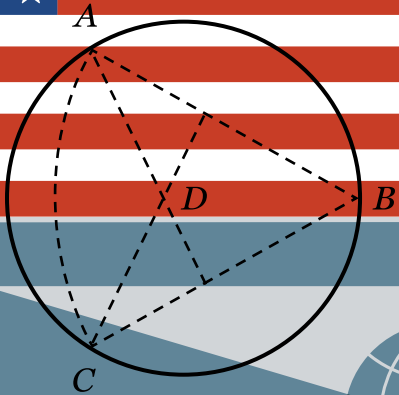
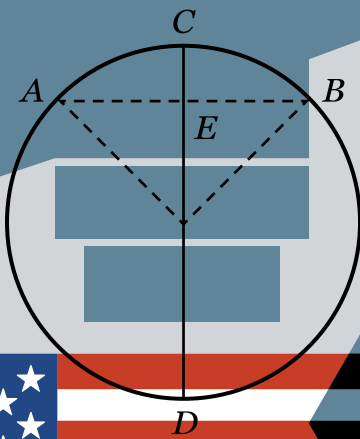


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Research Universities and the Future of America

BY JAMES J. DUDERSTADT

THE CRUCIAL IMPORTANCE OF THE RESEARCH university as a key asset in achieving economic prosperity and security is widely understood, as evidenced by the efforts that nations around the globe are making to create and sustain institutions of world-class quality. Yet, while America's research universities remain the strongest in the world, they are threatened by many forces: national and state economic challenges, the emergence of global competitors, changing student demographics, and rapidly evolving technologies. And even as other countries have emulated the United States in building research universities to drive economic growth, America's commitment to sustaining the research partnership that built a great industrial nation seems to have waned.



TAKEAWAYS

- 1 The partnership among universities, federal and state governments, philanthropy, and the business community should be strengthened in order to revitalize university research and speed its translation into innovative products and services.
- 2 Research operations within universities must be streamlined and their productivity improved.
- 3 America's pipeline of future talent in science, engineering, and other research areas must remain creative and vital, leveraging the abilities of all of its citizens and attracting the best students and scholars from around the world.

During past eras of challenge and change, our national leaders have acted decisively to enable universities to enhance American prosperity and security. While the country was engaged in the Civil War, Congress passed the Morrill Land-Grant Act of 1862 to forge a partnership between the federal government, the states, higher education, and industry aimed at creating universities that could extend educational opportunities to the working class while conducting the applied research that would enable Americans to become world leaders in agriculture and industry. Eighty years later, emerging from the Great Depression and World War II, Congress invested heavily in basic research and graduate education to build the world's finest research universities, capable of providing the steady stream of well-educated graduates and scientific and technological innovations central to our robust economy, vibrant cul-

Investing in innovation creates the jobs of the future. Investing in education prepares our citizens to fill these jobs. Building the infrastructure for a knowledge-based economy will ensure prosperity and security for our nation. Key to the achievement of all three of these goals is the American research university, which, through its research, creates the new knowledge required for innovation; through its advanced graduate and professional programs, produces scientists, engineers, physicians, and others capable of applying innovation to create economic value; and through its development and deployment of advanced infrastructure, such as information and communications technology, provides the foundation for the knowledge economy.

But America is not adequately investing in its research universities, nor has it developed a national strategy to support them. For many years, public universities

Mikulski (D-MD) and Representatives Bart Gordon (D-TN, retired) and Ralph Hall (R-TX)—made the following request to the National Academies of Sciences and Engineering and the Institute of Medicine:

“America’s research universities are admired throughout the world, and they have contributed immeasurably to our social and economic well-being. Our universities, to an extent unparalleled in other countries, are our nation’s primary source of long-term scientific, engineering, and medical research. We are concerned that they are at risk.

“We ask the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine to assemble a distinguished group of individuals to assess the competitive position of American research



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ture, vital health enterprise, and national security in a complex, competitive, and challenging world.

Today, the United States once again faces a period of rapid and profound economic, social, and political transformation driven by the growth in knowledge and innovation. Educated people, the knowledge they produce, and the innovation and entrepreneurial skills they possess have become the keys to economic prosperity, public health, and national security. As President Obama stated the challenge in his 2011 State of the Union Address:

“The world has changed. In a single generation, revolutions in technology have transformed the way we live, work, and do business. The competition for jobs is real. But this shouldn’t discourage us. The future is ours to win. But to get there, we can’t just stand still. We need to out-innovate, out-educate, and out-build the rest of the world.”

have seen steep reductions in state appropriations per student. Federal support for university research has also been declining in real terms, at the same time that other countries have increased funding for research and development. Meanwhile, American business and industry have not fully partnered with research universities to create the industrial leadership that was found in the past in large corporate research labs, such as Bell Labs.

The unfortunate consequence of the low priority given to support the unique missions of the American research university by the states, the federal government, and the public puts not only the leadership of higher education at risk, but also threatens the economic prosperity and security of the nation.

A Request from Congress

To address these concerns, in 2010, Congressional leaders—including Senators Lamar Alexander (R-TN) and Barbara

universities, both public and private, and to respond to the following question: What are the top 10 actions that Congress, state governments, research universities, and others can take to maintain the excellence in research and doctoral education needed to help the United States compete, prosper, and achieve national goals for health, energy, the environment, and security in the global community of the 21st Century?”

In response, the National Academy leadership recruited a group of top national leaders, roughly balanced among those from American research universities, industry, government, and science, to serve on the Committee on Research Universities. Over the past two years, our committee, chaired by Chad Holliday, former CEO of DuPont, met frequently to receive testimony and written input from an array of stakeholders from both the

public and private sectors. Supported by a strong team of National Academy staff, we conducted a number of internal exercises, including a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats). Those exercises influenced the committee's decision to frame its recommendations within the theme of the research partnership—among universities, the states, the federal government, and business and industry—that has been key to the evolution and leadership of the American research university.

Because of the importance of this study, the National Academies also developed a rigorous review process for the report, involving 23 reviewers from an unusually broad array of backgrounds and constituencies. The committee responded to hundreds of suggestions from those reviewers to arrive at its final report.

In my roles as both a member of this committee and the chair of the Policy and Global Affairs Division of the National Research Council of the National Academies, it seemed appropriate to summarize for members of university governing boards the principal recommendations and the implications for trustees of this important study. Most of our 10 recommendations would require modifications in both policies and practices of research universities and hence the engagement of boards.

10 Recommendations

The actions we have called for are organized to accomplish three broad goals. The first four recommendations will strengthen the partnership among universities, federal and state governments, philanthropy, and the business community in order to revitalize university research and speed its translation into innovative products and services.

Recommendation 1: *Within the broader framework of United States innovation and research and development (R&D) strategies, the federal government should adopt stable and effective policies, practices, and funding for university-performed*

R&D and graduate education.

As the economy improves in the coming decade, Congress and the administration should invest enough in basic research and graduate education to produce the new knowledge and educated citizens necessary to achieve our nation's goals. Congress and the administration should provide full funding of the amount authorized by the America COMPETES Act as a core component of a plan to raise total national R&D funded by all sources (government, industry, and philanthropy) to 3 percent of GDP. That would double the level of basic research that the National Science Foundation, the National Institute of Standards and Technology, and the Department of Energy Office of Science conduct, as well as sustain America's investment in other major areas of basic research, including biomedical research. Note that this recommendation is not calling for new programs, but rather asking Congress to achieve funding goals authorized earlier for various federal research agencies.

Recommendation 2: *The states should strive to restore appropriations for higher education to levels that allow public research universities to operate at world-class levels while providing them with greater autonomy to enable them to compete strategically and respond with agility to new opportunities.*

Over the past two decades, in the face of shifting public priorities and weak economies, states have decimated the support of public higher education, cutting appropriations per enrolled student by an average of 25 percent, or more than \$15 billion each year nationally. Yet even as the states have been withdrawing the support necessary to keep these institutions at world-class levels, they have also been imposing upon them increasingly intrusive regulation. As the leader of one prominent private university put it, "The states are methodically dismantling their public universities where the majority of the nation's campus research is conducted and two-thirds of its scientists, engineers, physicians, teachers, and other knowledge

professionals are produced."

Hence, we challenge the states to recognize that the devastating cuts and meddlesome regulations imposed on their public research universities are not only harming their own future, but also putting at great risk the nation's prosperity, health, and security.

Recommendation 3: *The role of business in the research partnership should be strengthened, facilitating the transfer of knowledge, ideas, and technology to society and accelerating "time to innovation" in order to achieve our national goals.*

We recommend strongly that the relationship between business and higher education should shift from that of a customer-supplier—of graduates and intellectual property—to a peer-to-peer nature, stressing collaboration in areas of joint interest. Strong support of a permanent federal R&D tax credit and more efficient management of intellectual property by businesses and universities to improve technology transfer are also needed. Such a tax credit would stimulate new research partnerships, new knowledge and ideas, new products and industries in America, and new jobs. Better management of intellectual property would result in more-effective dissemination of research results, thus also generating economic growth and jobs.

Recommendation 4: *Universities must increase cost-effectiveness and productivity in order to provide a greater return on investment for taxpayers, philanthropists, corporations, foundations, and other research sponsors.*

It is essential that research universities strive to address the American public's concern that their costs are out of control. To this end, universities should set and achieve bold goals in cost-containment, efficiency, and productivity. They should strive to constrain the cost escalation of all continuing activities—academic and auxiliary—to the national inflation rate (not the higher education price index) or less through improved efficiency and produc-

tivity. That will require the development of powerful and strategic tools for financial management and cost accounting, tools that better enable universities to determine the most-effective methods for containing costs and increasing productivity and efficiency. It is also essential that universities, working together with key constituencies, intensify efforts to educate people about the distinct character of American research universities and cease promoting activities that create a public sense of unbridled excess on campuses.

The next three actions we recommend will streamline and improve the productivity of universities' research operations.

Recommendation 5: *Create a strategic investment program that funds initiatives at research universities that are vital to advancing education and research in areas of key national priority.*

We recommend that the program begin with two 10-year initiatives. The first would be an endowed faculty-chairs program to facilitate the careers of young investigators. During a time of economic difficulty and limited faculty retirements, it would help ensure that America is developing the research faculty we need for the future. We also call for a research infrastructure program that is initially focused on the advancement of campus cyberinfrastructure, but perhaps evolves later to address as well emerging needs for the physical research infrastructure as they arise. Matching-grant requirements would generate additional funds from private or state support.

Recommendation 6: *Strive to cover, in a consistent and transparent manner, the full costs of research projects and other activities procured from research universities.*

Today, many research universities are forced to subsidize underfunded sponsored research grants from resources designated for other important university missions such as undergraduate tuition and patient fees for clinical care. That must cease. If the federal government

and other research sponsors would cover the full costs, research universities could hold steady or reduce the amount of funding from other sources like tuition that they have had to provide for research procured by the federal government. Universities should be able to allocate their various resources more strategically for their intended purpose. Both sponsored-research policies and cost-recovery negotiations should be applied in a consistent fashion across all academic institutions.

Recommendation 7: *Reduce or eliminate regulations that increase administrative costs, impede research productivity, and deflect creative energy without substantially improving the research environment.*

Federal and state policy makers and regulators should review the costs and benefits of federal and state regulations, eliminating those that are redundant, ineffective, inappropriately applied to the higher education sector, or impose costs that outweigh the benefits to society. Furthermore, the federal government should also harmonize regulations and reporting requirements across federal agencies. Reducing and eliminating regulations could trim administrative costs, improve productivity, and increase the nimbleness of American universities. With greater freedom, they will be better positioned to respond to the needs of their constituents and the larger society.

The final three recommendations will ensure that America's pipeline of future talent in science, engineering, and other research areas remains creative and vital, leveraging the abilities of all of its citizens and attracting the best students and scholars from around the world.

Recommendation 8: *Improve the capacity of graduate programs to attract talented students by addressing issues such as attrition rates, time to degree, funding, and alignment with both student career opportunities and national interests.*

Research universities should restructure doctoral education to enhance pathways for talented undergraduates,

improve completion rates, shorten time-to-degree, and strengthen the preparation of graduates for careers both in and beyond the academy. To this end, the federal government should achieve a better balance of fellowships, traineeships, and research assistantships. Both universities and research sponsors should address the many concerns characterizing postdoctoral research appointments, including the excessive length and low compensation of such service and the misalignment of these experiences with career opportunities. Such efforts would increase cost-effectiveness and ensure that we can draw from the "best and brightest" for our nation's future doctorates.

Recommendation 9: *Secure for the United States the full benefits of education for all Americans, including women and underrepresented minorities, in science, mathematics, engineering, and technology.*

Research universities should intensify their efforts to improve science education throughout the education ecosystem, including K–12 and undergraduate education. Furthermore, all research partners should take action to increase the participation and success of women and underrepresented minorities across all academic and professional disciplines and especially in science, mathematics, technology, and engineering (STEM). As careers in STEM fields continue to expand, recruiting more underrepresented minorities and women into those fields is essential in order to meet the workforce needs of our nation and to secure economic prosperity and social well-being.

Recommendation 10: *Ensure that the United States will continue to benefit strongly from the participation of international students and scholars in our research enterprise.*

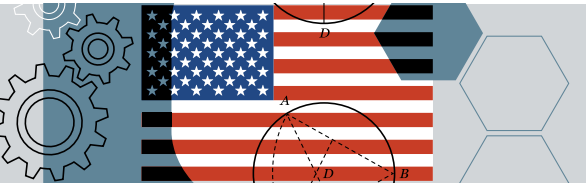
Federal agencies should make visa processing for international students and scholars who wish to study or conduct research in America as efficient and effective as possible, consistent also with homeland-security considerations. That should include the possibility of granting resi-

gency to each foreign citizen who earns a doctorate in an area of national need from an accredited research university (“attaching a green card to each diploma”).

These recommendations reflect the

erning boards of the nation’s research universities. For example, universities must set and achieve bold goals in cost-containment, efficiency, and productivity—not only in business operations and academic programs, but also in auxiliary

importance of research and of graduate education. While other missions, such as undergraduate education and public service, will remain priorities of their institutions, it is the unique role of the nation’s research universities in producing the new



Boards must help make the case to policy makers, opinion leaders, and the public that research universities need and deserve investment and support.

consensus of extensive testimony before the National Academies committee, both oral and written, from many constituencies, including federal agencies, business leaders, state governments, and, of course, leaders of American higher education. While sometimes bold and ambitious, we believe our recommendations and actions are necessary to preserve one of the nation’s most important assets: its world-class research universities. While achieving these goals will be challenging, particularly in a rapidly changing economic environment, we believe that it is important to state what we think is needed and then to develop implementation strategies in collaboration with the various constituencies that are key to achieving these goals.

It is important to keep the recommendations and the report sufficiently flexible to adapt to unforeseen challenges and opportunities as they arise. For example, the staging of implementation steps will depend significantly upon economic circumstances. During the current recession, most of the focus should probably be on those federal and state policies and university practices designed to improve cost-containment and productivity. As the current economic crisis recedes and the economy improves later in the decade, attention should turn to restoring or increasing investments in research and graduate education.

Final Comments for Governing Boards

The recommendations of the National Academies committee frame both challenges and opportunities for the gov-

activities like student housing, service activities like medical centers, and, yes, even in intercollegiate athletics. Rapid expenditure increases in any of those areas create the public impression of unbridled cost escalation that eventually is reflected in student fees.

Boards of public research universities will face the added challenge of renegotiating the social contract with their state governments. They will need to achieve sufficient institutional autonomy and flexibility, particularly in tuition and admissions decisions, to navigate what could well become a generation-long period of weak state support.

The deeper engagement of research universities with business partners and K–12 education will also call for both the expertise and commitment of governing boards. Although the major restructuring of graduate education and postdoctoral activities we recommend in the report must be led by the faculty, boards can play a major role as well by setting important strategic goals.

In addition, while our call for major federal policy changes in sponsored research support and regulation are aimed at significant cost reductions for universities, in the near term, they should be aware that those changes may also trigger faculty or staff concerns that could create pressures on governing boards. Examples include some shift of sponsored research funding from direct to indirect costs or the elimination of staffing necessary to comply with burdensome federal regulations.

Finally, boards must play a role in educating the public about the increasing

knowledge and advanced learning that make these institutions a vital asset for the nation’s future. Boards must help make the case to policy makers, opinion leaders, and the public that research universities need and deserve investment and support.

The actions recommended by the National Academies will require significant policy changes, productivity enhancement, and investments on the part of each member of the research partnership: the federal government, the states, stakeholders such as business and philanthropy, and most of all, the nation’s research universities. However, we believe these recommendations comprise a fair and balanced program that will generate significant returns to the nation. Such commitments are necessary for the future prosperity, health, and security of America. ■

AUTHOR: James J. Duderstadt is president emeritus of the University of Michigan. He is also University Professor of Science and Engineering and the director of the Millennium Project at the university and co-director of its Science, Technology, and Public Policy Program.

T'SHIP LINKS: “Overcoming Inertia: Can Higher Education Change?” July/August 2010. Michael M. Crow, “Toward Institutional Innovation in American Colleges and Universities.” May/June 2010.

OTHER RESOURCES: “Research Universities and the Future of America: Ten Breakthrough Actions Vital to Our Nation’s Prosperity and Security” (The National Academies Press, 2012).

http://www.nap.edu/openbook.php?record_id=13396&page=R1