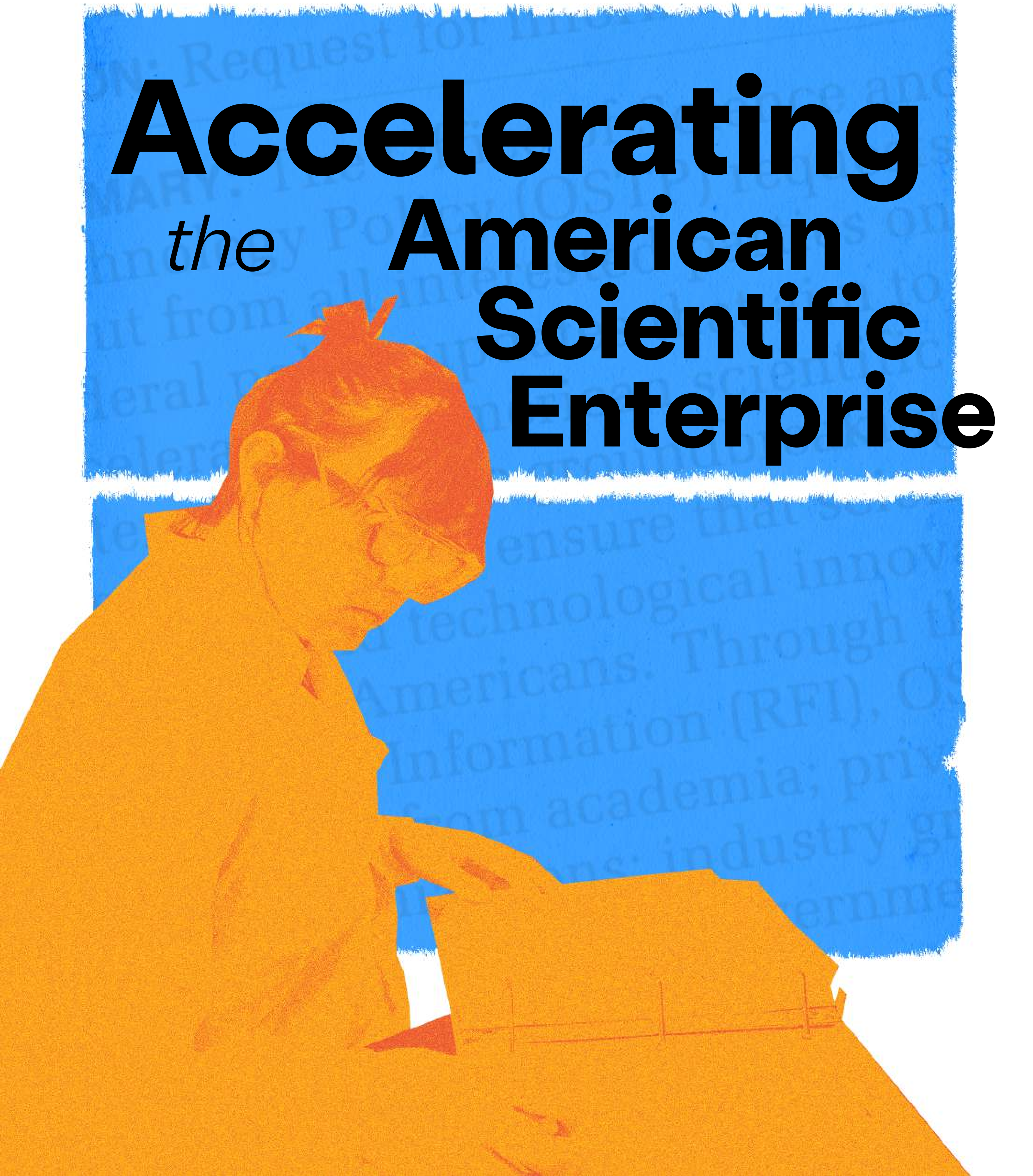
FAS FEDERATION OF AMERICAN SCIENTISTS

Accelerating *the* American Scientific Enterprise



December 23, 2025

To: Michael Kratsios
Director
Office of Science and Technology Policy
1650 Pennsylvania Avenue NW
Washington, D.C. 20504

From: Daniel Correa
Chief Executive Officer
Federation of American Scientists
1150 18th Street NW, Suite 1000
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RE: Notice of Request for Information; Accelerating the American Scientific Enterprise (2025-21150)

Dear Director Kratsios,

The American scientific enterprise is the greatest the world has ever known. It's also nowhere close to reaching its full potential in a rapidly evolving world that requires it to deliver more, faster and different outcomes than those demanded by the post-World War II order for which it was built.

The Federation of American Scientists (FAS) has curated a list of recommendations that, taken together, would unlock an enormous transformation in the ambition and function of the American scientific enterprise - one rooted in a vision of a more agile and effective engine for shared prosperity, security, human health and flourishing.

The key themes you'll see emerge in our responses can be summarized as follows:

1) **Unlock** ambitious, but achievable outcomes, by capitalizing on OSTP's ability to coordinate across the federal government and the broader science enterprise. Cut red tape to make the S&T ecosystem more nimble, dynamic, and responsive.
2) **Incentivize** executive branch agencies to reward risk-taking and experimentation, using the best practices from metascience research and other institutional and technical innovations, including the use of appropriately evaluated artificial intelligence systems to surface unidentified research with outsized transformative potential.

3) **Accelerate** the uptake of technologies at moderate technology readiness levels through the expansion of executive branch agency use of flexible authorities. This includes flexible partnership, procurement, and financing tools — such as Other Transaction Authority, prizes and challenges, and agency-adjacent foundations.
4) **Improve** the lives of everyday Americans by ensuring that scientific advances translate into tangible improvements in their lives. This includes the prioritization of context-specific evidence-building, accessible dissemination of research findings, participatory approaches to technology assessment, and stronger incentives for evidence use in program design, funding and governance.
5) **Modernize** the science and technology workforce by building more cohesive and integrated talent development, collaboration and mobility pathways. By creating opportunities for technical experts across the increasingly broad spectrum of fields needed to seed innovation, we position our workforce and this country as leaders of the next, next-generation technologies.

We believe that our science enterprise can *remain* the greatest the world has ever known and that OSTP has vast levers at its disposal to drive and shape the envisioned transformation. We aimed to identify concrete and specific steps that OSTP could take to unlock progress. We are happy to expand on any of the ideas outlined here, as well as many others that build on what we've shared in this RFI.

Additionally, we recognize that there is a tremendous amount of difficult and time-intensive implementation work to undertake to make any of this a reality. Our multidisciplinary team of experts including former government officials and subject matter experts are ready to provide technical assistance and serve as a resource to achieve measurable outcomes for the recommendations we lay out below in response to RFI questions: **1, 5, 6, 7, 8, 9, 11, 12, 13.**

POLICY MENU	
RFI Questions	**Policy Recommendations**
Q1 Mobilizing private-sector capacity for early-stage research	Rec.1: Overcome coordination barriers by leveraging convening powers and multi-sector partnerships Rec.2: Optimize use of Other Transaction Authority Rec.3: Establish agency-adjacent independent foundations across science agencies Rec.4: Expand use of prizes and challenges strategically across the innovation pipeline Rec.5: Create a culture of leadership and experimentation for innovative financing mechanisms Rec.6: Broaden applicability of IRS safe-harbor provisions Rec.7: Foster deeper industry-university research partnerships through expanding proven funding models Rec.8: Modernize technology transfer pipeline to facilitate transition of university-based research for commercial adoption
Q5 Utilizing metascience research to improve federal grantmaking	Rec.1: Build Government-wide Capacity for Research Process Innovation Rec.2: Leverage AI to Support Grant Evaluation Rec.3: Refresh the Merit Review Process Rec.4: Embed Test-and-Learn Frameworks
Q6 Reforms to enable high risk, high reward research	Rec.1: Prioritize High-Risk, High-Reward Grantmaking + Alternative Funding Strategies Rec.2: Create new centers within government specifically focused on high-risk, high-reward research Rec.3: Increase tolerance for failure by changing rules, incentives, and norms Rec.4: Leverage AI to guide high-risk investment by predicting emerging scientific trends Rec.5: Use “gap mapping” as strategic intelligence to identify foundational knowledge gaps in the R&D ecosystem Rec.6: Establish a High-Risk, High-Reward Research Marketplace
Q7 Enabling novel research institutions and models	Rec.1: Expand the NSF “Tech Labs” model for other science agencies. Rec.2: Innovate upon the current model of Federal Funded Research and Development Centers (FFRDCs) to incorporate FRO-like approaches

	Rec.3: Align incentives between universities and independent research organizations.
Q8 Leveraging advances in AI systems that may transform scientific research	Rec.1: Make Science "AI-Legible" Through Strategic Dataset Infrastructure Rec.2: Establish Community Benchmarks and Challenges for AI-for-Science Rec.3: Expand Access to Compute and Experimental Infrastructure Rec.4: Cultivate an Interdisciplinary AI–Science Workforce Rec.5: Ensure Scientific Integrity in AI-Augmented Research
Q9 Opportunities to reduce federal barriers to research and innovation	Rec.1: Establish a Federal Researcher Disclosure Data Registry Rec. 2: Reduce Disclosure Burden Through Data Minimization and Implementing Design Standards
Q11 Aligning research, engineering, and skilled technical training pathways	Rec.1: Develop integrated training programs, including apprenticeships Rec.2: Reform funding mechanisms to incentivize team integration Rec.3: Create a technical research scientist/staff career track Rec.4: Invest in customized talent mobility pathways to promote exchange between scientists, engineers, and skilled technical workers
Q12 Maximizing public return on federally funded research	Rec.1: Support Context-Specific Evidence-Building Rec.2: Make Existing and Emerging Evidence More Accessible Rec.3: Deploy Participatory Technology Assessment to ensure that federally funded research reflects public values Rec.4: Prioritize the Use of Evidence in Social Program Scaling and Design
Q13 Balancing research security and administrative burden	Rec.1: Direct federal research agencies to invest directly in both public and private sector research Rec.2: Granting original classification authority at the Top Secret level to heads of research agencies Rec.3: Request and ensure submission of rigorous cost-benefit analysis of existing and proposed research security efforts

1 | What policy changes to Federal funding mechanisms, procurement processes, or partnership authorities would enable stronger public-private collaboration and allow America to tap into its vast private sector to better drive use-inspired basic and early-stage applied research?

Problem: Industry now contributes over 75% of U.S. R&D spending, and its share of basic research rose to 35% in 2023. Over the same period, the federal share fell to 41%.[1] Despite this growth, well-documented externalities in the form of spillovers and coordination challenges reduce incentives for industry to undertake pre-competitive research. At the same time, the federal government's research funding mechanisms, procurement processes, and partnership authorities are not well-structured to incentivize the private sector to invest in use-inspired basic and early-stage applied research. In addition, specific authorities, culture, mission, and appropriations structures vary from agency-to-agency, making it difficult for the private sector to navigate and broker partnerships.

Recommendation 1: Overcome coordination barriers by setting goals that are ambitious but attainable, and that demand collaboration beyond any one organization or sector.
Just as the Defense Advanced Research Projects Agency (DARPA) Grand Challenges of the mid 2000s catalyzed the creation of the autonomous vehicle industry, well-scoped grand challenges can catalyze basic and use-inspired research across new technological frontiers with vast societal benefits. The federal government convenes expertise, sets shared goals, and creates the conditions needed to braid investments. Specifically, OSTP could:

- <u>Leverage convening power to coordinate actors across multiple goals</u>. Tools may include: OSTP-hosted roundtables, National Science and Technology Council (NSTC) committee meetings (including the creation of new committees where appropriate), and public–private dialogues.
- <u>Catalyze multi-sector partnerships to formulate and promulgate goals that are tailored for partnerships</u> by creating partnership frameworks, coordinating and setting the federal participation strategy, convening the whole ecosystem, and measuring collective impact.
- <u>Coordinate with the Office of Management and Budget (OMB) on R&D budget priorities</u> to prioritize partnerships. Establish explicit partnership requirements in budget guidance, including evaluation criteria that favor collaborative proposals, cross-agency coordination, and joint funding opportunities.

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[1] National Science Board, *Discovery: R&D Activity and Research Publications*, *Science and Engineering Indicators 2026*, NSB-2025-7 (Alexandria, VA: National Science Foundation, July 23, 2025), https://ncses.nsf.gov/pubs/nsb20257#

Recommendation 2: Optimize use of Other Transaction Authority (OTA). Across categories such as time to award, document complexity, IP terms, and contract modification speeds, OTAs are orders of magnitude faster and more flexible than traditional contracts under the Federal Acquisition Regulation (FAR), making them better suited to brokering partnerships and acting at the speed of technology cycles and innovation. Congress gives several federal agencies the authority to use flexible agreements known as other transactions (OTs). Importantly, OTs are defined by what they are not[2]. They are not a government contract or grant, and thus not governed by FAR.

Historically, the National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD) have been the most frequent users of other transaction authorities. Congress has extended OTA authority to additional agencies—including the Department of Energy (DOE), the Department of Health and Human Services (HHS), the Advanced Research Projects Agency–Energy (ARPA-E), and the National Science Foundation's Technology, Innovation, and Partnerships (TIP) Directorate—but most have not fully taken advantage of it.[3]

To assess the unrealized potential of OTA, OSTP and OMB should:

- Conduct a government wide audit of current OTA capabilities, and evaluate use cases and potential for expansion into more ambitious use within existing authority.
- Direct agencies through interagency collaboration to provide technical assistance to optimize its strategic use.
- Consider issuing OMB or Office of Federal Procurement Policy (OFPP) guidance to direct relevant agencies to use OTA where possible to to accelerate early stage R&D. OT is especially applicable at Technology Readiness Level (TRL) 3-7. Guidance could direct agencies to take actions such as: establishing use targets for OTA, designating OT coordination officials, developing internal policies and procedures on OTA, training an OT workforce, and establishing an OT community of practice.

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[2] Ryan Buscaglia, *Using Other Transactions at DOE to Accelerate the Clean Energy Transition*, Federation of American Scientists, July 31, 2023, https://fas.org/publication/other-transactions-accelerate-the-clean-energy-transition/

[3] Other agencies with OTA authority include the Department of Transportation (DOT), the National Institutes of Health (NIH), the Department of Homeland Security (DHS), the Federal Aviation Administration (FAA), the Transportation Security Administration (TSA), and the Domestic Nuclear Detection Office (DNDO).

Recommendation 3: Leverage, and where appropriate establish, agency-adjacent independent foundations across science agencies. These foundations can complement expanded OTA authority by providing ancillary support, conflict-free convening power, and the ability to blend public and private capital.

Since 1959, twelve agency-related independent 501(c)(3) nonprofit organizations have been created, which have averaged a return of $67 for every dollar in federal contributions[4]. Across the board however, the creation of agency-adjacent foundations remains underutilized. Though creating a new foundation would require legislation, recent precedent (2024) with the creation of the Foundation for Energy Security and innovation (FESI)[5] can provide a roadmap to replicate efforts in other agencies to maximize catalytic impact.

Foundations are independent 501(c)(3)s that can contract with vendors using commercial terms, negotiate IP rights freely, accept cost-sharing and in-kind contributions, and structure deals that federal agencies cannot. To accelerate use-inspired and early-stage research, the following agencies would benefit from adjacent independent foundations:

- NSF: With growing philanthropic interest in research, an independent institution could help facilitate industry co-investment. Specifically, an NSF foundation could complement and augment the role of the TIP Directorate. This entity could: 1) bridge the gap between basic research and commercialization; 2) support regional innovation ecosystems; 3) facilitate university-industry partnerships; 4) accept private funding for translational research.
- National Institutes for Standards and Technology (NIST): A NIST foundation could: 1) support advanced manufacturing (e.g. through a biomanufacturing center of excellence[6]); 2) facilitate industry consortia for standards development; 3) fund testbeds and demonstration facilities, 3) bridge academic research and industry adoption.
- U.S. Department of Agriculture (USDA): An agricultural innovation foundation could: 1) support agriculture technology commercialization; 2) facilitate farmer-researcher-industry partnerships; 3) fund demonstration projects and pilot programs; 4) bridge research and farm-level adoption.
- National Oceanic and Atmospheric Administration (NOAA): A foundation could: support private sector partnerships on weather technology, ocean observation networks and climate science.

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[4] U.S. Department of Energy, "DOE Appoints Inaugural Board of Directors for Groundbreaking New Foundation," *Energy.gov*, May 9, 2024, https://www.energy.gov/articles/doe-appoints-inaugural-board-directors-groundbreaking-new-foundation/

[5] David M. Hart, "Putting FESI on a Maximum Impact Path," Federation of American Scientists, August 7, 2024, https://fas.org/publication/putting-fesi-on-a-maximum-impact-path/

[6] *Biomanufacturing Excellence Act of 2025*, H.R. 6089, 119th Cong. (2025), https://www.congress.gov/bill/119th-congress/house-bill/6089/text

Recommendation 4: Expand use of prizes and challenges strategically across the innovation pipeline. Incentive prizes represent a powerful complement to research funding when applied strategically.[7] Prizes and challenges can serve both as a "supply push", stimulating activity toward a defined technical goal, as well as a "demand pull" mechanism, creating market validation and catalyzing private co-investment. The government vastly underutilizes prizes and challenges as tools and does not deploy them strategically across the whole innovation pipeline. The ambitious goals outlined in the FY27 R&D priorities open a policy window for a broader strategy. To this end, OSTP should:

- Re-establish a policy lead on open innovation. This role would report to the OSTP director and provide dedicated leadership for innovation initiatives (e.g. prizes and challenges). This role had a significant impact in driving the innovative use of prizes and challenges in prior administrations and should be reinstated and aligned for the current administration's priorities and goals.
- Set a strategy to use "discovery prizes" coupled with distinct category of "market acceleration prizes" to align with articulated FY27 research priorities[8]; for example, quantum device benchmarks, biomanufacturing efficiency targets, space technology demonstrations, and cybersecurity challenges.
- Prioritize cross agency and interdisciplinary participation in prize competitions.
- Democratize talent identification to ensure broad participation. Innovative ideas can come from anywhere and it is critical that access to prizes and challenge competitions reaches the most diverse pipeline of innovators possible.

Recommendation 5: Create a culture of leadership and experimentation for innovative financing mechanisms. Successful adoption of innovative funding mechanisms will depend on strong leadership and a cultural appetite to test new ideas.

- Invest in strong leadership. Federal agencies should have a dedicated "innovation cell" for acquisition innovation that reports directly to a Secretary or Director and bypasses the traditional acquisition hierarchy, in the way that the Department of Homeland Security has modeled through the Procurement Innovation Lab. This model would also serve to match the appropriate financing mechanism to the specific context.
- Support experimental approaches. Federal agencies should consider adopting a "marketplace model"[9] that allows agencies to syndicate vetted projects to private

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[7] Cristin Dorgelo, "Scaling Effective Methods across Federal Agencies: Looking Back at the Expanded Use of Incentive Prizes between 2010–2020," *Federation of American Scientists*, August 29, 2024, https://fas.org/publication/government-incentive-prizes/

[8] Office of Management and Budget and Office of Science and Technology Policy, *Fiscal Year (FY) 2027 Administration Research and Development Budget Priorities and Cross-Cutting Actions*, Memorandum M-25-34/NSTM-2 (Washington, D.C.: Executive Office of the President, September 23, 2025), https://www.whitehouse.gov/wp-content/uploads/2025/09/M-25-34-NSTM-2-Fiscal-Year-FY-2027-Administration-Research-and-Development-Budget-Priorities-and-Cross-Cutting-Actions.pdf

[9] Sandeep Patel, "Why Science Needs a Marketplace," *Catalyze* (Substack), October 30, 2025, https://catalyzernd.substack.com/p/why-science-needs-a-marketplace

capital, including philanthropies and family offices. Agencies can participate in shared, open platforms where their validation serves as a signal to crowd-in private investment for highly scoring work (through merit review) they cannot fund themselves. This model "unbundles" the funding process, allowing diverse entities to compete for funding based on the merit of their ideas rather than their institutional affiliation. An example pilot is provided under Question 6, recommendation 6.

Recommendation 6: Broaden applicability of Internal Revenue Service (IRS) safe-harbor provisions. IRS revenue procedures include safe-harbor provisions that exempt "basic research agreements" from restrictions on private business use. The IRS defines basic research as "any original investigation for the advancement of scientific knowledge not having a specific commercial objective." This definition is too narrow, because the lines between "basic" and applied research are blurry — and virtually nonexistent when it comes to cutting-edge fields such as digitalization, biosciences, and quantum computing.

- The IRS should broaden the definition and applicability of its safe-harbor provisions to include all research activities, not just 'basic research'[10].

Recommendation 7: Foster deeper industry-university research partnerships through expanding proven funding models and working with Congress to expand incentives. The R&D tax credit functions as a demand-pull mechanism to incentivize private sector R&D investment, encourage industry-university collaboration, complements other mechanisms (grants, OTAs, prizes), and reduces cost of innovation for companies.

- The current R&D credit could be improved by providing greater incentives for companies to partner with universities for R&D. This would require increasing the tax credit for R&D activities conducted at universities and other research entities so that it equals the benefit provided for "in-house" research at companies[11].

[10] Brian Darmody and Bill Bates, "Reforming Federal Rules on Corporate-Sponsored Research at Tax-Exempt University Facilities," Federation of American Scientists, July 8, 2021, https://fas.org/publication/reforming-federal-rules-on-corporate-sponsored-research-at-tax-exempt-university-facilities/

[11] Association of American Universities, "Research and Development (R&D) Tax Credit," *AAU.org*, December 7, 2022, https://www.aau.edu/research-and-development-rd-tax-credit#:~:text=The%20R&D%20Tax%20Credit%20and,result%20of%20industry%2Dfunded%20research

Recommendation 8: Modernize technology transfer pipeline from lab to market to facilitate transition of university-based research for commercial adoption. Reimagining the pipeline between university technology transfer offices (TTOs), Small Business Innovation Research (SBIR) Programs, and Loan Program Offices could open bottlenecks in the innovation pipeline. Currently, TTOs often serve as gatekeepers of innovation, with a focus on protecting university IP and are often expected to do functions that are better suited to other components of the innovation pipeline. Suggested reforms include:

- Incentivize models that locate TTO functions outside of universities. Regional models allow deeper flexibility, economies of scale, specialization of function, partnership with the private sector, and the ability to serve multiple universities at the same time. An external capability could also take on some of the downstream functions of a loans-program office to enable first-of-a-kind deployment.
- Build a robust talent pipeline for TTO functions. Capabilities across academic institutions vary widely. TTO offices would benefit from a specialized talent pipeline. Ideas to consider:
    - Create a national TTO training program via additional funds to NSF TIP.
    - Leverage talent mobility programs akin to the Intergovernmental Personnel Act (IPA) to create pathways for sabbaticals and exchanges with industry, including opportunities to deploy Presidential Innovation Fellows (PIF).
    - Universities could create “entrepreneur in residence” programs to promote knowledge exchange.

Related FAS Policy Memos
• A NIST Foundation to Support the Agency’s AI Mandate • Lessons Learned from Other Agency-Affiliated Foundations • Focused Research Organizations: A New Model for Scientific Research • Creating a US Innovation Accelerator Modeled on In-Q-Tel • Reforming Federal Rules on Corporate-Sponsored Research at Tax-Exempt University Facilities

5 | What empirically grounded findings from metascience research and progress studies could inform Federal grantmaking processes to maximize scientific productivity and increase total return on investment? Please provide specific examples of evidence-based reforms that could improve funding allocation, peer review, or grant evaluation.

Problem: Accelerating scientific progress requires more than good scientists—it requires agile and evolving institutions, systems, and processes. When those systems calcify, innovation itself slows down. Modernizing federal grantmaking isn't peripheral to scientific progress; it's central to unlocking innovation potential[12].

Scientific grantmaking was built for purpose in the post-World War II era. Science has changed dramatically in the past 80 years, but the grantmaking apparatus has not kept pace. Administrative burden impedes discovery; 42% of researchers' time on federally funded projects is spent on administrative tasks rather than actual research, more than double the 18% from two decades earlier[13]. Promising ideas that don't fit established categories or come from unusual sources often fall through the cracks. Decades of metascientific literature offer insights to better position grantmaking to drive innovative discovery, while becoming more streamlined for both scientists and federal agencies. But we still have more questions than answers. The principles of metascience can provide guidance and a framework for experimentation, evidence building, and integration into the system. And dozens of federal agencies provide fertile ground for experimentation. Embedding "metascience learning loop" across the whole of government could drive innovation in scientific methods that matches innovation in scientific discoveries.[14]

Recommendation 1: Build government-wide capacity for research process innovation.
OSTP could play an essential convening and coordinating role in building an infrastructure for agency experimentation with modernized grantmaking approaches in a manner that creates cross-agency incentives. OSTP could:

- Establish an NSTC Subcommittee on Research Process Innovation. This could bring together representatives from every major research agency with a mandate to approve agency pilot programs and track results.
- Launch a Federal Metascience Entrepreneurship Fellowship. OSTP should coordinate a fellowship program in which agencies commit modest resources and host term-limited

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[12] Michael Nielsen and Kanjun Qiu, "A Vision of Metascience: An Engine of Improvement for the Social Processes of Science," *Science++*, October 18, 2022, https://scienceplusplus.org/metascience/index.html#is-transformative-improvement-possible-in-the-culture-of-science
[13] https://goodscienceproject.org/articles/the-efforts-to-reform-research-bureaucracy-to-date/
[14] Nielsen and Qiu, *"A Vision of Metascience."*

fellows to design and run pilots. The model could build on NIH's 2024 Pilot NIH Science of Science Scholars Program[15], which embedded metascientists for program evaluation. Unlike the NIH pilot, these fellowships should be agency-funded.

- Create a Federal Grants Modernization Testbed. Designate one mid-sized agency (e.g. NIST) as a testbed that encourages radical experiments. This could provide a safe space to fail without threatening core missions, concrete results to show other agencies, and reduce political risk.

Recommendation 2: Leverage Artificial Intelligence (AI) to support grant evaluation.

- Make the full life cycle of funding more transparent. The government should provide access to proposal scoring data and disclose which meritorious proposals went unfunded, enabling others, including the private sector, to pick up those projects. This should be done only with full precautions taken to safeguard private information. Such an effort will require the creation of a "Knowledge Layer" that captures the full lifecycle of research—including unfunded proposals and negative results—in a machine-readable graph. This data infrastructure is the necessary prerequisite to train AI models that can predict outcomes and optimize national science strategy[16].
- Federal agencies should consider the use of AI to analyze grant applications. OSTP should coordinate an effort across science agencies to build fit-for-purpose tools for use by grant reviewers and agency staff. Such tools could be designed to help users understand overall trends in grant applications, the novelty of any specific grant application, or even to support prediction of research results[17].
- The government should invest in "AI Program Manager" infrastructure that functions as an "air-traffic control" system for research, mapping dependencies and duplication in real-time. This moves funding from "Level 0" (human-only) to "Level 2/3" (AI-assisted) autonomy, enabling dynamic coordination rather than static grant cycles[18].
- Deploy AI tools to safeguard scientific integrity. Further, such tools could support program officers' monitoring of scientific integrity (a core principle of Gold Standard Science) without increasing administrative burden[19]. A high-quality, validated tool has the potential to conduct pipeline forensics and detect fraud, ensuring that federally

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[15] National Institutes of Health, *Pilot NIH Science of Science Scholars Program*, Division of Program Coordination, Planning, and Strategic Initiatives, Office of Evaluation, Performance, and Reporting, accessed December 2, 2025, https://dpcpsi.nih.gov/oepr/pilot-nih-science-science-scholars-program
[16] https://catalyzernd.substack.com/
[17] Richard Ikeda and Neil Thakur, "Use Artificial Intelligence to Analyze Government Grant Data to Reveal Science Frontiers and Opportunities," *Day One Project*, Federation of American Scientists, July 10, 2025, https://fas.org/publication/ai-analyze-grant-data-science-frontiers/
[18] Sandeep Patel, "The AI Program Manager," *Catalyze* (Substack), October 29, 2025, https://catalyzernd.substack.com/p/the-ai-program-manager
[19] "A Top Scientist's Ideas as to NIH," *The Good Science Project* (Substack), November 22, 2025, https://goodscience.substack.com/p/a-top-scientists-ideas-as-to-nih

funded research results in studies free of p-hacking, HARKing, and other issues that have hindered trust in science and scientific progress.

Recommendation 3: Refresh the merit review process. Nearly three decades of data on NIH grants demonstrate that higher merit review scores are associated with better research outcomes,[20,21] but as with the rest of our grantmaking infrastructure, the current system of merit review requires modernization. Political interference in federal grantmaking processes that inserts additional subjective criteria has the potential to decrease the rigor and quality of funded research and is strongly discouraged.

In December 2025, the National Science Board (NSB) issued a report developed by the Commission on Merit Review to ensure that NSF's award decisions remain the best in class – based on merit – and that the resulting portfolio of awards accomplishes NSF's mission to promote the progress of science, advance the national health, prosperity, and welfare, and secure the national defense[22]. The recommendations in this report may serve as a broad template for other agencies in the context of scientific innovation.

- OSTP should consider using the NSF Merit Review reforms in the recently-released NSB report as a pilot for federal S&T governance across multiple agencies, then use its convening and coordinating authority to 1) standardize societal-benefit expectations across agencies; 2) normalize portfolio-based accountability; and 3) reduce administrative burden while improving outcomes.

Science agencies may take additional steps to improve merit review, such as:

- Introduce quantitative measures to inform the review process. FAS piloted the use of expected-utility forecasting—a formal, quantitative measure of predicted success and impact—as a metric for assessing the risk–reward profile of science proposals and funding portfolios. We found that forecasting is a light-touch approach that adds objectivity and rigor to the review process while reducing anti-risk bias.[23]
- Expand the reviewer pool. Agencies should broaden the definition of expertise to include perspectives beyond academia, such as industry professionals and patient advocates. This approach has been successfully used with federal programs such as the DOD's Congressionally Directed Medical Research program[24]. Diversifying reviewer

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[20] Danielle Li and Leila Agha, "Big Names or Big Ideas: Do Peer-Review Panels Select the Best Science Proposals?" *Science* 348, no. 6233 (April 24, 2015): 434–38, https://doi.org/10.1126/science.aaa0185.
[21] Stephen A. Gallo et al., "The Validation of Peer Review through Research Impact Measures and the Implications for Funding Strategies," *PLOS ONE* 9, no. 9 (2014): e106474, https://doi.org/10.1371/journal.pone.0106474.
[22] National Science Board, *Merit Review for a Changing Landscape*
[23] Alice Wu, "Predicting Progress: A Pilot of Expected Utility Forecasting in Science Funding," *Day One Project*, Federation of American Scientists, March 18, 2024, https://fas.org/publication/predicting-progress-utility-forecasting/
[24] Congressionally Directed Medical Research Programs (CDMRP), "CDMRP's Two-Tiered Review Process," *CDMRP.health.mil*, last updated October 28, 2025, https://cdmrp.health.mil/about/2tierRevProcess

pools also aligns with calls to strengthen public impact by including non-technical expertise and perspectives in the review process. Merit review, particularly the "broader impacts" criterion at NSF, would be strengthened by including reviewers with expertise in diverse domains of public impact rather than solely the technical discipline of the proposal.

- Mitigate bias with double-blind reviews. To address the favoring of prestigious, well-known scientists, agencies should move toward a two-phase, double-blind review system, beginning with a blind review of scientific merit where proposals are anonymized and only assessing investigator and institutional qualifications after merit is established.

Recommendation 4: Embed test-and-learn frameworks. Alongside the use of innovative funding mechanisms, we recommend that science agencies consider how they can build metascientific research into their processes. To that end, OSTP could play a critical role in normalizing experimentation across agencies, making test-and-learn approaches routine rather than exceptional. OSTP could:

- Issue guidance that encourages agencies to embed test-and-learn frameworks, such as randomized pilots, staged trials, and comparative evaluation into grantmaking, peer review, and program design, explicitly framing these as metascientific research activities rather than compliance burdens.
- Create a common metascience playbook that is developed with agencies to provide a shared set of methods, metrics, and experimental designs.
- Coordinate cross-agency pilots. Use NSTC subcommittees to launch coordinated test-and-learn pilots, enabling agencies to compare approaches and generate generalizable evidence about what improves research quality and outcomes.
- Ensure evidence feeds back into policy. Require agencies to document lessons learned and use results from test-and-learn efforts to inform future Requests for Proposals (RFPs), budget justifications, and evaluation criteria, closing the loop between experimentation and institutional change.

Related FAS Policy Memos
• Leveraging Machine Learning to Reduce Cost & Burden of Reviewing Research Proposals at S&T Agencies • Risk and Reward in Peer Review • Blank Checks for Black Boxes: Bring AI Governance to Competitive Grants • Enabling Faster Funding Timelines in the National Institute of Health

6 | What reforms will enable the American scientific enterprise to pursue more high-risk, high-reward research that could transform our scientific understanding and unlock new technologies, while sustaining the incremental science essential for cumulative production of knowledge?

Problem: Transformative breakthroughs that redefine fields, create new industries, or solve entrenched societal challenges almost never emerge from incremental work optimized for short-term certainty[25]. High-risk, high-reward (HRHR) research is essential in accelerating scientific innovation, but often fails, not because scientists lack bold ideas, but because the incentive system penalizes uncertainty at every level. Effective HRHR policy requires aligning incentives across researchers, institutions, and funders—shifting evaluation from project-level success to portfolio-level learning and impact, and institutionalizing tolerance and expectation of failure.

High-risk research requires different institutional structures than incremental research—longer time horizons, tolerance for failure, active management, flexible funding, and focus on transformational rather than incremental outcomes. Over the past decade, federal agencies and philanthropy have experimented with different institutional models, including ARPAs, consortium-based programs, and now focused-research organizations. But change at the institutional level must be translated to the level of program-specific grantmaking and will require federal agencies to embrace a culture of experimentation and the willingness to test a portfolio of different approaches.

Recommendation 1: Prioritize high-risk, high-reward grantmaking + alternative funding strategies

- <u>NIH should aim to fund one high-risk proposal for every 20 grants awarded.</u> NIH has historically funded high-risk, high-reward research at a rate of roughly one award for every 100 R01 grants, underscoring how small a portion of the NIH portfolio these HRHR programs currently represent[26]. In addition, *STAT News* recently published a detailed analysis that showed there has actually been a drop in high-risk, high-reward grants, despite the stated aim of NIH leadership. In the first nine months of 2024, the NIH funded 406 high-risk, high-reward grants; in 2025, that fell to 364[27]. NIH should

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[25] National Research Council, "Understanding the Pathways from Research to Innovation," in *Furthering America's Research Enterprise* (Washington, DC: The National Academies Press, 2014), chap. 3, https://www.nationalacademies.org/read/18804/chapter/5

[26] Andrew Sosanya, "Supercharging Biomedical Science at the National Institutes of Health," Federation of American Scientists, April 19, 2022, https://fas.org/publication/supercharging-biomedical-science-at-the-national-institutes-of-health/

[27] Megan Molteni, Anil Oza, and J. Emory Parker, "American Science, Shattered: Part 1 — Scientists Lost a Reliable Partner, with 'Nothing to Replace It,'" *STAT News*, December 4, 2025, https://www.statnews.com/2025/12/04/american-science-shattered-series-analyzes-trump-research-funding-cuts/

prioritize the expansion of existing HRHR programs, such as the Common Fund in the Office of Strategic Coordination[28], and seek new approaches to grant evaluation that reduce risk aversion (more detail in Recommendation 3 below).

- NSF should expand and incentivize the use of innovative, flexible funding mechanisms. We encourage the expanded use of programs like Early-Concept Grants for Exploratory Research (EAGER), Small Grants for Exploratory Research (SGER), and other approaches that allow program officers to provide small, flexible grants[29]. SGER, in particular, has been found to drive an outsized proportion of transformative research[30]. Further, NSF should build on the success of ARPA programs[31] by implementing a "micro-ARPA" grant program, with dedicated staff and flexible funding for small grants.
- Science agencies more broadly should also consider how they can balance funding portfolios not just across topic areas, but also on multiple timescales. Rather than being tied to just what is fundable on a yearly budget cycle, they should learn from prior ambitious projects such as the Human Genome Project, finding opportunities to invest in mission-aligned projects[32], even if the potential return on such projects may not be realized in the near term.
- Funding replication studies should be a priority. Secretary Kennedy proposed directing a substantive proportion of NIH funding toward studies that replicate prior studies, seeking to increase confidence in their findings. However, NIH and other science agencies should be intentional about which studies they choose to replicate. Analysis by the Institute for Progress[33] finds that replication of studies that are likely to be influential and with higher-than-average uncertainty about the results leads to a 1.36x return on investment.

[28] National Institutes of Health Common Fund, "High-Risk, High-Reward Research (HRHR)," last reviewed November 20, 2025, *NIH Common Fund*, https://commonfund.nih.gov/highrisk

[29] David T. Lang, "Micro-ARPAs: Enhancing Innovation Through Small Grants,", Federation of American Scientists, December 9, 2024, https://fas.org/publication/micro-arpa/

[30] Caroline S. Wagner and Jennifer Alexander**,** "Evaluating Transformative Research Programmes: A Case Study of the NSF Small Grants for Exploratory Research Programme," *Research Evaluation* **22, no. 3** (2013): 187–197, https://doi.org/10.1093/reseval/rvt006

[31] Pierre Azoulay, Ethan Fuchs, Ana-P. Goldstein, and Matt Kearney, "Funding Breakthrough Research: Promises and Challenges of the 'ARPA Model,'" *Innovation Policy and the Economy* 19, no. 1 (2019): 69–96, https://doi.org/10.1086/699933

[32] Neil Thakur, "Increasing the Value of Federal Investigator-Initiated Research through Agency Impact Goals," Federation of American Scientists, December 4, 2025, https://fas.org/publication/federal-research-agency-impact-goals/

[33] Jordan Dworkin, "How Much Should We Spend on Scientific Replication? A Data-Driven Framework for Targeting Replication Funding Where It Matters Most," *Institute for Progress*, October 31, 2025, https://ifp.org/how-much-should-we-spend-on-replication/

Recommendation 2: Create new centers within government specifically focused on high-risk, high-reward research

- Establish a new National Institute for High-Reward Research (NIHRR)[34] as a stand-alone agency, not tied to the NIH or the NSF. The NIHRR would be empowered to fund the potentially high-reward research that goes overlooked elsewhere, across disciplines.
- HHS could establish a Center for NIH Innovation (CNI)[35] by following the statutory process of invoking the Scientific Management Review Board, with a mission to develop pilot experiments as to how NIH hands out funds, evaluates the results, and promotes more widespread adoption of successful programs. CNI should be empowered to take approaches that work, and scale them up into NIH-wide policies, so that the rest of NIH benefits from experimental learnings

Recommendation 3: Increase tolerance for failure by changing rules, incentives, and norms. Increasing tolerance for failure requires reforming evaluation systems, redesigning funding mechanisms, and creating institutions that reward learning and exploration rather than short-term certainty. To this end, OSTP could:

- Direct agencies to assess HRHR programs by their portfolio learning, breakthrough outcomes, and follow-on spillovers, rather than solely by individual project success rates. Agencies should produce annual "learning reports" that emphasize insights and improvement, not just successes.
- Through the R&D budget priorities memo, require agencies to allocate a minimum share of research funding to HRHR mechanisms.
- Issue cross-agency guidance on risk-appropriate peer review, including explicit scoring of novelty and uncertainty and contribution-based evaluation for HRHR awards.

Recommendation 4: Leverage AI to guide high-risk investment by predicting emerging scientific trends.

- Use AI to analyze government grant data to select for high risk, high reward opportunities[36]. AI analyses also could help identify emerging funding trends in their innovation space in ways that protect the confidentiality of federal data. AI can also make practical, easy-to-digest summaries of U.S. federal grants in close to real time, and could help to identify areas of overlap, redundancy, and opportunity. By including

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[34] Stuart Buck, "A National Institute for High-Reward Research," Federation of American Scientists, July 23, 2025, https://fas.org/publication/national-institute-for-high-reward-research/

[35] Stuart Buck, "Experimenting with NIH Funding," *Techno-Industrial Policy Playbook 2025*, *RebuildingTech*, accessed December 22, 2025, https://www.rebuilding.tech/posts/experimenting-with-nih-funding

[36] Ikeda and Thakur, "Use Artificial Intelligence to Analyze Government Grant Data to Reveal Science Frontiers and Opportunities."

projects that were unfunded, the public would get a sense of the direction in which federal funders are moving and where the government might be underinvesting. With less effort focused on coordination between projects or unintentional duplication of projects, it will become easier to identify and prioritize investment in high-risk, high-reward projects.

Recommendation 5: Use "gap mapping" as strategic intelligence to identify foundational knowledge gaps in the R&D ecosystem that, if solved, could enable sophisticated identification of high-risk, high-reward research. "Gap maps" can be a powerful metascientific tool for systematically identifying where high-risk, high-reward research opportunities exist. For example, Convergent Research has developed a "gap map" portal that identifies[37] 1) capabilities that span multiple fields but aren't funded by any single agency; 2) enabling infrastructure that would catalyze progress across disciplines, 3) tools that don't fit traditional R&D categories. Administration progress on FY27 research priorities would benefit from developing targeted gap maps. For example, creating a map of AI applications across scientific domains to show what fields have applied AI extensively (e.g. protein folding) and which have not. This could direct high-risk, high-reward research toward domains that have rich data sets, but less AI capability. OSTP could:

- Direct agencies to create agency-specific gap maps and use gaps identified to shape new funding opportunities.
- Work with OMB to draft guidance that includes gap analyses to support R&D priority-setting and demonstrate the rationale for shifting priorities.
- OSTP (through NSTC) could drive the creation of government-wide gap maps for priority areas to avoid duplication across agencies and provide support for interagency initiatives.
- Create a process for public input on government-wide gap maps to crowdsource additional gaps from the research community and create buy-in.

[37] Convergent Research, *Gap Map Database*, accessed December 22, 2025, https://www.gap-map.org/?sort=rank

Recommendation 6: Establish a high-risk, high-reward research marketplace. Agencies should pilot a contained ideas marketplace limited to high-risk, high-reward research that has already undergone public technical review and received agency validation. This marketplace would function as a coordination layer, allowing government-vetted projects to be paired with complementary private or philanthropic funding[38]. While the platform improves discoverability, its primary value lies in operating a finance mechanism that includes explicit risk-sharing arrangements. Initial government funding would absorb early technical risk and serve as first-loss capital, while non-federal funders could participate through co-investment or matched funding. Importantly, this approach preserves public scientific integrity and maintains full independence of the peer-review process. NSF's EAGER program could serve as a proof of concept for this approach, with the research marketplace including EAGER projects that span frontier, cross-disciplinary, or systematically underfunded approaches, such as community-based or participatory science.

Related FAS Policy Memos
• Piloting and Evaluating NSF Science Lottery Grants: A Roadmap to Improving Research Funding Efficiencies and Proposal Diversity • Fund Organizations, Not Projects: Diversifying America's Innovation Ecosystem with a Portfolio of Independent Research Organizations • Open Scientific Grant Proposals to Advance Innovation, Collaboration, and Evidence-Based Policy

[38] Sandeep Patel, "Why Science Needs a Marketplace" *Catalyze* (Substack) October 30, 2025 https://catalyzernd.substack.com/p/why-science-needs-a-marketplace

7 | How can the Federal government support novel institutional models for research that complement traditional university structures and enable projects that require vast resources, interdisciplinary coordination, or extended timelines?

Problem: A more dynamic, agile federal S&T ecosystem – one that is capable of producing transformative scientific discoveries at scale and pace with national priorities requires: 1) institutional innovation to modernize the structures through which science operates; 2) high-risk high-reward research to drive transformative breakthroughs; and 3) metascience reform to improve the measurement, evaluation, and incentive systems that govern where research dollars go, which in turn, enables agencies to reward risk-taking and transformative potential. Questions 5 and 6 focused on metascience and HRHR, respectively. Institutional innovation is the third core pillar that will help the U.S. science enterprise realize its full untapped potential.

Historically, U.S. science funding has relied on project-based grants awarded to individual investigators at universities. While this model has served as a vital source of innovation and discovery, there is growing recognition that it is poorly suited for modern technology acceleration and translation challenges that require research built large-scale infrastructure, focused interdisciplinary collaboration, or long-term investment. Over the past five years, in the U.S. and globally, experiments with new institutional models for early stage research are proliferating in an "innovation menagerie[39]." But to date, federal support for novel institutional structures, such as Focused Research Organizations (FROs) has lagged. FAS applauds the recent announcement by NSF[40] for a new "Tech Labs" initiative, designed to launch and scale a new generation of federally funded independent research organizations, and hopes that this represents the beginning of expanded federal support for models of independent research organizations across the science agencies, as well as a reconception and reinvigoration of the National Labs and Federal Funded Research and Development Centers (FFRDCs). To that end, we offer the following recommendations.

[39]Sara G. Rodriques, Peter E. Slatkin, and Aviv Regev, "The Innovation Menagerie: New Institutional Structures Are Emerging to Support Scientific Discovery," *Cell* 187, no. 14 (2024): e13 — e27, https://doi.org/10.1016/j.cell.2023.11.039
[40]U.S. National Science Foundation, "NSF Announces New Initiative to Launch and Scale a New Generation of Transformative Independent Research Organizations to Advance Breakthrough Science," *NSF.gov*, December 17, 2025, https://www.nsf.gov/news/nsf-announces-new-initiative-launch-scale-new-generation

Recommendation 1: Expand the NSF "Tech Labs" model for other science agencies. Building on the momentum of the recent announcement from NSF, OSTP should direct other science agencies, including but not limited to NIH, NOAA, USDA, DOE, the Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), and NASA, to build capacity to incentivize and fund FRO-like independent research organizations that harness "team science" to accelerate discovery in specific topical areas in a time-bound and mission-driven manner. This could begin within existing appropriations and expand as additional resources are allocated. Each agency should experiment with its own 'design-for-purpose' approach, recognizing that there is not a one-size-fits-all model for the structure and function of independent research organizations.

- Federal agencies should back broad open calls for FROs in specific areas or across fields, leveraging the convening power of the federal government to accelerate cross-disciplinary innovation.
- A conceptual framework developed by the Institute for Progress lays out a detailed vision for an "X Labs[41]" approach that could be customized for use and uptake by different science agencies, notably also unleashing the power of AI to drive scientific innovation through an "X Labs" model[42].

Recommendation 2: Innovate upon the current model of FFRDCs to incorporate FRO-like approaches where appropriate. While FFRDCs serve legitimate ongoing needs (systems integration, objective analysis, classified work), many also have aging facilities and equipment that hinder research and development efforts, and long-duration contracts can create institutional inertia and more of a long-term operations role, rather than focused on specific problems. Restructuring some FFRDCs as appropriate with select FRO-like principles could enhance innovation capacity at a lower lift than creating whole new independent organizations. Actions to consider:

- Time-bound missions. Instead of indefinite contracts, new FFRDCs could be restructured as 5-7 year focused efforts with specific deliverables, then sunset or rebid. For existing FFRDCs, agencies could create FRO-style task orders within existing contracts with time-bound deliverables and dedicated teams.
- Focused technical challenges: FFRDCs could be organized around specific bottlenecks—building a particular tool, dataset, or capability—then dissolving when complete.

[41] Caleb Watney, "Launching X-Labs for Transformative Science Funding," *The Techno-Industrial Policy Playbook*(Rebuilding.Tech), May 6, 2025, https://www.rebuilding.tech/posts/launching-x-labs-for-transformative-science-funding
[42] Caleb Watney, "Using X-Labs to Unleash AI-Driven Scientific Breakthroughs," *Institute for Progress*, August 11, 2025, https://ifp.org/how-x-labs-can-unleash-ai-driven-scientific-breakthroughs/

Recommendation 3: Align incentives between universities and independent research organizations. Getting the incentive structures right can help ensure that universities provide valuable partnerships to federally funded independent research organizations, particularly with respect to scientific talent and shared infrastructure[43].

- Cross-institution talent pathways. The federal government can help create intentional pathways for talent mobility between universities and independent research organizations. Such entities could become a rich training ground for future scientists and entrepreneurs,and students could become critical components of "portable research teams." For example, graduate students and postdocs could be embedded full-time at an independent research organization, but tuition could still flow to the university, and salaries be co-funded. Joint deliverables could include academic publications and also milestone-based efforts that align with research goals. Additionally, similar to the NSF Rotator model, the federal government should consider the creation of a short-term appointment category (e.g., "Independent Lab Program Scientist") that creates a hybrid tour-of-service model for tenured faculty to participate in a team.
- Flexible funding mechanisms. Independent research institutions could develop milestone-based, block grants, subcontracts to university labs to leverage the use of critical equipment and physical space. This will help reduce administrative burden to universities and counter potential loss of indirect expenses.

Related FAS Policy Memos
• A Focused Research Organization to Design and Synthesize Spirligomer Catalysts • Automating Scientific Discovery: A Research Agenda for Advancing Self- Driving Labs • Establish a $100M National Lab of Neurotechnology for Brain Moonshots • Unpacking Hiring: Toward a Regional Federal Talent Strategy

[43]Erica Goldman, "Team Science Needs Teamwork: Universities Should Get in on the Ground Floor in Shaping the Vision for New NSF Tech Labs," *Federation of American Scientists*, December 12, 2025, https://fas.org/publication/tech-labs-announcement/

8 | How can the Federal government leverage and prepare for advances in AI systems that may transform scientific research—including automated hypothesis generation, experimental design, literature synthesis, and autonomous experimentation? What infrastructure investments, organizational models, and workforce development strategies are needed to realize these capabilities while maintaining scientific rigor and research integrity?

Problem: AI systems are poised to transform science—accelerating hypothesis generation, experimental design, literature synthesis, and autonomous experimentation. But this promise will not be realized automatically. Foundational scientific knowledge remains poorly digitized, often embedded in tacit practices or unpublished negative results. Many fields lack structured datasets or shared benchmarks to guide AI development. Access to compute, data, and AI expertise remains highly unequal. And there are ongoing challenges with replicating AI-based research. Without targeted policy intervention, AI may exacerbate existing disparities, concentrate benefits in a few institutions, and erode scientific rigor. The federal government must invest in infrastructure, workforce, and institutional practices that make science legible to AI systems while upholding quality and public accountability.

Recommendation 1: Make Science "AI-Legible" Through Strategic Dataset Infrastructure. AI systems need structured, high-quality data to be useful. Success stories like AlphaFold relied on the Protein Data Bank (PDB)[44], a decades-long, community-driven effort to curate experimental data. Most scientific domains lack comparable resources. The federal government should lead a coordinated initiative to support both top-down and bottom-up dataset creation and curation.

Top-down efforts should identify high-impact scientific problems—those with large combinatorial search spaces, rich data, and clear objective functions[45]—as prime candidates for AI acceleration. OSTP could direct agencies to fund dataset development using a phased model: Phase I for scoping and standards development, Phase II for scaled data collection and public release.[46]

Not all important datasets can be clearly identified in advance, and bottom-up approaches are equally important.[47] To surface this data, agencies should provide supplemental grants for

[44] Worldwide Protein Data Bank (wwPDB), *wwpdb.org*, accessed December 22, 2025, https://www.wwpdb.org/
[45] Conor Griffin, Don Wallace, Juan Mateos-Garcia, Hanna Schieve, and Pushmeet Kohli, "A New Golden Age of Discovery: Seizing the AI for Science Opportunity," *AI Policy Perspectives* (Substack), November 26, 2024, https://www.aipolicyperspectives.com/p/a-new-golden-age-of-discovery
[46] Erika DeBenedictis, Ben Andrew, and Pete Kelly, "Kickstarting Collaborative, AI-Ready Datasets in the Life Sciences with Government-funded Projects," *Day One Project*, Federation of American Scientists, January 2, 2025, https://fas.org/publication/collaborative-datasets-life-sciences/
[47] Griffin et al., "A New Golden Age of Discovery."

dataset curation, encourage dataset sharing in standardized, AI-ready formats as part of the publication process, and explicitly recognize datasets in grant reviews. OSTP could direct NIST to develop standards for AI-ready dataset publication in collaboration with funders and journals.

Science is more than structured data. It includes program reviews, failed experiments, informal workflows, and tacit knowledge often excluded from published work.[48] The UK's recent AI for Science Strategy[49] calls for mobilizing "dark data"—unpublished or hard-to-structure scientific information—for AI training.

- OSTP should support similar pilot efforts to extract such information from lab notebooks, grant proposals, and supplementary files, using AI tools to make this knowledge machine-readable. Grant data can also be analyzed using AI to find new scientific opportunities.[50]

Recommendation 2: Establish Community Benchmarks and Challenges for AI-for-Science. Progress in AI often follows the introduction of shared benchmarks (e.g., ImageNet in computer vision[51] and CASP in protein folding[52]). OSTP should coordinate across scientific agencies to pair dataset development with the creation of benchmark competitions targeting priority scientific problems.

- These "common task"[53] frameworks should include standardized datasets, evaluation metrics, and leaderboards, ideally with buy-in from a large scientific community[54]. Benchmarks not only coordinate research communities but also improve rigor by making results independently testable and providing a widely understood measure of progress.
- Benchmarks must evolve. As tasks become saturated or leak into model training data, agencies must update or retire them. Competitions should also encourage submission

[48] Ben Reinhardt, "Teaching AI How Science Actually Works: How Block-Grant Labs Can Generate the Real-World Data AI Needs to Do Science," *Institute for Progress*, August 11, 2025, https://ifp.org/teaching-ai-how-science-actually-works/
[49] Department for Science, Innovation and Technology, *AI for Science Strategy* (London: UK Government, November 20, 2025), https://www.gov.uk/government/publications/ai-for-science-strategy/ai-for-science-strategy
[50] Ikeda and Thakur, "Use Artificial Intelligence to Analyze Government Grant Data to Reveal Science Frontiers and Opportunities."
[51] ImageNet. *ImageNet*. Accessed December 22, 2025. https://www.image-net.org/
[52] Protein Structure Prediction Center. *Prediction Center*. Accessed December 22, 2025. https://predictioncenter.org/index.cgi
[53] Kalil, Tom. 2022. "AI for Science: Creating a Virtuous Circle of Discovery and Innovation." *Federation of American Scientists*, August 22, 2022. https://fas.org/publication/ai-for-science/;
[54] Renaissance Philanthropy. *"Common Task Method."* Accessed December 22, 2025. https://www.renaissancephilanthropy.org/playbooks/common-task-method/;

of methods and results, not just model performance, to foster openness and reproducibility.

Recommendation 3: Expand Access to Compute and Experimental Infrastructure. Unequal access to computing limits who can participate in AI-driven science, restricting the range of problems that get worked on. To address this bottleneck, the administration should continue to support the National AI Research Resource (NAIRR) pilot,[55] and work with Congress to authorize and fully fund the NAIRR.

While computing allows for exploration in silico, the power of AI-driven exploration can be enhanced by pairing it with AI-guided experimental facilities—autonomous labs that researchers can access remotely to run experiments.[56]

- In parallel to supporting compute, OSTP should coordinate with agencies such as DOE, NIH, and NSF to build a network of cloud labs, drawing on initial investments like DOE's AMP2[57] and NSF's cloud labs.[58]

Recommendation 4: Cultivate an Interdisciplinary AI–Science Workforce. AI-for-science requires people who can bridge disciplines. Scientists need to understand AI capabilities and limitations, AI experts need to understand scientific processes and problems, and metascientists can help both parties identify where the real bottlenecks to scientific progress lie. The federal government should invest in interdisciplinary training and workforce programs to build this capacity.

- OSTP should coordinate expanded fellowships, graduate training grants, and mid-career retraining programs across scientific agencies. These programs should support "bilingual" researchers with expertise in both AI and a scientific field. Embedded fellowships—for example, placing computer scientists in biology labs—can help build collaborative cultures.

- Agencies should allow and encourage funding for support roles in grants and center-scale projects, such as research software engineers, lab automation specialists, and data stewards, who are essential to support AI diffusion. Career pathways should

[55] National Science Foundation. *"National Artificial Intelligence Research Resource Pilot."* Accessed December 22, 2025. https://www.nsf.gov/focus-areas/ai/nairr
[56] Ball, Dean. 2024. *"Accelerating Materials Science with AI and Robotics."* Federation of American Scientists, Day One Project, November 26, 2024. https://fas.org/publication/accelerating-materials-science-with-ai-and-robotics/
[57] U.S. Department of Energy. 2025. *"Energy Department Launches Breakthrough AI-Driven Biotechnology Platform at PNNL."* December 5, 2025. U.S. Department of Energy. https://www.energy.gov/articles/energy-department-launches-breakthrough-ai-driven-biotechnology-platform-pnnl
[58] National Science Foundation, "NSF to Invest in New National Network of AI-Programmable Cloud Laboratories," news release, August 5, 2025, https://www.nsf.gov/news/nsf-invest-new-national-network-ai-programmable-cloud

be provided for research technical professionals to ensure a continuous pipeline of talent. Support roles such as research software engineers, lab automation specialists, and data stewards are also essential to support AI diffusion.

Recommendation 5: Ensure scientific integrity in AI-augmented research. As AI systems take on more scientific responsibilities, rigor and reproducibility must remain central. Without new safeguards, we risk a flood of irreproducible or overstated results—especially in domains where AI methods are poorly understood or evaluated.[59]

- OSTP should work with funders and journals to establish integrity standards tailored to AI-in-science applications. These should include requirements for model documentation,[60] open sharing of code and data when feasible, and clear disclosure of training and test protocols. Agencies should fund replication studies of high-impact AI research and consider convening third-party audit groups to evaluate key claims.

Related FAS Policy Memos
• Securing American AI Leadership: A Strategic Action Plan for Innovation, Adoption, and Trust - FAS's Response to OSTP'S February 2025 RFI regarding the development of an AI Action Plan • Kickstarting Collaborative, AI-Ready Datasets in the Life Sciences with Government-Funded Projects • Accelerating AI Interpretability to Promote US Technological Leadership • Accelerating R&D for Critical AI Assurance and Security Technologies • A Holistic Framework for Measuring and Reporting AI's Impacts to Build Public Trust and Advance AI • From Strategy to Impact: Establishing an AI Corps to Accelerate HHS Transformation

[59]Sayash Kapoor and Arvind Narayanan, "Leakage and the Reproducibility Crisis in Machine-Learning-Based Science," *Patterns* 4, no. 9 (August 4, 2023): 100804, https://doi.org/10.1016/j.patter.2023.100804
[60] Ibid.

9 | What specific Federal statutes, regulations, or policies create unnecessary barriers to scientific research or the deployment of research outcomes? Please describe the barrier, its impact on scientific progress, and potential remedies that would preserve legitimate policy objectives while enabling innovation.

Problem: Federal rules and policies affecting research have multiplied ninefold over the past two decades – from 29 in 2004 to 255 in 2024, with nearly half that growth occurring in the last five years[61]. Evidence suggests that federally funded faculty now spend nearly half of their research time on administrative tasks[62], and that almost one in every five dollars spent on university research is absorbed by regulatory compliance[63]. Bureaucratic overhead has also expanded within funding agencies themselves. While statutes and executive guidance, such as National Security Presidential Memorandum 33 (NSPM-33)[64], are not intended to create duplicative bureaucracy, administrative burden often emerges through agency-specific implementation. Over time, these interpretations compound, turning a limited set of new requirements into multiple, overlapping layers of bureaucracy rather than a coherent compliance framework. NIH's expanded "Other Support" documentation reflects an agency-level implementation response to evolving research security policy, including NSPM-33 guidance, rather than a direct statutory mandate. These implementation choices have produced duplicative reporting, overlapping with conflict-of-interest disclosures, and impose significant costs to institutions.

Recommendation 1: Establish a federal researcher disclosure data registry.

- <u>OSTP and OMB should direct NIH to pilot a shared researcher disclosure data service that maintains authoritative disclosure records and allows existing agency systems to access the information they require</u>. The primary objective is to reduce duplicative data collection, improve consistency across agencies, and lower administrative burden on researchers, not to replace existing grant or compliance systems.

This effort would establish a parallel data layer that sits alongside existing platforms. User-facing tools such as SciENcv could continue to serve as front-end interfaces for

[61] Council on Governmental Relations, *Changes in Federal Research Requirements Since 1991*, December 2024, PDF file, https://www.cogr.edu/sites/default/files/RegChangesSince1991_Dec%202024.pdf
[62] Federal Demonstration Partnership Foundation, *2018 Faculty Workload Survey: Research Report — Primary Findings*, prepared by Sandra L. Schneider (2020), PDF file, https://thefdp.org/wp-content/uploads/FDP-FWS-2018-Primary-Report.pdf
[63] Vanderbilt University, *The Cost of Federal Regulatory Compliance in Higher Education: A Multi-Institutional Study*(October 2015), PDF file, https://cdn.vanderbilt.edu/vu-news/files/20190417223557/Regulatory-Compliance-Report-Final.pdf
[64] Donald J. Trump, *Presidential Memorandum on United States Government-Supported Research and Development National Security Policy*, National Security Presidential Memorandum-33, January 14, 2021, https://trumpwhitehouse.archives.gov/presidential-actions/presidential-memorandum-united-states-government-supported-research-development-national-security-policy/

researchers, while the shared disclosure data service would function as the authoritative source of record. Researchers would update disclosure information once, and agency systems would retrieve the data needed for specific oversight purposes, eliminating repeated form-based submissions. Unlike form-based intake tools that are tightly coupled to individual workflows, this approach treats disclosures as structured, reusable data governed independently of any single application. The pilot should be narrowly scoped, focusing on a limited set of high-value disclosure elements that are currently collected repeatedly across agencies, and designed to support incremental integration rather than requiring universal adoption at launch.

NIH already operates a comparable registry-based disclosure infrastructure, most notably ClinicalTrials.gov, which exists independent of grant systems, defines standardized data fields, and supports multiple oversight and reporting uses across federal agencies. This demonstrates the feasibility of a decoupled, authoritative data architecture within existing technical and governance environments. By establishing an authoritative disclosure data service, interoperability becomes a concrete design expectation for future federal research systems. Rather than repeatedly rebuilding disclosure functionality, agencies can treat compatibility with shared infrastructure as a baseline requirement for new tools and platforms.

Recommendation 2: Reduce disclosure burden through data minimization and implementing design standards. Shared infrastructure will only reduce administrative burden if it is paired with deliberate limits on what data the federal government chooses to collect.

- OSTP and OMB should direct NIH and other major research funders to implement data minimization/data sunsetting as a design requirement, not just as an aspirational result of "streamlining".
- In parallel with piloting a shared researcher disclosure registry, NIH should undertake a focused review of disclosure requirements to distinguish between data that are necessary for oversight purposes and those that persist primarily due to legacy practices or overzealous legal-specific concerns. Disclosure elements that cannot be tied to oversight should be eliminated rather than carried over.

To ensure that the data registry and data minimization effort translate into meaningful burden reduction, OSTP and OMB should implement interoperability-focused design standards as part of its existing governance structures or approval processes. Enforcing interoperability and data minimization as explicit design expectations can shift oversight upstream from post hoc review of burdens to the architectural/design decisions that generate duplication in the first place. Both recommendations leverage existing authorities of the PRA and Evidence Act more effectively, without requiring new statutory mandates, and ensure that future modernization efforts meaningfully reduce the administrative burden on the research enterprise.

Related FAS Policy Memos
• Measuring Research Bureaucracy to Boost Scientific Efficiency and Innovation • Reduce Administrative Research Burden with ORCID and DOI Persistent Digital Identifiers • Build Capacity for Agency Use of Open Science Hardware • Improve Research Through Better Data Management and Sharing Plans • Increasing Responsive Data Sharing Capacity Throughout Government

11 | How can the Federal government foster closer collaboration among scientists, engineers, and skilled technical workers, and better integrate training pathways, recognizing that breakthrough research often requires deep collaboration between theoretical and applied expertise?

Problem: Fragmentation and lack of integration in the S&T workforce impede breakthrough science and innovation. Ph.D scientists, engineers, and skilled technical workers work in different parts of the S&T ecosystem, and therefore have limited opportunity to coordinate around shared scientific innovation goals and to bring their distinct and complementary capabilities. For example, scientists provide theoretical understanding and experimental design; engineers develop tools, instruments, and systems; and skilled technical workers build prototypes, maintain equipment, troubleshoot problems. To build a more cohesive workforce positioned for impact, OSTP should consider working with OMB and the science agencies toward the following goals:

Recommendation 1: Develop integrated training programs, including apprenticeships. Training programs that build cross-sector competencies from the ground up can build critical capacity for coordinated "team science." Core attributes of integrated training models involve: 1) research technologists work alongside Ph.D scientists, 2) technical staff with independent project authority, 3) career progression pathways for technical staff, and 4) shared credit in publications and presentations. Building on the momentum of the NSF Tech Labs announcement on December 12, 2025, [65]NSF has the opportunity to pilot an integrated training program approach to create a robust pipeline for team-based science, with an expectation that it could be modeled and replicated by other organizations. NSF could:

- Create a "Team Science Training Initiative" that could either be standalone or linked to the NSF Tech Lab pilot. This initiative could address some of the cultural and institutional disincentives that hinder engagement in new research models. For example:
    - Grants could be given to universities for integrated training programs that could either serve as a pipeline to Tech Labs or be standalone.
    - Embed requirements for Ph.D. students to work on teams with technical staff and prioritize cross-institutional collaborations.
    - Incentivize community college partnerships with research universities
- Prioritize the development of apprenticeship programs that align with “team science” priorities. Apprenticeships can serve as a critical pipeline for a skilled technical workforce that brings hands-on expertise for technical tasks, and the Administration has already signaled an open policy window for expanding their use. President Trump issued a recent Executive Order "Preparing Americans for High-Paying Skilled Trade Jobs of the Future,"[66] directing the Secretary of Labor, Secretary of Commerce, and Secretary of Education to submit a plan for 1 million new active apprentices to new industries and occupations. To scale apprenticeship capacity agencies should:
    - Create a Research Apprenticeship Grant Program modeled after *CHIPS Act* workforce provisions and requirements in the Tech Hubs and Regional Innovation Engines programs that require awardees to fully integrate technology development and workforce efforts.
    - Embed apprentices in research centers (NSF, DOE, NIH), with dedicated budget and partnerships with community colleges.
    - Integrate apprentices with Team Science training, providing opportunities for apprentices to participate in team research projects.

Recommendation 2: Reform funding mechanisms to incentivize team integration. Funding agencies have a critical role to play in furthering better integration between scientists, engineers, and skilled technical workers.

- Expanding upon the NSF Tech Lab approach, research agencies could develop grants that incentivize technically focused teams that would: 1) require team composition plans

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[65] National Science Foundation, “NSF Announces New Initiative to Launch and Scale a New Generation of Transformative Independent Research Organizations to Advance Breakthrough Science,” news release, December 12, 2025, https://www.nsf.gov/news/nsf-announces-new-initiative-launch-scale-new-generation

[66] The White House, “Preparing Americans for High-Paying Skilled Trade Jobs of the Future,” presidential action, April 23, 2025, https://www.whitehouse.gov/presidential-actions/2025/04/preparing-americans-for-high-paying-skilled-trade-jobs-of-the-future/

showing integration; 2) enable multi-year technical staff appointments; 3) include technicians as co-Principal Investigators.

Recommendation 3: Create a technical research scientist/staff career track. Technical work underpins science but is systematically undervalued. Numerous studies by the National Academies of Sciences, other organizations, and the academic literature have examined this issue from multiple perspectives[67] [68]. Studies consistently find that academic reward systems—especially promotion, tenure, and funding norms—systematically undervalue technical expertise, team science, and infrastructure work, creating weak promotion pathways, lower compensation, and reduced prestige for staff scientists and research engineers, despite their central role in research productivity. The pathway to model this practice should begin within the federal government. To this end, OSTP and OMB should:

- Direct research agencies (e.g., NSF, NIH, DOE) to create a Research Technologist pathway with parallel career progression milestones to the research scientist track and a competitive federal salary scale, and appropriate recognition mechanisms.
- Create grant review criteria that require the inclusion of a budget for technical staff.

Recommendation 4: Invest in customized talent mobility pathways to promote exchange between scientists, engineers, and skilled technical workers. To enhance integration and build cross-functional capabilities, 'tours of service' can be a powerful model for building systemic capacity in government. These models can bring cutting-edge academic expertise to federal priorities, transfer federal insights and data back to universities, create lasting collaborative relationships,and accelerate knowledge flow in both directions.

Cross-sectoral talent exchange relies on making it as easy as possible for individuals to move between organizations. A number of different mechanisms exist, including the Intergovernmental Personnel Agreement Act (IPA) and Schedule A(r) authorities, to facilitate talent exchange. Overall, such mechanisms are underutilized and have not been deployed at scale to target scientific innovation. To expand the use of IPAs and other flexible hiring authorities, the following policy steps could be considered:

- Clarify best practices. OMB could issue guidance on frequently asked questions related to 1) when IPAs are preferable than hiring; 2) approaches for cost-sharing; 3) mechanisms for expedited processes, and 4) integration with other talent programs.
- Coordinate across government. OSTP should designate an IPA coordinator who works across multiple science agencies.

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[67] National Academies of Sciences, Engineering, and Medicine, *Promoting the Institutional and Professional Development of Scientists and Engineers* (Washington, DC: National Academies Press, 2021).

[68] Pew Charitable Trusts, *Broadening University Faculty Reward Systems to Support Public and Community-Engaged Scholarship* (Washington, DC: Pew Charitable Trusts, 2020).

- Expand the IPA rotator program to all research agencies. NSF brings in outside scientists, engineers, and educators on temporary, rotational assignments to work with its staff of permanent federal employees to help decide which projects the agency will fund[69]. This program could be tailored and targeted to all federal science agencies and specifically focused on topics of national priority (e.g., biotech, quantum, etc.)
- Establish specific IPA targets for emerging fields of priority. OSTP should direct aligned agencies to set targets for talent acquisition via IPA for specific fields (e.g., AI, quantum, biotech, and advanced manufacturing.
- Expand IPA use in FFRDCs to accelerate industry collaboration without conflict of interest concerns. FFRDCs are eligible for IPA despite often having industry sponsors, which means that industry employees can go to FFRDCs, then FFRDCs can IPA to federal agencies. This would create an indirect industry-government talent flow while maintaining conflict-of-interest protections. To this end, FFRDCs should also set IPA targets for emerging fields of priority.

Related FAS Policy Memos
• Investing in Apprenticeships to Fill Labor-Market Talent and Opportunity Gaps • Creating Competitive Career Pathways for Low-Income Americans through a Sector-focused Employment Training Initiative • Creating an Advanced Research Projects Agency (ARPA-L) for the Department of Labor • Strengthening the National Labs' Workforce

[69] U.S. Government Accountability Office, *National Science Foundation: A Workforce Strategy and Evaluation of Results Could Improve Use of Rotating Scientists, Engineers, and Educators*, GAO-18-533 (Washington, DC: U.S. Government Accountability Office, September 5, 2018),https://www.gao.gov/products/gao-18-533

12 | What policy mechanisms would ensure that the benefits of federally-funded research—including access to resulting technologies, economic opportunities, and improved quality of life—reach all Americans?

Problem: Federally funded research and development has led to major advances that affect Americans' everyday lives: the creation of the building blocks for the internet and GPS under DARPA, IES-funded research discovering the effectiveness of the science of reading, and NIH-funded scientists discovering what would ultimately become GLP-1 agonist drugs. And yet, the possible benefits of using the results of many federally-funded studies have not yet been realized.

Discussion of the impacts identified in studies is often constrained to the academic community. State and local governments that might rely on evidence in their decision-making find that existing research is not relevant or not specific enough to their context. To maximize the return-on-investment of federally-funded R&D, the federal government needs to generate evidence that is useful to state and local policymakers, practitioners, and families across the U.S.; further, it must ensure that it sets up appropriate incentives to make the use of such evidence a core input into decision-making.

Recommendation 1: Support context-specific evidence-building

Ensuring that the benefits of federally funded research will reach Americans is a process that begins with deciding what research to fund. End-users of research do not necessarily need the most novel research, but rather high-quality research that can speak to the effectiveness of interventions in their context. While basic science funding is important, it is critically important for the federal government to support applied and/or engaged research with a clear customer that has been identified and is part of the process of developing R&D efforts[70].To this end, OSTP could:

- Require other agencies to have a program that replicates the State Planning and Research[71] ("SPR") program at USDOT, requiring NSF, NIH, and other federal agencies to set aside 2% of funds to states that can then oversee and fund local research needs.
- Encourage the development of grant programs that incorporate data-gathering and rigorous evaluation as a core component. The 2024 Uniform Grants Guidance[72] clarified

[70] Ben Miyamoto and Angela Bednarek, "Funders Tailor Approaches to Ensure Research Meets Real-World Needs," *The Pew Charitable Trusts*, March 27, 2025, https://www.pew.org/en/research-and-analysis/articles/2025/03/27/funders-tailor-approaches-to-ensure-research-meets-real-world-needs

[71] *Research Program and Project Management*, "State Departments of Transportation Programs," Research Funding Guidebook, accessed December 22, 2025, https://rppm.org/research-funding-guidebook/state-dot-programs/

[72] Office of Management and Budget, *Uniform Grants Guidance 2024 Revision: Reference Guides*, Council on Federal Financial Assistance, April 2024, PDF file, https://www.coffa.gov/assets/files/Uniform%20Guidance%20_Reference%20Guides%20FINAL%204-2024.pdf

that data and evaluation-related costs are allowable under federal grants. Agencies should build on this by developing grant programs similar to Section 1115 Medicaid Demonstrations[73] at CMS, which required that states conducting pilot or experimental programs under its authority conduct impact evaluations to determine if their project had the intended impact.

Recommendation 2: Make existing and emerging evidence more accessible

While the 2022 OSTP memo *Ensuring Free, Immediate, and Equitable Access to Federally Funded Research*[74] represents an important step forward, it does not do nearly enough to ensure that research results are useful to the non-academic community. Agencies that fund research should require their grantees to make the results of their studies not just available, but also accessible to taxpayers and target audiences. There are several approaches agencies may consider adopting to make research accessible:

- Require all grant recipients to produce and publish a one-page, plain-language (that is, no higher than an eighth-grade reading level) summary of their findings. Ideally, these summaries, along with link-outs to full-text articles/reports, should be located on one easy-to-find webpage for each federal agency.
- Allow and/or specifically encourage requests for funding to support knowledge brokers[75] that are utilized toward the end-stages of a research grant to proactively share findings with relevant audiences.

In addition to making individual studies accessible, the federal government also plays an important role in synthesizing evidence for end-users. Many federal agencies have platforms such as clearinghouses that aim to provide evidence-based recommendations for stakeholders ranging from state and local governments to practitioners. While these agencies do not exclusively synthesize federally funded research, such research is often a core input. Many of these resources could be modernized to better meet Americans' needs. They are slow to incorporate new evidence and are generally less user-friendly than they should be. We recommend that agencies that produce evidence syntheses adopt the following practices:

- Adopt emerging evidence synthesis approaches, including living and rapid reviews, that seek to speed up the process of evidence synthesis in response to users' priorities. This has already been done at agencies including the Agency for Healthcare Research and Quality, the Veterans' Health Administration, and the Department of Labor. FAS has laid

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73 Centers for Medicare & Medicaid Services, *"Section 1115 Demonstrations,"* Medicaid.gov, accessed December 22, 2025, https://www.medicaid.gov/medicaid/section-1115-demonstrations

74 Alondra Nelson, *Memorandum on Ensuring Free, Immediate, and Equitable Access to Federally Funded Research*, Office of Science and Technology Policy, August 25, 2022, PDF file, https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Memo.pdf

75 Victoria Ward, Andrew House, and Susan Hamer, "Knowledge Brokering: The Missing Link in the Evidence to Action Chain?," *Evidence & Policy: A Journal of Research, Debate and Practice* 5, no. 3 (2009): 267–79, https://doi.org/10.1332/174426409X463811

out a model[76] for how the Institute of Education Sciences and additional agencies could follow their lead.

- Leverage emerging technology. There is great potential to utilize AI to help users of research, data, and evidence. For example, agencies could build chatbots that allow users to ask plain-language questions (e.g.,what programs have been shown to reduce recidivism in communities like mine?). AI could also be used to help stakeholders navigate the use of data. For example, tools could be built to help users of the American Community Survey quickly generate summary statistics and insights about their specific communities.

Recommendation 3: Deploy participatory technology assessment to ensure that federally funded research reflects public values

Participatory Technology Assessment (pTA) is an established suite of tools and processes for eliciting and documenting informed public values and opinions to contribute to decision-making around complex issues at the intersections of science, technology, and society. To bolster capacity to address longstanding and emerging issues at the intersection of scientific progress and societal well-being, where progress depends on aligning scientific, market, and public values, the Administration should[77,78]:

- Support and conduct pTA across the Federal Government by expanding the scope of the Science and Technology Policy Institute (STPI) to include a special unit with a separate operating budget and specialized experts dedicated specifically to pTA. STPI is an existing federally funded research and development center (FFRDC) that already conducts research on emerging technological challenges for the Federal Government and is strategically associated with the White House Office of Science and Technology Policy (OSTP). Integrating pTA across federal agencies aligns with STPI's mission to provide technical and analytical support to agency sponsors on the assessment of critical and emerging technologies.
- Support STPI pTA unit through projects requested by other federal agencies. An agency would fund the pTA unit to design, plan, conduct, assess, and analyze a pTA effort on a project relevant to the agency. This model would enable the unit to distribute costs across the executive branch and would ensure that the unit has access to subject-matter experts (i.e., agency staff) needed to conduct an informed pTA effort.

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[76] Nicholas Weller, Michelle Sullivan Govani, and Mahmud Farooque, *Supporting Federal Decision-Making through Participatory Technology Assessment* (Federation of American Scientists Day One Project, 2020), https://fas.org/publication/supporting-federal-decision-making-through-participatory-technology-assessment/
[77] Ibid.
[78] David Anderson, Leya Mohsin, and Susannah Schoeffel, *Harnessing Innovation: Implementing Living Evidence at the Institute of Education Sciences* (Federation of American Scientists and Future Evidence Foundation, April 2025), PDF file, https://fas.org/wp-content/uploads/2025/04/Harnessing-Innovation-Implementing-Living-Evidence-at-IES.pdf

Recommendation 4: Prioritize the use of evidence in social program scaling and design

- To ensure the benefits of research reach Americans, there must be clearer incentives to utilize evidence in decision-making. There are existing approaches to doing so that can be replicated:
  - The *Families First Prevention Services Act* provides federal funding to improve state child welfare systems by reducing reliance on foster care placements. It requires that states implement evidence-based programs and to support this implementation the Administration for Children and Families maintains a resource that clarifies which programs meet the criteria for implementation using these federal funds. This type of approach ensures that both federally and non-federally funded research is used by states to improve outcomes for children and families.
  - The *Families First Act*, among others, leverages a "tiered-evidence"[79] funding model, which provides higher levels of funding for programs that are backed by stronger evidence. This is a model that could be similarly replicated in the delivery of other social services.

Related FAS Policy Memos
• Harness Innovation: Implementing Living Evidence at the Institute of Education Science • Strengthening Policy by Bringing Evidence to Life • Truly Open Science Needs Knowledge Synthesis

[79] U.S. Government Accountability Office, *Tiered Evidence Grants: Opportunities Exist to Share Lessons from Early Implementation and Inform Future Federal Efforts*, GAO-16-818 (Washington, DC: U.S. Government Accountability Office, September 21, 2016), https://www.gao.gov/products/gao-16-818

13 | How can the Federal government strengthen research security to protect sensitive technologies and dual-use research while minimizing compliance burdens on researchers?

Problem: The government's current research security system, which is based on the National Security Presidential Memorandum 33[80], fails to stop research from being acquired by foreign actors. Current measures over-index on disclosure requirements and basic research activities, rather than proprietary research and sensitive research that is produced at later stages of the pipeline. When the government chooses not to fund a project or deport a scientist who has presented their idea to the government, the idea stays entirely in the possession of the individual seeking funding. These individuals may then be incentivized to seek funding from other sources, which leaves space for unscrupulous actors to secure resources from an adversarial foreign government. In some cases, the withdrawal from or unavailability of U.S. government funding for research projects has accelerated the transition of knowledge and talent that is currently being used to accelerate the People's Republic of China's (PRC)'s military research establishment. To improve the security of research that is likely to benefit the U.S. science enterprise, the following recommendations should be considered:

Recommendation 1: OSTP should direct federal research agencies to invest directly in both public and private sector research that may be of national security value in order to participate in global discovery, help define outcomes, and reduce risk. As noted in the JASON Report on Fundamental Research Security,[81] the most straightforward way to create "high walls" around narrowly defined areas is the classification system. To classify information or control the behavior of the organization in question, the government needs to establish an investor relationship with the entity (usually through grants, contracts, or cooperative agreements). The Department of Defense's use of contracts to protect U.S. security interests is already common practice, most famously recently used to ensure that SpaceX's Starlink would not cut service in Ukraine[82]. Other elements of the government's research security apparatus also rely on federal granting authority; research agencies are not regulators.

[80] Trump, *Presidential Memorandum on United States Government-Supported Research and Development National Security Policy*, NSPM-33.
[81] JASON, *Fundamental Research Security: Protecting the Open Research Enterprise from Foreign Interference* (Arlington, VA: JASON Advisory Group commissioned by the National Science Foundation, December 6, 2019), PDF file, https://nsf-gov-resources.nsf.gov/files/JSR-19-2IFundamentalResearchSecurity-12062019FINAL.pdf
[82] Patrick Tucker, "Pentagon Looking to Make Sure SpaceX Doesn't Abandon Them in War," *Defense One*, March 9, 2023, https://www.defenseone.com/technology/2023/03/pentagon-looking-make-sure-spacex-doesnt-abandon-them-war/383837/. Defense One

Moreover, in activities where there is foreign involvement, it benefits the government to invest, define outcomes, and retain access to intellectual property of national security value, rather than to surrender ideas to foreign control and risk falling victim to technological surprise.

Recommendation 2: The Executive Office of the President should issue a presidential memorandum or executive order granting original classification authority at the Top Secret level to heads of research agencies that produce use-inspired or otherwise sensitive or risky research. Classification is governed by Executive Order 13526 (E.O. 13526)[83], which establishes the processes for agencies to establish national security classification protections. Under this guidance, science agencies cannot even implement the lowest level of classification, confidential[84], because they lack such authority. Classification provides real benefits for the government, the intelligence community, and law enforcement. It clearly identifies which information is covered by the *Espionage Act*. It also provides a strong disincentive for the individuals and organizations that manage the information, providing ongoing accountability to ensure that the information is protected. Conducting classification reviews also forces the government to seriously evaluate what is and is not worth protecting and guards against excessive classification that carries real risks for the long term competitiveness of the research enterprise.

When the head of an agency is granted this authority, agencies would need to develop rules and guidelines for the appropriate identification and marking of such material, and likely need to employ staff to conduct classification reviews to make appropriate determinations or recommendations. While this may be costly for agencies, it is far less costly than implementing a nebulous research security regime across the entire S&T ecosystem while ensuring that the government maintains accountability for the research that it sponsors.

Recommendation 3: OSTP should work with OMB to request and ensure submission of rigorous cost-benefit analysis of existing and proposed research security efforts to assess whether current measures are appropriately tailored to prevent the illicit transfer of knowledge and information. Those that do not should be discarded.

- <u>To do so, OMB should rely on the same cost/benefit analysis tools that it uses in research security decision-making as it does for regulatory decisions.</u>The use of grants to impose research security requirements that alter an organization's behavior at the institutional level are, in effect, de-facto regulatory action with significant economic

[83] The White House, *Executive Order 13526: Classified National Security Information*, December 29, 2009, Information Security Oversight Office, National Archives and Records Administration, accessed December 22, 2025, https://www.archives.gov/isoo/policy-documents/cnsi-eo.html

[84] Confidential information is defined as " information, the unauthorized disclosure of which reasonably could be expected to cause damage to the national security that the original classification authority is able to identify or describe."

impact (as defined by Executive Order 12866). Therefore, new research security requirements should be subject to the same cost-benefit analysis as other significant regulatory actions, and agencies should have to link requirements to observed threat vectors that have demonstrably harmed the U.S. science and technology ecosystem. Those requirements should be cross-walked with those imposed by other government agencies to minimize additional costs to institutions, given that those institutions will be forced to implement duplicative (but different) requirements.

- Variations in the requirements between agencies have the potential to magnify the compliance burden for institutions, and particularly those that have not historically received significant federal support (such as universities in EPSCoR jurisdictions, Historically Black Colleges and Universities, and more recent participants in the federal research enterprise like Focused Research Organizations). Given that basic requirements, such as the treatment of information as CUI, have the potential to double the cost of even large research programs, research security requirements have the potential to dramatically decrease the productivity of the science and technology ecosystem and place the country at a significant competitive disadvantage[85]. This is coming at a time when the PRC is dramatically outproducing the United States in the creation of new knowledge in critical and emerging technologies[86].

Related FAS Policy Memos
• Bringing Transparency to Federal R&D Infrastructure Costs

[85] Ibid
[86] Xiaoying You, "China Leads Research in 90% of Crucial Technologies — A Dramatic Shift This Century," *Nature*, December 12, 2025, https://www.nature.com/articles/d41586-025-04048-7

About FAS

The Federation of American Scientists (FAS) is an independent, nonpartisan think tank that brings together members of the science and policy communities to collaborate on mitigating global catastrophic threats. Founded in November 1945 as the Federation of Atomic Scientists by scientists who built the first atomic bombs during the Manhattan Project, FAS is devoted to the belief that scientists, engineers, and other technically trained people have the ethical obligation to ensure that the technological fruits of their intellect and labor are applied to the benefit of humankind. In 1946, FAS rebranded as the Federation of American Scientists to broaden its focus to prevent global catastrophes.

Since its founding, FAS has served as an influential source of information and rigorous, evidence-based analysis of issues related to national security. Specifically, FAS works to reduce the spread and number of nuclear weapons, prevent nuclear and radiological terrorism, promote high standards for the safety and security of nuclear energy, illuminate government secrecy practices, and prevent the use of biological and chemical weapons.
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