect for finding life elsewhere in the universe.

Experiential learning is another important area of emphasis for today's students, and at Iowa, entrepreneurship is catching fire and connecting undergraduates to our faculty in real-world applications of their business acumen. Economic development and student engagement meet in our entrepreneurship certificates (including technology and the performing arts), the John Pappajohn Entrepreneurial Center, and the Bedell Entrepreneurship Learning Laboratory.

The John Pappajohn Entrepreneurial Center is housed in the Tippie College of Business, but it is a collaborative effort in partnership with the Colleges of Engineering, Liberal Arts and Sciences, and Medicine. JPEC offers a wealth of programs for our students, including business plan and elevator pitch competitions, seminars and workshops, and actual start-up business support in the Bedell Entrepreneurship Learning Laboratory. JPEC also offers similar programs and consultation to businesses and entrepreneurs throughout Iowa.

The Bedell Entrepreneurship Learning Laboratory is a business incubator for entrepreneurial students pursuing the creation of a startup while attending the University of Iowa. Individual students

and teams in the program receive a dedicated office space in our remodeled 10,000-square-foot facility, allowing them to concentrate on developing their business concepts. Bedell students also benefit from one-on-one mentoring and coaching from our faculty and professional staff, funding opportunities, workshops and training, and networking and community exposure. Dozens of successful businesses have spun out of the Bedell Lab, including those that offer design services for communities and charities; a mobile app to encourage recycling; genetics and genomics research software; a free information-sharing site called ClusterFlunk.com that provides a virtual meeting space for students taking the same college courses; and much more.

Although I'm emphasizing student entrepreneurship here, we also have a growing number of programs and facilities that focus on business and research spinoff incubation for our faculty, staff, community and corporate partners. These include our long-standing UI Technology Innovation Center, as well as our relatively new UI BioVentures Center, which includes wet labs for life science companies. The Iowa City CoLab is a partnership between the university, the Iowa City Area Development Group, and several corporate partners, providing space and economic development and workforce development services for interstate commerce companies in our service territory. And the UI THINC Collaboration Space is a new additional innovation and collaboration student space. THINC is collaborative-friendly, featuring comfortable furnishings, whiteboard walls, and a gaming room to help aug-

ment creativity. THINC is ideal for entrepreneurial students who are in the early stage of business development and need a space to meet with business partners or mentors. Students can also use THINC to meet with business consulting clients or work on team projects. And it's a great study space, too!

In addition to the teaching and learning arena, we must demonstrate our research value in terms of public engagement. I have already talked at length about economic development and entrepreneurship in other contexts, so let me highlight here a couple of other ways we are pursuing public engagement at Iowa.

Perhaps the most obvious way our faculty and staff can take our research to public awareness is direct contact. Of course, many of us have done this in myriad ways for many years. At the UI, we're redoubling our efforts to bring the best of our faculty work to Iowa citizens through the new Hawkeye Lunch and Learn series, which we launched in 2014. Sponsored by the Office of the Provost, these monthly presentations aim to build connections among Iowa communities, university faculty, and industry and government leaders. We want to highlight ways the university is working with partners across the state, strengthening existing relationships, and creating new ones. The monthly talks are presented first in Des Moines at the UI John and Mary Pappajohn Education Center. They are also streamed online and then re-presented at home in Iowa City. Our presentations so far have been wide-ranging. Provost and Engineering Professor Barry Butler spoke on "Wind Energy: Past, Present, and Future." J. A. Van Allen/R.J. Carver Professor of Physics Don Gurnett discussed his

role in the Voyager 1 and 2 missions launched in 1977. UI Chair in Public Affairs, former Congressman, and former Chairman of the National Endowment for the Humanities Jim Leach spoke on Nazi seizures of art, which was the basis for the recent film *Monuments Men*. Neuroscientist Steven Anderson discussed "The Aging Brain in the Workplace: How's That Going to Work?" Art and Gender, Women's, and Sexuality Studies Professor Rachel Williams shared her work with women's studies students at the Iowa Correctional Institution for Women facilitating classes about healthy relationships. Curators from the new UI Mobile Museum talked about this collaboration between the Office of the State Archaeologist, the Old Capitol Museum, and the UI Museum of Natural History. The Mobile Museum is a 38-foot, custom-built RV featuring exhibits on Iowa history, archaeology, and paleontology, as well as an interactive digital wall that allows visitors to explore UI research and creativity (and yes, the Mobile Museum itself was also there). And Sean O'Harrow, Director of the University of Iowa Art Museum talked about "Two Years in the Life of Iowa's Most Famous Painting." Sean discussed our most famous piece in the collection, Jackson Pollock's painting *Mural*, which has recently undergone technical study and conservation treatment by research scientists at the Getty Conservation Institute and conservators at the J. Paul Getty Museum in Los Angeles. In July 2014, we celebrated *Mural's* return to Iowa, exhibited until April 2015 at the Sioux City Art Center.

One other innovative initiative that is bringing multidisciplinary UI expertise to our state's communities, with a special



emphasis on opportunities for graduate research and learning, is the Iowa Initiative for Sustainable Communities. Founded in 2009 by Charles Connerly, director of the UI's School of Urban and Regional Planning, the IISC has grown into a campus-wide initiative that helps Iowa's communities build more sustainable futures by addressing the economic, environmental, and socio-cultural issues of today. The IISC previously matched Urban and Regional Planning graduate students with projects in a number of Iowa communities (transportation, local foods, energy, community gardens, waste systems, etc.). Now, the expanded IISC is funded through the University of Iowa Office of the Provost; supported by the Office of Outreach and Engagement; and administered through the School of Urban and Regional Planning. IISC now has a dedicated coordinator, graduate assistant, faculty/staff advisory board, and campus-wide affiliated faculty and staff.

The most extensive project so far has been with the community of Dubuque. From 2011 to 2013, IISC partnered with Dubuque's Sustainable Dubuque Initiative on such areas as sustainability indicators, renewable energy, poverty, local foods, and the Green and Healthy Homes program. Not only did our work in Dubuque earn rave reviews in town and back on campus, but the nation noticed as well. I am very proud that Dubuque was recognized in *The Guide to Greening Cities*, published in 2013, as a national leader in developing sustainability partnerships, with our IISC Dubuque partnership highlighted. And we were even more proud that our graduate students involved in the Dubuque project received the 2013

Student Project Award from the American Planning Association's American Institute of Certified Planners, the organizations' highest honor for a planning student project.

Let me just briefly summarize my suggestions on how we might think about "playing a new game" in the current public university landscape. First is research portfolio diversification, seeking new partners for our individual institutions in governmental and industry funding. Second is seeking new partnerships outside of the traditional government and industry sectors—in, for example, the nonprofit sector, nontraditional private partners, regional economic development, and entrepreneurship. Third is increasing our commitment to interdisciplinary approaches, capitalizing on our institutions' current strengths and forging new paths through cluster hires, innovative new programs, and new facilities that encourage interdisciplinary work. Amidst all this, we must nurture programs that bring our research expertise into our core missions of undergraduate education and public engagement.

As with anything in life, these ideas are easy to say but not always easy to do. I hope I've demonstrated to you that we are hard at work implementing these ideas at the University of Iowa, and we've done so through a commitment to innovative thinking. But even once we actually have "boots on the ground," so to speak, implementing new programs and approaches, there are still fundamental policy and practical implications for us as institutions. These policy implications can be challenging and certainly need to be addressed at the same time we are shifting our approaches to the research

enterprise. Let me just suggest three important areas that must be confronted to play this new game.

The first is probably obvious: continued advocacy for federal research funding. We know that the federal budget is constrained and that there are forces in Washington advocating for continued cuts, including cuts in areas where we have traditionally enjoyed rock-solid support and ongoing growth. We must remain vigilant and redouble our institutional advocacy for the nation's research enterprise.

Second—and of course this is also related to funding, but more at the state and private level—we must create the physical space for new approaches to happen. These include spaces that are flexible enough to encourage interdisciplinary research, as well as classrooms that support inquiry-based learning.

And third, we must continue to revisit our standards for promotion and tenure. Traditional publication, of course, can and should remain important to the promotion and tenure process. But we must also develop real standards and commitment to these areas that have often been more difficult to measure and/or have sometimes received little more than lip service in the promotion and tenure process: interdisciplinary work, innovation and excellence in teaching, and public engagement. Just one example: at Iowa, I have appointed an Associate Provost for Outreach and Engagement, and one of her projects is to work on a

method of capturing faculty engagement activity—and of course defining it in the process—so that we may also have some consistency across campus when we talk about faculty achievement for promotion and tenure.

Change is daunting, no doubt about it. But the university has always been about change—the very essence of discovery is the new. Public universities can be difficult ships to steer, but if we're doing our jobs right, we as teachers, researchers, and administrators are always moving them into new, unexplored waters. That needs to include how we go about doing our business as well as what subjects we wish to explore.

The University of Iowa began over 165 years ago with a handful of faculty, one building, and a few dozen students to teach. Today, we are a world-class, multifaceted enterprise with over 30,000 students. We conduct groundbreaking research in myriad areas for the betterment of all society, we pursue creative endeavors that the whole world recognizes and is inspired by, and we are engaged with our community and state, making life better for all Iowans, in ways our university founders probably never dreamed of. We wouldn't have gotten where we are today if we had not planned and innovated in uncertain times. After all, what times are *not* uncertain? Haven't we been successfully navigating new waters since the beginning? Hasn't that always been our stock in trade?