

A Response to OSTP Agency Guidance for Implementing Gold Standard Science in the Conduct & Management of Scientific Activities

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The White House Office of Science and Technology Policy (OSTP) issued a memorandum on June 23, 2025 outlining agency guidance for “Gold Standard Science” (GSS). This was done in accordance with the Executive Order on “Restoring Gold Standard Science” issued on May 23, 2025. The OSTP memorandum requests that all federal agencies indicate how they will implement the new requirements for GSS into their research activities by August 22, 2025.

This memo is authored by members of the National Academies of Sciences, Engineering, and Medicine’s *Strategic Council for Research Excellence, Integrity, and Trust*¹ in their individual capacities to assist federal agencies with developing the required implementation plan by offering a set of cross-cutting observations.² To clarify their approach in providing this advice, the authors define scientific efficiency as the yield of reliable research findings per unit of resources invested, where relevant resources include money, time, and human capital. Like the federal government, the authors share the **goal of maximizing the trustworthiness of scientific research and the efficiency of the nation’s scientific research enterprise to save people’s lives, improve quality of life and health and wellness, promote economic growth, and improve national security.**

- 1.) Create space for fundamental discovery. The GSS tenets emphasize hypothesis-driven science, but hypotheses must come from somewhere. Knowledge also may be advanced by other approaches. Some of the most important scientific discoveries are stimulated by observational or theoretical work, or research without pre-defined protocols. Science learns more when it responsibly integrates insights from hypothesis-generating research and hypothesis-driven research. **Agency implementation plans should leverage the complementary roles of hypothesis-generating and hypothesis-driven science.**
- 2.) Foster convergence across disciplines, studies, and researchers. The fact that smoking dramatically raises lung cancer risk is based on studies that might not individually satisfy all the GSS tenets, but their convergence does. Similarly, the conclusion that estrogen-receptor blockers (i.e. tamoxifen) reduce breast cancer mortality was based on a combination of randomized trials, each of which was insufficient on their own, but their combination clearly established the effect. Many reliable scientific insights are the product of multiple studies of varying types, rigor, and design that produce a “convergent scientific finding.” This is captured in the OSTP memo in the endorsement of “diverse methodologic approaches” to supporting reproducibility. **Agency implementation plans should prioritize the application of GSS tenets to “convergent scientific findings” that come from different types of rigorous and high-quality studies, and less so to individual studies.**

¹ The National Academies’ Strategic Council for Research Excellence, Integrity, and Trust was established in 2021 to advance the integrity, ethics, resilience, and effectiveness of the scientific research enterprise. See <https://www.nationalacademies.org/our-work/the-strategic-council-for-research-excellence-integrity-and-trust>.

² This memo is not a product of the National Academies, or of the Strategic Council. Opinions and statements included in this memo are solely those of the individual authors, and are not necessarily adopted, endorsed, or verified as accurate by the Strategic Council or the National Academies of Sciences, Engineering, and Medicine.

- 3.) Support open science. Gold standard science is cumulative, building on prior knowledge, findings, and data. **Agency implementation plans should include continued access to rigorously curated taxpayer-funded infrastructure and support services for conducting science openly.**
- 4.) Prioritize rigorous, evidence-based debate. GSS tenets should be applied equally to scientific claims and to criticisms of scientific claims. The authors welcome the memo's views on "constructive skepticism" and warnings about falling prey to confirmation bias and other sources of scientific orthodoxy. The authors note that skepticism best contributes to scientific effectiveness when it also follows the GSS guidelines as closely as possible. If scientific claims are held to high standards, and critiques are not, then the result is double standards and not gold standards. **Agency implementation plans should apply GSS tenets to all points of view offered in favor of, or in opposition to, the reliability of scientific claims.**
- 5.) Drive federal government-wide platforms for coordinating and elevating GSS. Efficient implementation of the GSS tenets will require coordination across agencies on key considerations. As an example, breast cancer research is conducted under the auspices of many agencies, among them NIH, NSF, DoD, and the VA. At a minimum, there should be interagency agreement on the criteria for approved repositories and formats, annotation, and access requirements. Uncoordinated agency-specific implementation standards or processes can impede the GSS's quest for scientific efficiency. This fact is already envisioned in the OSTP memo in its call for collaborative and interdisciplinary partnerships, including those within and across agencies, as well as its request for "standardized metadata formats and data-sharing platforms to ensure accessibility and interoperability." Agency sponsored spot-checking mechanisms including reproducibility and verification checks (Jamshidi-Naeini et al., 2024), red teaming (Coles et al., 2020), and error bounty programs (Brundage et al., 2020) all have merit.

Templates for how to coordinate already exist. Examples can be found in a variety of collaborations, projects, and reports, including many from the National Academies, such as:

1. [Optimizing the Nation's Investment in Academic Research](#) (2016)
2. [Federal Research Grants: Opportunities Remain for Agencies to Streamline Administrative Requirements](#) | U.S. GAO (2016)
3. [Fostering Integrity in Research](#) (2017)
4. [Reproducibility and Replicability in Science](#) (2019)
5. [Roundtable on Aligning Incentives for Open Science](#) (2024)
6. [Federal Demonstration Partnership \(FDP\)](#) (ongoing)
7. [Improving the Regulatory Efficiency and Reducing Administrative Workload to Strengthen Competitiveness and Productivity of U.S. Research](#) (forthcoming)

Agency implementation plans should involve planning for cross-agency collaboration, taking inspiration from existing models.

- 6.) Enable freedom and transparency in communication. A welcome theme of the OSTP memo is its call for transparent and complete communication across the scientific community and with the public. **Agency implementation plans should include statements about how they will ensure the ability of government and government-funded scientists to freely communicate any and all findings among themselves and with the public, and to freely disseminate their findings in well-established scientific journals, reports, and scientific meetings.**

References

Brundage, M., et al. 2020. Toward Trustworthy AI Development: Mechanisms for Supporting Verifiable Claims. *Arxiv*. <https://arxiv.org/pdf/2004.07213>.

Coles, N.A., Tiokhin, L., Arslan, R., Forscher, P., Scheel, A., and Lakens, D. 2020. "Red Team Challenge." *The 20% Statistician*. Accessed online Jul. 7, 2025. <https://daniellakens.blogspot.com/2020/05/red-team-challenge.html>.

Jamshidi-Naeini, Y., et al. "Evaluating the Reproducibility and Verifiability of Nutrition Research: A Case Study of Studies Assessing the Relationship between Potatoes and Colorectal Cancer." *medRxiv*. <https://pubmed.ncbi.nlm.nih.gov/39677420/>.

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