

A Survival Guide For the STEM Research and Education Enterprise at US Universities^{1,2}

Bruce Guile³, Marjory Blumenthal⁴, Robert Brown⁵, Peter Hoffman⁶, Eion Lys⁷,
Mark Pierpoint⁸, Albert Pisano⁹, Thomas Schuelke¹⁰, David Teece¹¹

Abstract: The paper reviews the increased global competition facing US research universities and the degree to which universities have increased internal resources directed to research. This is context for the Trump Administration's 2025 broad but scattershot reduction in Federal research funding at universities. This has turned an unsustainable path into a crisis at many institutions. The paper recommends four ways in which US research universities need to respond to this crisis even as they prepare to make longer term strategic choices. This is followed by five actions to cope with reduced Federal research funding, all of which will require exceptional intentionality from most university leadership and boards. The paper closes with supporting policy and practice changes needed to enable adaptive strategic action.

1. Background and Introduction

¹ There are many articles, both journalistic and scholarly, covering the impact of the Trump administration's policies on US R&D and university research on US innovation, national security, and economic leadership. This white paper does not repeat those arguments but rather focuses on how US universities need to adapt in the national interest. Further, the focus of this paper is on the shift in US university research in the sciences, engineering, and applied life sciences (e.g., biomedical, environmental, and agricultural sciences). Those areas garner the bulk of university research funding from the Federal government (and are therefore suffering the largest reductions). These are the areas (broadly, STEM) that have been the focus of rapid increases by other nations, especially China, in their home universities.

We are under no illusion that research and research degrees in STEM are the entirety of US university research or the even the focus of all US universities. US university culture and programs are rich in humanities, the arts, social sciences, and professional programs among others. US universities play a critical national role in knowledge production, knowledge transmission, workforce development, and US cultural health and wellbeing across an extremely broad front.

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³ The Applied Research Consortia (ARC) Project

⁴ MSBlumenthal, LLC

⁵ Boston University

⁶ Elevated Advisors, LLC

⁷ Berkeley Policy Institute

⁸ Keysight Technologies, retired

⁹ University of California San Diego

¹⁰ Fraunhofer USA

¹¹ University of California Berkeley

1.1 R&D-based global competition has eroded US technological leadership and dramatically shifted the playing field for US research universities.

In the decades following World War II, US research universities rose steadily in global prominence, and the decentralized US university system became a central pillar of a demonstrably successful US science and technology (S&T) policy. During the final decades of the 20th Century the US led the world in most fields of science and engineering. US research universities — performing research funded primarily by the US government — became wellsprings of innovation and entrepreneurship in addition to their traditional role in the education of the national science and engineering workforce. They were sought-after research collaborators and served the nation as a network for global S&T engagement, attracting thousands of talented faculty, researchers, and students to study, work, and live in the US. That period coincided with US research universities dominating global rankings. Other nations noticed.

Since the end of the Cold War, and with the explosion of global trade, other national governments have invested heavily in areas of science and technology regarded as nationally strategic. Those investments have often been focused on building up home country research universities because of their unique role in educating a scientific and engineering workforce. The growth in US university research has been significantly outpaced by government supported university research in Europe and Asia.

The rise of Asian universities is obvious when comparing the Times Higher Education World Rankings from 2010 to 2025. US universities comprised 27 of the leading 50 in 2010 and were only 20 in 2025, while Asian universities moved from 7 to 9 and Chinese Universities from 1 to 4. Chinese universities and research centers account for eight of ten top institutions in the 2025 Nature Index.¹²

Today, US research universities face dramatically increased global competition in terms of research output, quality of faculty and students, and as leading participants in global S&T research collaborations. The rise of well-funded and high-performing entities outside the US has raised the bar on the performance of the decentralized US research university system.

1.2 Domestic reputational competition among universities has compounded the impact of global competition, pushing US research universities to increase internal expenditures on research.

Industry and state support of research at US universities has remained mostly flat over the past decade. While research-focused current philanthropy (as opposed to endowment support) has grown it remains limited, accounting for only about 15 percent of university

¹² <https://www.nature.com/nature-index/institution-outputs/generate/all/global/all>

research funding.^{13,14} In total, industry, state, and philanthropic sources accounted for only 20 percent of total university research funding in 2023, a slight increase from 19 percent in 2013.¹⁵

While Federal funding still dominates US research university support, research universities' internal funding of research has grown significantly over the last decade. While public and private institutions face different constraints on how revenues can be used the research-focused domestic reputational competition has driven many institutions into using other revenues, including tuition revenues, to support research. In 2013, university internal support for research was 38 cents for every dollar of Federal support, growing to 46 cents by 2023, amounting to \$28 billion of university support, compared to the \$60 billion from the federal government.^{16,17} The growth in university internal funding from 2013 to 2023 exceeded inflation by \$8 billion in 2023 dollars.

Further complicating matters, the number of R1 institutions (first tier research universities) in the US has grown. In 2025, the Carnegie classification for higher education institutions added 42 universities to the R1 designation, bringing the total number of R1 schools to 187. This increased count reflects a methodology simplification, under which institutions qualify for R1 status through an annual combination of \$50 million or more in research spending, including their own funds, and at least 70 awarded research doctorates.¹⁸

Some of the aggregate increase in internal university support was, therefore, a result of efforts by universities to climb into the R1 category. More importantly, at both new and long-standing R1 universities, the increase in the share supported by internal funds has been necessary because sponsored research at US universities costs more than it brings in. Very few government or private research funders provide true full cost recovery. An FY 2023 NSF analysis found universities received \$17.7 billion for research overhead from sponsors out of \$24.4 billion total overhead costs, leaving an operating gap of \$6.7 billion.¹⁹

¹³ Total annual charitable contributions, for all recipients, not only higher education, in the US approached \$600 billion in 2024. <https://givingusa.org/giving-usa-2025-u-s-charitable-giving-grew-to-592-50-billion-in-2024-lifted-by-stock-market-gains/>. Higher education received approximately \$60 billion in 2024 (for all purposes, not research in particular). <https://www.case.org/resources/case-insights-voluntary-support-education-2024-key-findings>

¹⁴ <https://indicators.sciphil.org/key-findings>

¹⁵ <https://nces.nsf.gov/pubs/nsf25313/figure/1>

¹⁶ <https://nces.nsf.gov/pubs/nsf25313/figure/1>

¹⁷ Life sciences research accounted for \$15 billion of the \$28 billion self-funded total, followed by non-S&E fields at \$4 billion and engineering at \$3 billion, per <https://nces.nsf.gov/pubs/nsf25313> Table 28.

¹⁸ <https://ssti.org/blog/forty-two-institutions-added-ranks-r1-designees> and <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/2025-research-activity-designations/>

¹⁹ <https://nces.nsf.gov/pubs/nsf25313>

Further, to maintain their global competitiveness, in both real terms and reputational terms, US universities have had to invest their own funds for new fields of research or education beyond what is supported by traditional government, industrial, and philanthropic sources.

The absolute and relative growth of this internal support for US university research — and how that stresses other university missions/functions — is a large part of what made the 2024 trajectory of the decentralized US research university system unsustainable.

1.3 The entire US research university sector – absent a dramatic turn about in government policy – is facing a reduction in Federal research funding that universities cannot cover from already stretched internal resources.

The decline in the share of university research supported by the US government preceded the Trump administration but the current administration’s aggressive approach to cutting US university-based research, accompanied by increases in regulation/constraints on how Federal funding can be used, is a fundamental inflection point. We do not know the amount or pattern of such reductions, but they could be as much as 50-75 percent (depending on domain of research) and the incremental constraints range from new caps on overhead rates, to new research security protocols, as well as to certain topics, such as climate change or impacts on disadvantaged populations, being off the table entirely.

Uncertainty about amount and pattern of reductions is unlikely to resolve into anything predictable in the next 36 months but, as we have already seen, many institutions will need to reduce the personnel (faculty, post-docs, graduate students) and facilities engaged in research and research degree education, especially for doctoral programs. Very few, if any, US universities will be able to quickly replace the reduction in funds from US federal sources.²⁰

Operationally, the Federal research funding system is in chaos. This not only affects the proposal review and allocation processes, but also the disbursement of funds for funded and ongoing (not cancelled) research projects. Using the language of change

²⁰ Although the decrease in federal funding will probably be the largest research universities have seen, it is not the first time that reductions in research support have coupled with negative shifts in student demographics. The same pattern affected research universities in the early 1970’s leading to the call for the federal government to support a set of “national universities” leading to the first ranking of universities and eventually to the USN&WR’s first listing in 1983. Allan M. Cartter a well-known labor economist and the former chancellor of New York University sounded the alarm in his article, “Scientific Manpower for 1970–1985: The Oversupply of PhDs Will Seriously Affect Higher Education and National Science Policy,” (*Science* 172, no. 3979 (1971): 132–140) which led to the first national rankings of universities (see William R. Petrowski, Evan L. Brown, and John A. Duffy, “National Universities’ and the ACE Ratings,” *The Journal of Higher Education* 44, no. 7 (1973): 495–513.

management, "the boats have been burned on the beaches", so there is no going back. Either a new set of processes will emerge, or the chaos will continue.

1.4 The US has a clear national interest – self-sufficiency and efficacy of its research enterprise and research degree education – in the aggregated responses of research universities to current challenges.

It is axiomatic that decentralization and diversity of US research universities are a national strength, but this is only truly a national strength if the incentives for individual university action are consistent with the national interest. While the incentive structures and common practices in place have worked well during a period of growth to global dominance, it is entirely unclear what will work well in the next period of retrenchment and intense competition from abroad.

Most US research universities have already contracted in response to reductions in Federal research funding. The employment of research faculty, researchers, and administrative staff on soft money is routinely ended when research funding dries up. Research-focused graduate programs (STEM PhD and some MS programs) contract by accepting fewer students as faculty and program leaders recognize there is inadequate research funding to support larger numbers of students. These adaptive reductions — which require little or no intervention by university leadership — are a great strength of research universities in the face of normal fluctuations in research funding but the approach is insufficient to meet the current challenge.

The 2025 decline in Federal support of research requires a different scale of response. Most institutions will need new, or substantially revised, alliances as well as some structural changes. These will need to be rooted in a university-wide strategic vision for the research enterprise. Absent this, universities that contract only in the typical fashion will find themselves with programs and research activities that are sub-critical in scale and scope, forcing a dramatic reduction in their educational programs, contributions to knowledge, and public service.

From a national perspective, this is a serious long-term challenge. For example, the US graduates approximately 12,000 PhD's annually in engineering alone (the total number of doctorates is over 57,000). This is a big and expensive enterprise. The combination of stipends and minimal support exceed \$12 billion annually; little of this is supported by the NIH, so DoE, NSF, and DoD (currently the Department of War) cover most of these costs. Dramatic cuts to these budgets will drop the number of doctoral graduates significantly, with the knock on effects damaging the US economy.

If too few R1 universities respond intentionally to the changes in Federal funding (scale, constraints, and international limitations), the nation will suffer a grievous blow to its domestic economic health and its international economic and national security. Ultimately, Federal and State policy makers will need to correct the incentive structure

facing universities. In the meantime, university leaders will need to deal with considerable on-campus resistance to change and find a way to step up to fulfill their unique role serving the national interest.²¹

1.5. This white paper has been prepared as a service to university boards and senior members of university administrations.

Boards of Trustees and university leadership face a difficult and unfamiliar challenge in leading the necessary change for their respective institutions, even as they must bring faculty and faculty governance into the process.

Because the missions and situations of US research universities are very diverse, WHAT needs to be done can be generalized, HOW it can be done will depend on the specific structure and institutional capacity affected. This white paper focuses on what needs to be done and presents a menu of how it can be implemented.

2. Four preparatory actions to support more intentional responses to reductions in Federal research support.

2.1 ACTION: Sound the alarm within the board of trustees and senior leadership that the university faces an existential crisis.

Most institutions are aware that this is not “business as usual”, but we strongly recommend that the president formalize the call to action by organizing a very visible staff and faculty strategic working group to conceptualize and lead the needed change. Further, we recommend the board set up a special committee of the board to oversee the strategies and actions of the leadership including restructuring, retrenchment, and strategic collaborations.

During this crisis institutions need to retain key faculty and staff in areas of strength allowing those in areas that will be deemphasized to move to other places where their careers can develop more effectively. It is therefore important to make decisions quickly and clearly making it transparent which areas will be a focus and which will not. These issues will require attention, and active intervention, from all levels of university governance and leadership, from the board of trustees to the faculty senate and all members of the university administration.

²¹ Steven McLaughlin and Bruce Guile, “Greatness Thrust Upon Them: US Research Universities and the National Interest,” *Issues in Science and Technology*, September 2021. <https://issues.org/us-research-universities-national-interest-mclaughlin-guile/>

2.2 ACTION: Execute financial and programmatic modelling and analysis of the university's research enterprise.

The board members and management must understand the institution they govern and lead. This work should include a careful accounting of sources and uses of funds (income and expenditures) for research across the university. These data are not typically captured today, especially in institutions using Responsibility Centered Management (RCM) systems. It is important to understand, for example, the research subsidy implicit in the lower teaching obligations for research-active faculty.

A particularly important question is, where has the university obtained the revenue to support internal investments in research? Because most university accounting does not distinguish the uses of revenues from tuition, state, expendable gifts, endowment income, and redirected revenues from previous indirect cost recovery, it is currently impossible to truly identify the internal sources of research support.²²

2.3. ACTION: Use the necessity of revision to near-term plans and budgets to develop agreement on an institution-wide research strategy.

There will be some very difficult immediate budget choices. This presents an opportunity for the institution (board, leadership, faculty) to align around a framework for its longer-term research strategy, including sources of funding. There will be plenty of contentious “lets save this activity because...” thinking, but the logic that needs to prevail in the near term is, “Do we need to cut off a limb to save the body and, if ‘yes’, then which limb”?

Each institution will need to consider how it defines a strategic vision for research including the kind of tradeoffs a strategic vision entails (e.g., breadth vs. depth). For some smaller, regional, and non-flagship universities, pivoting away from pursuing a national presence and research intensity may be a wise choice. Instead, a renewed focus on local and regional student and alumni success, and focused business sector and community partnerships and engagement may offer a successful approach.

At a minimum, any strategy will require a university-wide agreement on genuine institutional comparative advantage in some areas of research and research degree education. This implies, of course, careful thought and work to reduce some areas of

²² The role of the endowment can be estimated. Using the value of each R1 university's endowment in fiscal year 2023 and estimating the annual distribution to be 4 percent of the total gives an upper bound on what the endowment could support, acknowledging that this is a vast over-estimate as much of this funding is earmarked by donors for other purposes. Even so, the institution's research support is larger than the total endowment distribution for all except a few with the very largest endowments. Eliminating the endowment income as a source of revenue for internal support of research points to tuition as the major source of revenue for internally sponsored research.

activity while growing others. This type of intentionality will be a challenge for most institutions.

2.4 ACTION: Identify and secure institutional collaborators to advance both short-term adaptation to reduced Federal funding and long-term strategy.

The inter-institutional research collaboration strategy for most US research universities relies heavily on faculty-initiated research collaborations. Because institutional collaboration is difficult, intentional collaboration — based on needs articulated by the leadership of a department, school, or whole institution — often devolves into hiring away the best faculty from a potential collaborator.

The challenge currently facing most universities is to contemplate collaborating to address subcritical research degree programs or research. The effort needs to go beyond the common, and often required by government funding agencies, collaboration in pursuit of a specific funding opportunity.

The board and leadership should consider an explicit discussion and plan that differentiates easier-to-consider growth-oriented collaboration and those collaborations that are a necessary response to downsizing or deemphasizing research areas. The discussion will raise the issue of how to establish regional, national, or international research and research degree collaborations. As with the issue of research strategy, execution will most likely require a special staff-faculty leadership working group and an oversight committee of the board.

3. Five strategic actions requiring exceptional intentionality from most universities.

3.1 ACTION: Shape the “natural” contraction of research activities to align with a research strategy.

If there is no strategic guidance/intervention from the university, reductions in research workforce, including soft-money research faculty, graduate students, staff, and line faculty will simply reflect the uneven and unguided reductions in Federal funding. The alternative is that the university leadership with scope across the entire institution takes this opportunity to **deemphasize some research activities** to reduce the draw on university resources and **increase inter-institutional research partnerships and pursue functional mergers** (e.g., joint degree programs with other institutions and/or joint research initiatives).

Most universities will need to increase joint activity with all types of partners. Through student internships and rotations of faculty and staff, industry engagement, and exchange programs with other institutions, universities can and should explore new approaches to positive outcomes for students. Increased academic collaboration allows an institution to combine research activities with other institutions. These actions can reduce the

cost/footprint of a domain of research or create unassailable position in a domain by joining forces with others to deliver exceptional research and research degree education.

3.2 ACTION: Secure additional research funding from industry that supports the strategic vision for the university.

Industry funding will not fill the hole left by reduced NSF and NIH funding at universities since only a small fraction of the industry ecosystem will support basic research. Companies are more interested in funding solutions to problems aligned with their businesses than driving forward fundamental understanding of science or technology, but the pipeline of fundamental research must continue at universities to provide the future feedstock for problem solving research. To be of value to industry a university must perform both types of research — fundamental and problem-solving.

The reduction in support for fundamental, non-proprietary research from the Federal government means that universities will need to be inventive with regard to policies, practices, and organizational structures to blend and differentiate fundamental (openly published) and proprietary-leaning research and research-degree education.

There are dozens of different approaches in widespread use, ranging from simple publication delays (to give a funding company a lead in exploiting IP), to on-campus industrial consortia (which by their nature blunt the most problematic aspects of single company proprietary research), to campus adjacent research facilities with faculty and students wearing different hats (and operating with different norms) on and off campus.

Increasing strategic research support from industry implies an exceptional degree of intentionality from a university and approaches which are more top-down than bottom-up. Universities that want to attract additional industry support need to strengthen the bridge between fundamental research that will only take place at a university and problem-solving and talent development for industry partners. Supporting policy changes discussed in the next section — in particular, firewalls and IP policy flexibility (4.1 and 4.2) — are at the heart of being able to attract additional industrial support for research.

3.3 ACTION: Secure philanthropic support for strategic areas of research.

The uncertainty and unprecedented nature of federal action in the current administration, coupled with strong public support for STEM research funding,²³ suggests that universities should explore targeted efforts at ramping up philanthropic research funding. It is unrealistic to think that philanthropy will grow fast enough to cover the emerging funding gaps, but it is not implausible that existing and new philanthropic support can be shaped to fit the strategic directions of the university.

²³ <https://www.sciencecoalition.org/2025/04/30/national-poll/>

Traditionally, research-focused fundraising efforts have been based on ideas that bubble up from departments, individual faculty, board members, and trends/fashions in philanthropy. It is also often the case that large donations are earmarked for buildings and other concrete memorials to a donor. An institution-wide research and research degree strategy needs to inform development (fundraising) efforts, taking every opportunity to shape proposals to existing and potential sponsors around strategic areas for the university.

The growth in science-funding philanthropic foundations presents an opportunity as do growing efforts to solicit research gifts from alumni and other donors.²⁴ But this is only an opportunity for the institution if the proposals put forward are aligned with the university's strategy. The challenge here may be to say "no" to donors insistent on supporting activities outside the critical focus areas for the institution. In all cases a consideration for the overall return on the research investment needs to be maintained.

3.4 ACTION: Cultivate State research funding; multi-State compacts to mutually fund research; and similar sources from other countries or regions.

There are numerous instances of state-based, multi-state, and regional cross-border efforts at supporting research collaborations. In addition, there are other entities which appear to be good candidates for easily developing new applied, practical, and regionally focused efforts on a collaborative basis. These entities could be models, targets for contact and engagement, and could be developed as new sources of university funding and support [see Attachment A.]

3.5. ACTION: Plan for uncertainty in Federal research funding processes, amounts, and direction.

The Trump administration has articulated research priorities²⁵, but the volume, details, and processes remain unclear. Moreover, research security concerns, including retaining the benefit of US funded research in the US, have grown steadily, presenting challenges for recruitment of students (especially graduate students) and the involvement of foreign national students in certain kinds of research.

Planning for an uncertain future involves understanding past practices and how they will need to be changed. Historically, research universities commonly encouraged faculty to apply broadly to federal funding opportunities, in a continued-growth, more-is-better approach. That approach is unlikely to yield good results in the current situation. Universities should consider a scenario planning exercise that incorporates new elements such as:

²⁴ Heavily tuition-dependent institutions focus fundraising on financial aid and student support, so for some institutions more fundraising to support research has to increase the pie.

²⁵ <https://www.whitehouse.gov/wp-content/uploads/2025/09/FY27-OMB-OSTP-RD-Priorities-Memo-FINALSIGNED.pdf>

- I. Strategic alignment: Will the funding diverge from the university's mission, existing programs and practices weakening its ability to engage with its stakeholders and partners?
- II. Security restrictions: Will the funding impose security-related obligations that the institution cannot easily adapt to, in terms of reporting and compliance, publication restrictions or student advancement hurdles?
- III. Funding challenges: Will the funding awards have arbitrary limits to overhead costs, rather than previously negotiated rates, or is there a likelihood of post-award reductions or freezes in funding?

Such scenario planning should flesh out possible futures and allow more effective preparation and planning.

Also, we recommend that every university — alone or in collaboration with others — develop a simple articulation of an institution-wide vision as to how the university advances the national or regional interest. Major associations (e.g., AAU, APLU) will have content to draw from, but individual institutions need clear messages for their stakeholders (faculty, students, alumni, and the broader university community). For all but the largest and most diverse research universities this implies a crafted focus and a “big bets” logic at the institutional level. The focus can be on an area of basic research, major research infrastructure facilities, or research applied to national security or mission agency work (where there may be added funding from the Federal government in the near term).

4. Six supporting organizational, policy, and practice changes.

It is a truism of planning that culture trumps strategy at every turn. Leadership at many universities needs to develop a new narrative regarding the positive benefits of receiving increased research funding from industry and philanthropy. A new narrative, of course, needs to be backed up with changes in policies and practices that reward faculty and departments for a wider set of funding sources and research contributions. Most of the changes below will be necessary to pursue a new and different mix of research funding consistent with a strategic vision for a university's research enterprise.

4.1 Create or maintain firewalls (organizational and physical) to protect proprietary research, classified research, or non-classified research subject to considerable research security protocols.

Some of this will require a significant change on campus. Other implementations of firewalls/protections will simply be extending existing policies and procedures to new

environments. Borrowing good practices from peer research institutions (see Attachment B) is always a good idea.

The tension between unconditional openness in university research and education, and the fact that many potential sources of funding in 2026 and beyond may require some constraints on openness, is certain to be a matter of almost philosophical debate on campus. Openness is equated with the purposes of the university, growth of knowledge, dissemination of knowledge and education, and innovativeness of the economy. Company-proprietary research, national security research, or research security constraints on otherwise open research are often regarded as unhelpful or even counterproductive to the missions of most US research universities.

There are, however, programmatic or structural approaches that bridge the divide. For example, industrial consortia pool company funds and interests to advance knowledge of direct interest to an industry sector (sometimes basic research), without the single-company proprietary research constraints. Such consortia are inherently porous with regard to intellectual property. Recognizing this, consortia – to maintain full engagement of university researchers – often promote IP sharing and minimal publication delays.

Also, while not the norm in most US universities, there are sound practices and policies that allow doctoral research in proprietary settings. There are, of course, constraints on publication but for many individuals headed to industry the prospect of directly job-relevant research experience is considered a fair trade for constraints on publication.

There are abundant solutions to the “openness vs. proprietary” issues in research and education should a university be willing to investigate them, make sure they are aligned with the university’s character and mission, and then manage the risks to individual students or the university’s overarching goals.

4.2 Increase flexibility in university intellectual property (IP) policies.

Increased flexibility is needed both in the direction of more open, non-proprietary research freely available to the public (true open science) and in the direction of proprietary collaborations where IP developed may be owned by a third party.

The 1980 Bayh-Dole Act, which enabled universities to own and manage the intellectual property from federally sponsored research, has resulted in broadly positive benefits for higher education institutions, technology-focused companies, and the national well-being. However, a traditional university IP licensing model, focused on intensive patenting and revenue-centered licensing, may no longer be optimal, especially for smaller, less-

resourced, and more regional universities.²⁶ An approach that holds out for hypothetical income that may come years in the future from IP may pointlessly limit current research income.²⁷ When considering new or expanded sources of funding, flexibility will likely be required.

Further, leadership should explore different ways to maximize public benefit, and minimize institutional costs, from the IP their researchers generate. Such approaches include applied research consortia with industry partners (allowing for different IP practices than on the main university campus), partnering with other universities or forming regional organizations to outsource technology transfer and licensing, and re-orienting licensing to promote broad diffusion of IP rather than a focus on licensing revenues.

4.3 Initiate strategy-reinforcing changes in the structure of research and research degree activities of the university.

This effort will include reducing inflexible disciplinary boundaries and policies for faculty recruitment and retention. To be nationally or internationally competitive in many important areas of research will require convergent research efforts — breaking down departmental boundaries and intentionally hiring the faculty who can be leaders in these efforts. This is hard enough to do in a normal growth situation but will need special attention during a retrenchment where departments may be downsized or closed, internal support for some research efforts may be terminated, and with new research collaborations overtaking some purely internal efforts.

4.4 Revise policies and practices for international engagement and collaborations.

The US needs its universities to be fully engaged with research enterprises and individuals overseas. The nation cannot be first in everything but pulling back from international research engagement is a recipe for falling behind in almost everything.

It is important to acknowledge that this will require a shift in the animating logic at many institutions. International engagement has most often been to broaden a US university's reach and reputation by providing education and research abroad. US universities need foreign institutions and international research collaboration to maintain or advance domestic research and education missions in the US national interest (even as they attend to research security).

²⁶ Such cost challenges from IP licensing are not limited to smaller institutions or a new phenomenon, as a paper addressing Penn State found in 2012, <https://www.aaup.org/sites/default/files/files/FoleyPSUnewIPpolicy.pdf>

²⁷ To be sure the Bayh Dole Act applies to Federally funded research and if a patentable invention made in the course of such funded research, the Bayh Dole rules must be followed. But there is no requirement for a university to apply a private Bayh Dole framework to collaborations funded by philanthropies or industry.

4.5 Simplify and streamline the resource-draining sponsored research proposal process on campus.

As exemplifying data points, researchers submitted 55,000 NIH R01 proposals in 2024, each representing workload from investigators and support staff time over a three-month or longer period.²⁸ The NIH only issued 10,000 awards, a 19 percent success rate²⁹ Although efforts to simplify and harmonize grant processes have been longstanding at the federal level, universities need to make sure that their internal processes for all funders are streamlined and include milestones to qualify likely success as early as possible in the process.

4.6 Deepen the institution's focus on research in education – especially for graduate research degrees but also for undergraduates – as a central mission of the university.

University research has long been appreciated as an intergenerational process—faculty mentor graduate students, in particular, who join in mentoring undergraduates. Further, the value of undergraduate research is well documented and has been growing for at least two decades.³⁰

It is in the national interest that US research universities demonstrably shift their faculty reward, graduate student recruitment, and related practices toward the critical role of research in education and workforce development. Such efforts can align with popular opinion; a 2025 Gallup poll found an emphasis on practical, technical, and career-focused teaching as the largest combined theme that universities could address to increase confidence in the sector³¹.

5 Research, Research Degrees, and the Broader Challenge Facing US Universities.

“Fixing” the current funding problems facing university STEM research and STEM graduate education in US universities is necessary but not sufficient to address the most pressing issues US universities face, including the disconnect of many Americans from US universities. This from the recent piece by Crow, Dabars, and Rosowsky in *Issues in Science and Technology*³²:

“This [disconnect of universities from population] was reinforced by the fact that they primarily focused their efforts on students from families in the top half of American incomes, who have consistently gotten 7 out of 10 bachelor's degrees—a

²⁸ <https://www.niaid.nih.gov/grants-contracts/overview-r01-process>

²⁹ <https://grants.nih.gov/grants/guide/notice-files/NOT-OD-25-132.html>

³⁰ <https://www.elon.edu/u/news/2024/04/22/aacu-publishes-new-report-on-mentored-undergraduate-research-in-global-contexts/>

³¹ <https://news.gallup.com/poll/692519/public-trust-higher-rises-recent-low.aspx>

³² <https://issues.org/universities-redesign-contract-crow-dabars-rosowsky/>

ratio that has barely budged in the last 50 years. And, as technology suffused American life, health disparities persisted, income inequality grew, and social mobility lagged. A recent analysis by economists Zachary Bleemer and Sarah Quincy explains that “the relative premium [of going to college] received by lower-income Americans has halved since 1960,” suggesting that for the Americans who need it most, the value of college degrees has been declining for 65 years. Moreover, as of fall 2023, 43.1 million Americans had started college but failed to finish—leaving many struggling with debt. It is not surprising that a widely cited 2023 Gallup poll showed that only 36% of Americans expressed a “great deal” or “quite a lot” of confidence in higher education.”

Some of the ideas in this white paper will help universities bridge public disaffection with universities but a productive and more focused university research enterprise cannot alone save universities. Our intent has been to provide a guide for boards of trustees and senior university leadership to navigate a sea change in research funding thereby maintaining their research and research degree education capability for the national interest.

Attachment A

State and Multistate Programs of Research Support

State-based initiatives

Dementia Prevention and Research Institute of Texas (DPRIT) (newly established from 2025 ballot measure)	https://www.science.org/content/article/dementia-researchers-cheer-texas-voters-approval-3-billion-funding-initiative
Massachusetts Life Sciences Center	https://www.masslifesciences.com/funding-programs/
New York Fund for Innovation in Research and Scientific Talent	https://esd.ny.gov/ny-first-program
Ohio Cyber Range Institute (OCRI)	https://www.ohiocyberangeinstitute.org/
Quantum California	https://business.ca.gov/governor-newsom-announces-quantum-california-strengthening-the-golden-states-leadership-in-next-generation-technology/
Research Universities for Michigan	https://miresearchuniversities.org/
Texas Higher Education Coordinating Board (THECB)	https://www.highered.texas.gov/research-funding-in-texas/research-funding-and-programs/

Multi-state and regional cross-border consortia

Cascadia Innovation Corridor	https://connectcascadia.com/
Great Lakes Higher Education Consortium	https://councilgreatlakesregion.org/program/great-lakes-higher-education-consortium/
Massachusetts Green High Performance Computing Center	https://www.mghpcc.org/
Northeast Semiconductor Manufacturing Corridor	https://nsmc-semiconductor.com/
State Science & Technology Institute	https://ssti.org/
Strategic Pharma-Academic Research Consortium	https://chicagoitm.org/sparc-funding/
University of British Columbia & University of Washington Collaborative Research Mobility Award (dormant)	https://www.washington.edu/research/resources/funding-opportunities/collaborative-research-mobility-award/
Western Governors Association	https://westgov.org/

Attachment B
Balancing largely open and proprietary/classified research
is not uncharted territory.

Universities, when implementing thoughtful policies and practices and managing them well, can advance both open research (as a core function), and, in other circumstances (subject to a clear review and approval process), confidential and proprietary functions. Carnegie Mellon University (CMU) provides a workable example of such a framework.³³ The CMU model categorizes research units as either semi-autonomous or non-autonomous, with differences as shown here.

CMU Restricted Research Policy Summary	Semi-autonomous	Non-autonomous
Included units	Mellon Institute and the Software Engineering Institute	All entities other than semi-autonomous units
General practice	Restricted research (encompassing classified and proprietary) allowed	Restricted research not permitted Exceptions allowed only for proprietary research: 1. Six-month delay due to sponsor IP rights 2. 30 day delay for publication review
Student engagement	Students must be notified that restricted research cannot be used for academic credit	

The University of Wisconsin-Madison (UW) lists a brief policy regarding publication in proprietary sponsored research, including a capped 30-day review period.³⁴

“To fulfill its missions UW research must be disseminated on a nondiscriminatory basis. The UW cannot, therefore, undertake studies the results of which cannot be freely published.”

“The UW, nonetheless, recognizes the need of industrial sponsors to protect proprietary information. On those occasions when the UW has agreed to accept a sponsor's proprietary information for use in the research project or when the UW investigators have developed patentable inventions or copyrights, publication can be deferred for a limited period of time, normally not more than

³³ <https://www.cmu.edu/policies/research/restricted-research.html>

³⁴ <https://rsp.wisc.edu/policies/indres.cfm>

thirty (30) days, to allow sponsor review and comments. The sponsor understands that the basic objective of research activities at the UW is the generation of new knowledge and its expeditious dissemination. Therefore, in review of any publication, the sponsor shall provide all reasonable cooperation in meeting this objective.”

“The UW will give the sponsor the option of receiving an acknowledgement in any publication for its sponsorship of the research.”

Johns Hopkins University (JHU) policies allow restricted research, subject to a multi-step review and approval process. However, JHU does not permit classified research on an academic campus or for degree requirements:³⁵

“As part of its commitment to its public service mission, the Johns Hopkins University endorses faculty participation in research in the national interest;” and

“The University’s commitment to openness in documentation and dissemination of research results precludes the pursuit of classified research or the use of classified information within the academic enterprise. Thus, no classified research will be carried out on any academic campus of Johns Hopkins nor will classified information be used to satisfy the criteria for any academic degree requirements, faculty appointments, or faculty promotions.”

Massachusetts Institute of Technology (MIT) similarly permits restricted research subject to review, and, as with JHU, with consideration to national interests:³⁶

“It is the policy of the Institute, therefore, that every research project within the academic structure of MIT (excluding Lincoln Laboratory) that requires a classification on the research process, classification as to the source of funds, classification of the research results, or imposition of other restrictions on publication or access must receive the prior approval of the Provost, who shall seek the advice of the Faculty Policy Committee and will inform the committee of all approvals. When unrestricted research at MIT is important to the national security, appropriate efforts will be made to ensure that relevant government agencies are informed of the results at the same time as are others in the scholarly community.”

In aggregate, such policies enable separation between open and restricted research, with the latter frequently taking place at distinct off-campus facilities – University Research Park (UW), Applied Physics Laboratory (JHU) and Lincoln Laboratory (MIT).

³⁵ https://jhura.jhu.edu/wp-content/uploads/2024/05/Classified_Restricted-Work-Review-Committee-4.13.2023.pdf

³⁶ <https://policies.mit.edu/policies-procedures/140-research-policies-and-public-and-private-support/142-open-research-and-free>