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MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

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SUBJECT: Ushering in a New Golden Age of American Innovation: Fiscal Year 2028 Administration Research and Development Budget Priorities

American leadership in science and technology (S&T) underpins our economic prosperity, national security, and public health. As the United States celebrates the 250th anniversary of declaring its independence, we stand at the threshold of a new golden age of American innovation. The future of American leadership in the emerging technologies that will define this century, from frontier artificial intelligence (AI) to quantum technologies and advanced nuclear fission and fusion, depends in part on core Federal investments in foundational research, the basic and use-inspired inquiry upon which a broad range of sciences and engineering work depends. Rapid technological advances are transforming the way scientific research is conducted, the scientific questions that we can now ask, and the scientific instruments we can build. To usher in this new golden age, we must renew the research and development (R&D) enterprise on which our scientific leadership depends.

Eighty years ago, Vannevar Bush's *Science: The Endless Frontier* laid the foundation for the modern American scientific enterprise, giving rise to the National Science Foundation and a partnership between Federal Government, universities, and industry that won the American Century. Today, that enterprise is being reshaped by forces Bush could not have foreseen. Global competitors are racing to challenge U.S. scientific leadership, developing new methods to drive discovery and innovation. At the same time, our own enterprise has fallen out of balance. Industry now drives a growing share of innovation and even basic research,[1] where its share of national R&D funding has doubled over the past half century,[2] and yet we have largely not updated how the Federal Government funds research or partners with the private sector. The government invests more in R&D than ever before, yet much of the non-defense increase is concentrated in the life sciences[3] and the pace of significant breakthroughs has slowed.[4] And while transformative discoveries are still made in America, too often we fail to capitalize on them at home, ceding the manufacturing and supply chains that turn discovery into industry to competitors abroad. The

[1] National Center for Science and Engineering Statistics, National Patterns of R&D Resources (2023–24 edition).
[2] Ibid. Table 7.
[3] National Science Board. Science & Engineering Indicators, Discovery: R&D Activity and Research Publications (2025 edition).
[4] https://dx.doi.org/10.2139/ssrn.3822691.

opportunity before us is clear: by integrating industry more fully into the research enterprise, funding transformative science, especially in the physical sciences and engineering, and reconnecting scientific discovery with manufacturing and skilled crafts, America can once again fully translate scientific discovery into broad-based prosperity, creating new applications, high-paying jobs, and stronger regional economies.

This memorandum provides guidance to Federal departments and agencies (agencies) to recalibrate the Nation's S&T enterprise, implementing the recommendations in *Science: A New Golden Age* and advancing the President's vision of a Golden Age of American Innovation. The guidance identifies Administration R&D priorities for agencies to consider, as appropriate, in Fiscal Year (FY) 2028 Budget formulation and related planning. These priorities include: (i) rebalancing R&D portfolios toward foundational research and the physical sciences and engineering, (ii) advancing national S&T missions, (iii) applying AI and emerging technologies to accelerate American research and innovation, (iv) expanding R&D infrastructure for broader ecosystem use, (v) translating scientific advances into stronger regional ecosystems and broad-based prosperity, (vi) considering new funding mechanisms and institutional models to support frontier science, (vii) exploring better ways to identify and develop scientific talent, (viii) rigorously studying, evaluating, and improving how Federal science is funded, and (ix) integrating Federal R&D into the broader S&T enterprise. Agencies should account for this guidance, as appropriate, in their FY 2028 Budget submission to the Office of Management and Budget (OMB).

FY 2028 R&D PRIORITY AREAS

Invest in Foundational Research to Drive Scientific Breakthroughs for Emerging Technologies

Foundational research, including basic and use-inspired inquiry across the sciences and engineering, remains the bedrock of American scientific and technological leadership. The United States derives outsized long-term security, economic, and societal returns from foundational research, which expands the frontier of knowledge and leads to the growth of new industries. The Federal Government's comparative advantage relative to private industry lies here, in supporting work where payoffs are long-horizon, broadly distributed, and difficult to realize privately. In their FY 2028 budget submissions to OMB, agencies should seek to increase the share of foundational research relative to later-stage development.

Many of the Administration's strategic technology priorities, including AI, quantum information science, semiconductors, advanced communications, robotics, advanced manufacturing, nuclear fission and fusion, and space systems, all rely on foundational research across the physical sciences, computer science, and engineering. However, the physical sciences and engineering have declined as a share of the Federal research portfolio over an extended period, even as the strategic importance of these fields has grown.[5] Agencies are encouraged to prioritize both the absolute level and the relative share of funding directed within budget guidance levels to the physical sciences (physics, chemistry, materials science, space science, *etc.*), computer science, and supporting engineering and mathematical disciplines, especially within national security-relevant research portfolios. In addition, to support Administration priorities in biotechnology and

[5] National Center for Science and Engineering Statistics. Survey of Federal Funds for Research and Development (2024-2025 edition).

biomanufacturing, agencies should prioritize foundational research in the biological sciences over the life sciences, a broader category not focused on foundational research.

In their FY 2028 Budget submissions to OMB, agencies should note the R&D character classification of proposed activities as a percentage of their R&D funding portfolio and identify the specific programs through which the agency proposes to shift its portfolio toward earlier-stage work. Where agencies propose to significantly expand later-stage development activities, they should justify why such activities would not occur absent Federal support. Agencies should prioritize funding for:

- **Physical Sciences**. Agencies should prioritize foundational research in the physical sciences, including condensed matter and quantum materials physics, including correlated, magnetic, and topological states; photonics, addressing the generation, control, and detection of light; atomic, molecular, and optical physics, addressing precision measurement and the quantum control of systems; the physics of superconductivity and other quantum phenomena; plasma and high energy density physics; nuclear physics and matter under extreme conditions; gravitational physics and geodesy; and space and planetary physics, including the radiation, plasma, and space-weather conditions in which space systems operate. These fields underpin quantum science, semiconductors, advanced communications networks, future computing technologies, advanced nuclear fission and fusion energy, and space exploration technologies including novel sensing modalities and precision position, navigation, and timing.
- **Chemistry and Materials Science**. Agencies should prioritize foundational research in chemistry and materials science, including electronic, photonic, and quantum materials; the surface, interface, and defect chemistry that governs fabrication and device performance; materials for extreme environments (*e.g.,* radiation-tolerant, plasma-facing, and high-temperature); the structure, properties, synthesis, and characterization of materials, including condensed matter and materials theory, ceramics, metals, polymers and biomaterials; electrochemistry and solid-state ionics; and catalysis, synthesis, and reaction mechanisms. These fields underpin quantum science and semiconductors and extend across advanced manufacturing, energy production and storage, the nuclear fuel cycle, photonics, and space and hypersonic systems.
- **Mathematics and Computer Science**. Agencies should prioritize foundational research in the mathematical and computational sciences, including applied and computational mathematics, numerical analysis and uncertainty quantification; classical and quantum information theory; algorithms, computational complexity, and cryptography, including post-quantum cryptography; the mathematics of optimization and control; statistics, probability, and the foundations of data science; and the foundations of high-performance and future computing. These fields underpin advanced communications networks and secure information systems, quantum information science and future computing, and the modeling, simulation, and verification on which fusion energy, advanced manufacturing, and space systems depend.
- **Engineering Sciences**. Agencies should prioritize foundational research in engineering sciences, including microelectronics, photonic, quantum, and microsystem device engineering and early-stage manufacturing; the electromagnetic, radiofrequency, and propulsion sciences; the thermal, fluid, and mechanical sciences, including solid mechanics

and the mechanics of materials; the dynamics, estimation, and control of complex systems, including astrodynamics, guidance, and navigation; and magnet, superconducting, and power-system engineering. These fields underpin semiconductors and advanced communications networks, advanced manufacturing, space systems, robotics, and fission and fusion energy.

- **Biological Sciences**. Agencies with general, broad-based life-sciences research missions should prioritize foundational research in the biological sciences including molecular, cellular and structural biology; biochemistry and chemical biology; genetics, genomics, and synthetic and engineering biology; neuroscience and the neural basis of cognition and behavior; and microbiology and quantitative biology. These fields underpin biotechnology and biomanufacturing, neurosciences and brain-machine interfaces, and human health and therapeutics.

Advance National Science and Technology Missions

From the Manhattan Project to the Apollo Program, some of America's greatest scientific achievements have come from focused national missions that united the Nation's brightest minds behind an ambitious common goal. This Administration has revived that mission-driven model for a new era of global competition, launching a set of national science and technology efforts targeting the technologies that will define the coming century. Federal R&D is uniquely suited to drive these efforts forward by supporting them across every stage from foundational discovery to demonstration, sustaining the long-horizon and high-risk work the private sector cannot undertake alone, and convening the partnerships among government, industry, academia, and philanthropy through which national missions are ultimately achieved. Realizing them will demand a comparable concentration of national effort. Agencies should align their R&D investments, where appropriate, with the Administration's national missions, including:

- **AI**: The Genesis Mission to harness AI to double the productivity and impact of America's research enterprise within a decade, including agency-specific contributions across national S&T challenges and compute and research infrastructure for the American Science and Security Platform, pursuant to Executive Order 14363;
- **Quantum:** The Quantum Computer for Application Development and Discovery Science (QC-ADDS) effort to develop a quantum computer at a scale intended to initiate the era of quantum-enabled scientific discovery, pursuant to Executive Order 14413;
- **Fusion:** Demonstration of commercial fusion power in the United States by the mid-2030s, following the Department of Energy's Fusion Science & Technology Roadmap;
- **Space:** Return of Americans to the lunar surface by 2028, the construction of a lunar base, the National Initiative for American Space Nuclear Power, and the development of a responsive and adaptive national security space architecture, pursuant to Executive Order 14369;
- **Robotics:** General-purpose autonomous systems capable of dexterous manipulation, mobility, and reliable operation in real-world environments, to initiate the era of physical AI-driven scientific discovery and American reindustrialization; and

- **Semiconductors:** Next-generation semiconductor technologies, including EUV-and-beyond photolithography, 3D advanced packaging, and novel materials for future semiconductor devices and technology nodes.

Agencies should support these missions through the full range of R&D policy instruments available to them. Each agency should identify, through the FY 2028 Budget process and other established budget review channels how its mission-specific research priorities and programs can support these national goals, consistent with statutory authorities, agency missions, and available resources. In their FY 2028 budget submissions, agencies should consider how to prioritize their R&D infrastructure, including user facilities, testbeds, and high-performance computing assets, toward mission needs and expand access for university and industry partners. Agencies should also propose investments that employ the full set of talent and incentive mechanisms at their disposal, including graduate and postdoctoral fellowships to build the skilled workforce these missions require, and prizes, grand challenges, and competitions to mobilize the broadest possible range of innovators toward the hardest problems.

Build the Foundation for a New Era of Scientific Discovery

AI and emerging technologies have immense potential to transform science by unlocking novel experimental and analytical capabilities, enabling new ways to organize the research enterprise, and prompting new fields of scientific inquiry. In November 2025, President Trump launched the Genesis Mission, a whole-of-government effort to harness the AI-driven computing revolution with the intent to double the productivity and impact of American science and engineering within a decade. Rather than crowding subfields of AI research where private capital is already abundant, the Genesis Mission is designed to ensure America's scientific enterprise is first and fastest to harness these technologies for discovery across the scientific landscape.

Agencies should identify opportunities to integrate AI and other emerging technologies into research as appropriate; prepare Federal scientific instrumentation, datasets, and compute for the AI-for-science transformation; and treat support for the Genesis Mission as a central R&D priority. Proposed agency efforts in this area should be noted in FY 2028 Budget submissions. Agencies should prioritize funding for:

- **AI as an Instrument of Scientific Discovery**. Agencies should fund research that uses AI as a new instrument of scientific discovery, not merely as a tool to augment existing capabilities. Agencies should seek out proposals that thoughtfully integrate AI into scientific workflows, rather than projects that apply AI for incremental gains or without clear justification for why the problem requires AI-specific methods. Agencies should align R&D funding with the Genesis Mission's National S&T Challenge areas where appropriate and propose new or expanded challenges consistent with their own priorities. Given the scale of private sector investment in AI, agencies should prioritize work that industry is unlikely to pursue on its own, including pre-competitive research outputs and enabling platform technologies.
- **Scientific Foundation Model Development**. Agencies should propose investments that support domain-specific scientific foundation models that enable high-fidelity simulations of natural phenomena and accelerate scientific discovery across Genesis Mission's National S&T Challenge areas, including advanced manufacturing, biotechnology, critical materials, nuclear fission and fusion, quantum information science, and semiconductors,

and coordinate with other agencies as applicable. These models require curated scientific datasets and compute that no performer can assemble alone, making the Federal Government uniquely well-positioned to develop them as shared, pre-competitive assets for the research community.

- **Scientific Data Generation for AI**. Agencies should propose efforts to make internal scientific datasets available for use and investments in the data infrastructure that makes them accessible for AI training and inference. Agencies should create incentives for researchers to curate and share valuable data that is routinely abandoned due to lack of dedicated funding or recognition, including experimental records, negative results, and operational data from laboratory procedures. Agencies should further support the creation, curation, and stewardship of ambitious new datasets that could open entirely new fields of inquiry or deliver exceptional value to the Nation's S&T enterprise. As laboratory automation matures, agencies should propose investments in infrastructure to capture data at an industrial scale, laying the groundwork for a future of rapid, autonomous scientific discovery.
- **Integration of AI with Scientific Instrumentation**. Agencies should build on the Genesis Mission by proposing investments in robotics, automated laboratories, modernization of user facilities to operate within closed-loop AI scientific workflows, and autonomous control of large-scale experiments in which AI systems generate hypotheses, conduct experiments, interpret results, and iterate in real time. Agencies should leverage their purchasing power to build domestic supply chains for AI-ready scientific instrumentation and drive the redesign of these instruments with open interfaces, standardized data formats, and cross-vendor interoperability, making it easier for researchers to connect instruments and use the software tools best suited to their work.

Expand World-Class R&D Infrastructure for Broad Use

The productivity of Federal R&D depends on scientific infrastructure, including the physical platforms, user facilities, instrumentation, compute, and laboratory spaces through which research is conducted. These assets have long planning horizons, high fixed costs, and operating requirements that extend well beyond the grants they support, and are often out of reach for individual investigators and institutions. When broadly accessible, this infrastructure enables scientists to pursue cutting-edge research and focus on conducting their best science, rather than the time and capital required to build their own infrastructure and facilities.

In their FY 2028 budget submissions to OMB, agencies should assess scientific infrastructure needs deliberately rather than treating them as a residual claim on research grants. In particular, agencies should propose investments in mid-scale instrumentation, fully funded within a fiscal year and aligned with Administration priorities, given it has historically been underfunded relative to its scientific importance; advanced compute; and sustained operating support for user facilities and shared platforms. Where agencies propose to significantly reduce or defer these investments, they should justify the proposal and explain how they will address the resulting gaps and sustain operation of existing facilities. To expand the reach of investments in scientific infrastructure, agencies should prioritize funding for:

- **User Facilities for the S&T Ecosystem**. Agencies should propose investments in cutting-edge R&D infrastructure and instrumentation to enable researchers and innovators to

validate new hypotheses, test prototypes, and scale new technologies, lowering barriers to frontier research. Proposed investments should be consistent with overarching Administration priorities to both maximize the use of existing infrastructure by addressing deferred maintenance and increase efficiency by reducing footprints and when necessary, include new infrastructure to achieve the greatest utilization by a broad community of researchers, including the private sector and other non-Federal researchers. Agencies should consider the resources needed to increase access to Federal R&D facilities by adopting evaluation criteria that weigh innovative potential and commercial urgency alongside scientific merit, streamlining Cooperative Research and Development Agreements and licensing processes, and reducing administrative burdens on industry users. These arrangements should encourage facilities to leverage industry cost-share arrangements and user-fee revenue to expand capacity and fund next-generation instrumentation.

- **Advanced Compute for Federal R&D**. Compute is the foundation of AI-enabled science, and Federal infrastructure must keep pace with the scale and flexible access researchers now require. Agencies should propose investments that expand access to advanced compute infrastructure, including unified access portals, standardized applications, and common data and software environments that allow researchers to move work seamlessly across facilities. Application processes should lower the barrier to entry for students, individual investigators, and small teams, particularly for fast-turnaround projects. Federal compute investment should offer capabilities differentiated from the commercial market, such as highly secure data centers for sensitive research, access to unique Federal datasets, and specialized AI accelerators and computing architectures. Where commercial compute is cost-effective and meets researcher needs, agencies should pursue public-private partnerships or procure capacity through commercial providers to improve agility and time-to-science.

Leverage R&D to Strengthen Regional Manufacturing and Industry

Federal R&D investments can be leveraged to translate scientific discoveries into benefits for all Americans, securing broad-based prosperity and supporting the reindustrialization of our Nation. Achieving these objectives require Federal investments that pair foundational research with advanced manufacturing, strengthen regional ecosystems, build resilient supply chains, develop a skilled technical workforce, and catalyze non-Federal investment to the greatest extent possible.

Agencies should prioritize funding for manufacturing R&D across strategic technologies with the goal of building domestic manufacturing capacity and supply chains to produce the next generation of semiconductors, advanced materials, biotechnology, nuclear technologies, and robotics. Manufacturing R&D spans the full research spectrum: the manufacturing science underlying how things are made, including process science, materials science, metrology, automation, and the underlying physics, chemistry, and engineering; advanced engineering methods and production technologies; translational programs such as manufacturing innovation institutes, pilot lines, and demonstration facilities that bridge laboratory discovery and production; and supply chain analytics. Cost-share arrangements should generally be considered, and where appropriate, expected for later-stage manufacturing and demonstration activities, while earlier-stage manufacturing science should be supported on terms appropriate to foundational research.

R&D PRIORITY PRACTICES

1. Develop New Mechanisms to Support Frontier Science

America must continue to expand the repertoire of institutions and R&D funding mechanisms it uses to conduct science, enabling our best researchers to tackle the most ambitious S&T challenges that exist. These mechanisms should account for forces reshaping the scientific enterprise, including the rise of funding from industry and philanthropy, and the growing importance of genuinely integrated, multidisciplinary teams.

The Federal Government should incentivize new institutional models that complement conventional principal-investigator driven laboratories, industry laboratories, and Federal R&D facilities. It should also supplement conventional, consensus-driven peer review, which excels at advancing established lines of inquiry, with new review mechanisms that are better suited to recognizing high-risk, high-reward research, early-career talent, or ideas that fall outside established disciplinary boundaries. Agencies should adopt a deliberate, portfolio-based approach that matches funding mechanisms to the S&T challenges they seek to address, maximizing Federal return on investment through an explicit mix of modalities, risk profiles, and time horizons. A broader menu of institutional structures and funding mechanisms will enable new forms of scientific work, encourage scientists to pursue novel lines of inquiry, and attract higher-caliber reviewers empowered to make bold bets.

Agencies are encouraged to review their existing institutional models and funding mechanisms, explore new ones to close gaps in areas critical for national priorities, and construct balanced Federal R&D portfolios according to the following principles:

- **Support a Diverse Portfolio of Institutions**. The Federal Government should reflect a portfolio of institutions that collectively advance the core objectives of the Nation's S&T enterprise, including conducting a range of scientific work, training the next generation of scientists, and translating scientific discoveries into concrete benefits for Americans. Agencies should identify objectives that remain unaddressed because no existing institution is well-suited to pursue them. One notable gap is agile, mid-scale science: infrastructure-heavy, multidisciplinary basic research that requires coordinated teams of ten to a hundred people. Agencies have begun to address these gaps through new models like the U.S. National Science Foundation's (NSF) X-Labs and certain Advanced Research Projects Agency programs. Agencies should consider these models and experiment with additional designs to enable new types of scientific pursuits.
- **Increase Grant Durations for Transformative Research**. Agencies should expand the number of long-duration grants, ideally lasting five years or more, that give our best researchers the time and autonomy to pursue bold, ambitious projects whose most important results may take years to emerge. These awards should be fully-funded in year one, with all resources earmarked upfront, to minimize administrative burdens and reduce pressure for researchers to generate intermediate results to secure continued funding. This upfront commitment should be paired with clear performance metrics and periodic reviews, with the understanding that funding may be withdrawn and redirected if needed. Existing programs, such as the National Institute of Health (NIH) Director's Pioneer Award and the DOW Vannevar Bush Faculty Fellowship, offer useful models for long-duration, investigator-centered support for creative basic research.

- **Expand Use of Fast Grants for Exploratory Projects**. Agencies should consider establishing or expanding, where authorized and consistent with available resources, flexible, low-friction "fast grants" to support preliminary research, exploratory projects, and time-sensitive work. These programs should feature simplified applications requiring just a few pages of writing, rapid review timelines of under one month, and award sizes calibrated to proof-of-concept work. Agencies should encourage greater use of existing mechanisms and ensure that they meet their intended timelines, while developing additional fast-track pathways as needed.
- **Design Ambitious Prizes and Challenges**. Well-designed prizes can spur cross-disciplinary collaboration, attract nontraditional entrants, mobilize substantial private capital, and catalyze entirely new industries with a relatively small amount of funding. Agencies should expand their use of prizes and challenges to advance national missions. To maximize participation from nontraditional teams, agencies should emphasize outcome-based goals rather than prescribing specific methods. Prizes should target at least a 3:1 leverage of private to Federal investment, and may be paired with complementary incentives such as advance procurement commitments, regulatory fast-tracking, and access to Federal testing facilities.
- **Experiment with Emerging Funding Mechanisms**. Agencies should study, pilot, and evaluate whether there are existing models or additional designs for innovative funding mechanisms beyond those described above and in conjunction with OMB and OSTP. Mechanisms for consideration could include, as appropriate, "golden tickets" that let individual agency technical reviewers recommend unconventional proposals that may not pass consensus-driven review panels, which tend to skew toward funding more incremental advances; advance market commitments that signal demand for a scientific or technical capability before it exists, subject to available appropriations and demonstration of capabilities against clearly defined criteria; regranting models that delegate funding authority to working scientists to tap distributed expertise; and more speculative approaches such as quadratic funding or eigenfunding. Such models could surface valuable ideas too divisive for committees and attract higher-quality reviewers by empowering them to exercise independent scientific judgment. Such approaches will not be a one-size-fits-all solution to grantmaking, but should be appropriately explored for their potential role in the Federal R&D portfolio as agencies look to more effectively support the American S&T enterprise. Agencies should ensure that new funding mechanisms strictly adhere to agencies' legal authorities and conflict of interest policies, and that funded proposals meet a level of scientific rigor appropriate for Gold Standard Science.

2. Identify and Develop Top Technical Talent

The Federal Government should orient around the scientists, engineers, and technicians who serve our Nation, providing them with the support, freedom, and opportunities needed to do their best work. S&T workforce programs should select the best and brightest Americans, recognizing that these individuals are distributed across the Nation, not isolated to major metropolitan areas. The programs should identify and invest early in high-potential students and early-career individuals, while cultivating their long-term commitment to America's S&T enterprise.

Agencies with S&T workforce development programs, including graduate fellowships; K-12 Science, Technology, Engineering, and Mathematics (STEM) education; and skilled technical workforce programs should review existing efforts and, where appropriate, propose modifications or new approaches through established budget and policy processes to:

- **Identify Exceptional Talent Nationwide**. S&T workforce programs should identify and support all talented Americans across geographies, incomes, and demographics. Exceptional talent is defined by demonstrated technical ability, not background or identity. Agencies should therefore anchor selection processes in criteria predictive of STEM success, such as reasoning assessments, domain competitions, engineering portfolios, and technical work, rather than relying on self-selection, essays, institutional referrals, or polish and credentials. Agencies should leverage merit-based identification mechanisms that cover as many people as possible (*e.g.*, SAT scores or other standardized quantitative assessments) to find overlooked talent.
- **Expand Advanced K-12 STEM Enrichment Opportunities.** Targeted programs can accelerate the development of advanced K-12 STEM talent by increasing exposure to pathways into scientific careers and connecting students with expert mentors and similarly capable peers. Where appropriate, agencies should support K-12 STEM enrichment opportunities, such as residential math and science programs and Olympiad-style competitions, that immerse high-ability students in advanced S&T environments and direct their ambitions to the hardest open questions.
- **Expand Hands-On Technical Learning**. S&T workforce programs should provide early and sustained exposure to real-world technical environments. Agencies should treat research placements in academic, industry, and Federal laboratories as standard components of high-quality S&T talent development programs. Placements should be substantive, last at least one semester, and provide participants with meaningful access to advanced scientific instrumentation, datasets, and challenges not available in traditional academic settings. Agencies should expand opportunities for hands-on technical learning as early as high school through work-based learning, vocational training, makerspace access, and machine shop classes.
- **Support Early-Career Researchers**. Agencies should strengthen support for graduate students, post-doctoral researchers, and early-career faculty, when research creativity is often highest but institutional support the weakest. Agencies should expand the use of fellowship programs and address conditions that limit the mobility of graduate students, post-doctoral researchers, and early-career researchers as they navigate opportunities in the S&T enterprise. These programs can provide young scientists with resources and intellectual freedom during the most pivotal stage of their careers, encouraging them to remain in the Nation's S&T enterprise.
- **Support Individuals Agnostic of Institutional Affiliations.** S&T workforce programs should provide individuals flexibility to choose their research institutions, supervisors, and topics. Agencies should prioritize programs that distribute funding directly to students and researchers, similar to NSF's Graduate Research Fellowship Program, so recipients can apply the grant to any qualifying institution that best supports their goals and retain it if they move, encouraging institutions to compete for early-career talent. Agencies should

develop the capability to track supported individuals longitudinally across multi-year transitions, minimizing the need for individuals to re-discover and re-apply for support.

- **Build Flexible Cross-Sector Talent Pathways**. The Nation's top scientific talent should be encouraged to gain experience across research cultures and engineering environments throughout their careers. Agencies should expand opportunities for scientists, engineers, and skilled technical workers to move fluidly across academia, industry, and Federal R&D facilities by increasing the flexibility of academic fellowships, establishing cross-institution placements like joint industry or Federal laboratory Ph.D. programs, and supporting alternative paths for skilled technical workers to participate in academic training and scientific discovery.
- **Encourage Broad Post-Fellowship Service**. Federal investments in individuals should strengthen the Nation's S&T enterprise. Agencies should consider incorporating service requirements into fellowship programs while defining service broadly to capture the myriad ways individuals can leverage their training to advance that enterprise. Qualifying service could include academic research and training the next generation of American scientists, entrepreneurship, work in the defense industrial base, advisory roles that shape Federal S&T priorities, or government and military service. Agencies should aim to make any service requirements flexible enough for recipients to pursue the highest-impact opportunities after their fellowship ends and to attract the strongest candidates.

3. Build a Self-Improving Scientific Enterprise

The Federal Government invests approximately two hundred billion dollars in R&D each year, but allocates comparatively little to understanding which funding mechanisms, institutional models, workforce development programs, and research practices produce the strongest scientific outcomes. Agencies should treat the science of science-funding with the same rigor as the science they fund, and build the organizational capacity to learn, experiment, and improve continuously. Agencies should assess whether to establish metascience capabilities, where appropriate, following the guidance below:

- **Establish Metascience Capabilities**. Agencies should establish metascience capabilities that evaluate what programs actually work and drive organization-wide reforms. Core responsibilities should include conducting research on how factors such as funding mechanisms, peer review, and publication practices affect scientific outcomes; piloting novel funding mechanisms and institutional models; and evaluating pilots and informing agency-wide portfolio management. These functions should be established at a sufficiently high level within agencies to effect real, cross-agency change.
- **Develop Systematic Gap-Mapping Capacity**. Agencies should develop the capacity to systematically compare their grantmaking portfolios against the landscape of unsolved scientific and technical challenges in their domains, rather than relying primarily on historical funding patterns. In collaboration with industry, academia, and philanthropy, agencies should maintain "gap maps" that identify unmet needs, duplicated efforts, and emerging opportunities. Gap maps should directly inform portfolio construction, helping agencies select appropriate funding mechanisms and institutional models to target the most important and neglected gaps.

- **Build Data Infrastructure for Metascience**. Agencies should develop purpose-built data infrastructure for metascience, including systems that integrate application-level data, reviewer behavior and scoring, and links between awards and downstream outcomes. These systems should support longitudinal tracking for both awardees and near-miss applicants. Agencies should assess workforce and contracting operations for software engineers and data scientists with the skills to build and maintain these systems as a core institutional capability.
- **Elevate and Empower Agency Program Officers**. The effectiveness of Federal R&D funding depends heavily on agencies' ability to recruit exceptional program officers and give them genuine discretion to define technical problems, build a research portfolio, and manage toward ambitious outcomes. Agencies should consider approaches for recruiting top scientists, engineers, entrepreneurs, and philanthropists into time-limited public service and raising their prestige, visibility, and authority. Agencies should also assess options for reducing barriers to hiring program officers from non-traditional backgrounds, expanding rotational mechanisms such as the Intergovernmental Personnel Act, and developing competitive compensation and career pathways that make program management a career-enhancing opportunity for top scientific talent. Agencies should also develop or enforce mechanisms to ensure that conflict of interest policies are strictly followed for all employees involved in funding recommendations and decisions.
- **Reduce Administrative Burdens.** Agencies should reduce administrative burdens in the grantmaking and research process to maximize the impact of taxpayer-funded science. This includes clarifying requirements for the research community and eliminating overcompliance beyond what Federal regulations and statutes require. Agencies should consider proposals to coordinate to harmonize and standardize grant requirements, forms, and submission processes to the greatest extent possible, and carefully weigh any incremental gains in oversight from new requirements or regulations against the cumulative burden they impose on researchers. Agencies should also consider options for easing administrative and regulatory burdens on Federal technology transfer to increase private-sector investment in R&D.

4. Integrate Federal R&D into Broader S&T Enterprise

Federal R&D is one part of a far larger national S&T enterprise that spans private industry, academia, state and local governments, and the regional economies in which discovery is translated into production. To maximize the return on Federal investment, agencies should more deliberately integrate their R&D with this broader enterprise. This means looking for opportunities to expand the use of non-Federal cost share, so that Federal dollars draw in and are amplified by private and other non-Federal investment rather than standing alone. It also means coordination between Federal R&D and non-R&D investments to support the growth of regional innovation ecosystems and domestic manufacturing hubs consistent with statutory purposes.

- **Drive Greater Integration of Foundational and Applied Research**. In many frontier technologies, scientific discovery, engineering, and manufacturing R&D are not sequential but iterative and tightly coupled. Where appropriate, agencies should propose funding consortia and partnerships that integrate basic research with manufacturing R&D, reflecting the multidisciplinary, engineering-intensive way science is conducted today.

Agency funding in this area should ensure the pursuit of long-term research agendas in partnership with industry, employment of career scientists, engineers, and technicians, publication of foundational discoveries as public goods while licensing specific process innovations, and co-locate with manufacturing facilities and testbeds. Agencies should explore how such institutions can provide durable infrastructure to anchor place-based innovation ecosystems aligned with a region's economic strength.

- **Expand the Use of Non-Federal Cost Share**. Federal R&D funding is most effective when it catalyzes, rather than substitutes for, private and non-Federal investment. Agencies should structure funding opportunities, within existing resources, to prioritize support for initiatives that incorporate meaningful non-government cost share from industry, philanthropy, State and local governments, or international partners. Cost-share arrangements signal market validation, accelerate translation, distribute risk, and extend the impact of taxpayer-funded research. These arrangements should draw on the deep domain expertise external funders have built in particular sub-fields and leverage their networks to identify exceptional grant opportunities. Agencies should review existing authorities for cost-shared R&D, including cooperative agreements, public-private partnerships, consortia models, and other transaction authorities where applicable, and propose expansions where statutory or regulatory barriers can be addressed.
- **Integrate Federal R&D with Non-R&D Investments to Support Regional Ecosystems**. The impact of Federal R&D depends critically on the surrounding ecosystem, including the workforce, infrastructure, capital, supply chains, and institutions that translate discovery into economic growth. Agencies should coordinate R&D investments with Federal non-R&D investments, including in workforce and education, economic development, infrastructure, small business support, manufacturing extension, and procurement, to strengthen regional innovation ecosystems and ensure that the benefits of Federal science are broadly distributed across American communities, particularly where doing so would accelerate industry-specific R&D anchored in a region's area of expertise. Agencies should coordinate across the Federal Government, including through OMB, the NSTC, and agency-to-agency agreements where helpful, to identify opportunities to co-locate, sequence, or jointly award R&D and non-R&D resources in support of place-based strategies and ensure complementary Federal investments in a given region.
- **Integrate Industry in Workforce Training**. S&T workforce programs should maximize collaboration with the private sector, which increasingly leads both basic and applied R&D, holds unique scientific instrumentation, data, and computing resources, and can recruit the best science and engineering talent in ways no university can match. Where practicable, agencies should partner with industry to attract stronger applicants and amplify Federal investments, including through industry co-funding (*e.g.,* tuition, stipends, and portable research funding), paid internship placements, access to research infrastructure, curriculum development, and expert mentorship.

IMPLEMENTATION

To address the budget formulation priorities set forth in the "FY 2028 R&D Priority Areas" section of this memorandum, agencies should follow the standard process for FY2028 budget submission to OMB.

In addition, within 90 days of this memorandum, the head of each agency with $3 billion or more in FY 2026 budget authority for R&D shall submit to the Assistant to the President for Science and Technology (APST) and Director of the Office of Management and Budget (OMB Director) an action plan describing how the agency intends to implement the program implementation guidance set forth in the "R&D Priority Practices" section of this memorandum. Agency action plans should identify how program execution of their FY2026 and FY2027 budgets can support these priority practices. Budget formulation matters addressed by this memorandum are outside the scope of action plans and should instead be reflected in agency FY 2028 budget submissions to OMB. Each action plan shall identify specific actions to address each R&D priority practice (e.g., new funding opportunities, program solicitations, pilot initiatives, statements to the research community, internal organizational changes), implementation timelines, and the offices responsible. OSTP and OMB will coordinate implementation of these action plans and issue supplementary guidance as appropriate.