Department of Commerce
Gold Standard Science

IMPLEMENTATION PLAN

Report to the Office of Science and Technology Policy
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Howard W. Lutnick
Secretary of Commerce

Paul Dabbar
Deputy Secretary of Commerce

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Overview of Gold Standard Science

> *"I am calling upon you to blaze a trail to the next frontiers of science. We have the opportunity to cement America's global technological leadership and usher in the Golden Age of American Innovation."*
>
> - *President Donald J. Trump*

Executive Order 14303, signed by President Donald J. Trump on May 23, 2025, titled "Restoring Gold Standard Science," aims to rebuild public trust in federal scientific research by mandating rigorous, transparent, and reproducible scientific practices across government agencies. It addresses concerns about declining confidence in science due to issues like data falsification, reproducibility concerns, and perceived politicization under prior administrations. This executive order establishes "Gold Standard Science" principles—emphasizing being reproducible, transparent, communicative of error and uncertainty, collaborative and interdisciplinary, skeptical of findings and assumptions, structured for falsifiability of hypotheses, unbiased peer review, and freedom from conflicts of interest—and directs the Office of Science and Technology Policy (OSTP) to issue implementation guidance within 30 days, with agencies required to report to the OSTP Director within 60 days on actions taken to align with these standards.

The executive order further mandates that federal agencies prevent scientific misconduct, ensure transparency in data use, and make influential scientific information, including models and analyses, publicly available unless restricted by law. It emphasizes acknowledging uncertainties in scientific data and using a "weight of scientific evidence" approach in decision-making.

On June 23, 2025, OSTP issued guidance to federal agencies on implementing Gold Standard Science, as it pertains to generating science. Generating science is the process of creating new scientific knowledge through systematic inquiry, experimentation, and observation. It involves formulating and testing hypotheses to produce verifiable data and theories that expand our understanding of the world.

This is the first report on how the Department of Commerce is implementing OSTP's guidance for Gold Standard Science, across its bureaus and offices.

The Department of Commerce

Established in 1903, the U.S. Department of Commerce's mission is to create the conditions for economic growth and opportunity for all communities throughout the United States. Through its 13 bureaus, the Department works to drive U.S. economic competitiveness, strengthen domestic industry, and spur the growth of quality jobs in all communities across the country. The Department serves as the voice of business in the Federal Government, and at the same time, the Department touches and serves every American every day.

Through its network of bureaus and offices span the entire United States, its territories, and the globe, the Department drives innovation and invention, strengthening the nation's global competitiveness through cutting-edge scientific research.

Agencies like the National Oceanic and Atmospheric Administration (NOAA), the National Institute of Standards and Technology (NIST), and the U.S. Census Bureau lead groundbreaking work in marine science, meteorology, advanced technology standards, and demographic analysis, providing critical data that informs policy and decision-making. NOAA advances our understanding of environmental systems, NIST develops precise standards for technology and industry. The National Telecommunications and Information Administration (NTIA), through its Institute for Telecommunications Science (ITS), conducts scientific research on radio wave propagation, spectrum efficiency, and advanced communications technologies like 5G that are crucial for fostering technological growth. And the Census Bureau conducts detailed statistical research, such as the American Community Survey (ACS), to illuminate population dynamics, housing trends, and economic shifts. Additionally, the Bureau of Economic Analysis (BEA) produces vital economic indicators, including GDP and trade statistics, to guide policymakers and businesses in fostering economic growth. The Department also champions emerging fields like quantum computing and artificial intelligence, ensuring the U.S. remains at the forefront of technological innovation and global trade.

Bureaus and Offices

The U.S. Department of Commerce operates through 13 bureaus and offices, each tasked with specialized functions to advance the Department's mission of promoting economic growth and innovation. These bureaus enable the Department of Commerce to effectively support businesses, communities, and the broader economy while driving policies for national prosperity.

Commerce Bureaus with Scientific Missions

Executive Order 14303 defines "scientific information" as "factual inputs, data, models, analyses, technical information, or scientific assessments related to such disciplines as the behavioral and social sciences, public health and medical sciences, life and earth sciences, engineering, physical sciences, or probability and statistics." This definition spans work conducted across four Commerce bureaus (NIST, NOAA, Census, and BEA) whose mission is primarily to generate scientific information.

National Institute of Standards and Technology (NIST)

NIST plays a vital role in advancing the nation's technological and economic landscape. Its mission is to advance measurement science, standards, and technology to boost innovation and industrial competitiveness. NIST's scientific research is a cornerstone of its mission, with a focus on emerging and critical technologies like quantum computing, artificial

intelligence (AI), and materials science. This work helps to develop foundational technologies, create scientific benchmarks for trustworthy AI, and accelerate the discovery of new materials. The standards and guidelines that NIST develops are crucial for ensuring reliability, safety, and interoperability across a wide range of sectors. These include the widely adopted NIST Cybersecurity Framework, standards for advanced manufacturing, and the fundamental measurement standards (metrology) that underpin all science and commerce in the United States. In essence, NIST's work creates the essential infrastructure of modern technology and commerce, providing the fundamental tools that allow American industries to innovate, compete globally, and ensure the safety and reliability of the products and services we use every day.

National Oceanic and Atmospheric Administration (NOAA)

NOAA provides crucial data on weather, climate, and ocean conditions. Its scientific research and data are foundational to its mission, employing advanced technologies like weather satellites to deliver continuous, high-resolution imagery for forecasting severe storms and hurricanes. NOAA also conducts extensive research on the earth's atmosphere, using a vast network of instruments and sophisticated models to project future weather scenarios and inform policy. In the marine environment, the agency's scientific efforts are focused on fisheries management and ocean health, where researchers assess fish populations and study the impacts of pollution. This robust scientific data is not only for research but is also applied to critical functions like creating nautical charts for safe navigation, and monitoring space weather to protect essential infrastructure like power grids and satellite systems.

U.S. Census Bureau

The U.S. Census Bureau is the nation's primary provider of data about its people and economy. It conducts the decennial census and other important surveys, which help determine how over $675 billion in federal funds are distributed annually. The Bureau's data informs a wide range of decisions, including resource allocation, policy development, reapportionment, and infrastructure planning. It also pioneers research in statistics and data science, developing new methods for data analysis and modeling to ensure its insights are accurate and reliable. This work is vital for understanding population dynamics, economic trends, and for supporting evidence-based policymaking.

Bureau of Economic Analysis (BEA)

BEA produces critical economic statistics, including Gross Domestic Product (GDP), personal income, corporate profits, and international trade balances, which serve as essential indicators of the U.S. economy's performance. The data provided by BEA provides insights into economic trends, informing government policy, business investment decisions, and academic research. BEA leverages scientific methods, particularly advanced statistical analysis and econometric modeling, to ensure the accuracy, timeliness, and objectivity of its economic indicators. By integrating data from sources like the U.S. Census Bureau and employing rigorous methodologies, such as chain-weighted price indices and input-output analysis, BEA generates reliable metrics that guide fiscal and monetary strategies.

Additionally, BEA's research into areas like regional economic accounts and digital economy measurement incorporates cutting-edge statistical techniques, enhancing the precision of economic forecasts and supporting evidence-based policymaking.

Other Commerce Bureaus

Many of Commerce's other bureaus have offices or units that generate scientific information, while all rely on scientific information to fulfill their missions.

National Telecommunications and Information Administration (NTIA)

NTIA manages federal radio frequency spectrum use and develops telecommunications policies to advance connectivity and innovation. It oversees the efficient allocation of the federal spectrum for federal agencies, supporting everything from national defense to scientific research. NTIA also spearheads initiatives to expand broadband access, and advises on cybersecurity policy. Through its Institute for Telecommunication Sciences (ITS), NTIA conducts scientific research on radio wave propagation, spectrum efficiency, and advanced technologies like 5G, providing data-driven insights that are crucial for shaping national policy and fostering technological growth.

Bureau of Industry and Security (BIS)

BIS regulates the export of sensitive goods, technologies, and dual-use items to safeguard national security and advance U.S. foreign policy interests. BIS administers the Export Administration Regulations (EAR), overseeing export controls, licensing, and compliance to prevent the proliferation of commodities, software, and technology contrary to U.S. national security or foreign policy interests. The bureau employs scientific and technical expertise, particularly in analyzing the capabilities and risks of advanced technologies such as semiconductors, artificial intelligence, and biotechnology, to inform its regulatory decisions.

International Trade Administration (ITA)

ITA promotes U.S. exports and strengthens trade policies to enhance global competitiveness. It supports businesses entering international markets, enforces trade agreements, and combats unfair trade practices. ITA's Office of Trade Analysis conducts significant economic and data analysis. ITA collects and analyzes vast amounts of trade data, including statistics on U.S. exports and imports, to identify global trends, assess industry competitiveness, and measure the economic impact of trade agreements. This data-driven approach is a key part of ITA's mission to foster economic growth and strengthen the global standing of U.S. businesses.

United States Patent and Trademark Office (USPTO)

The USPTO grants patents and registers trademarks to protect intellectual property, fostering innovation and creativity. It processes millions of applications annually, ensuring inventors and businesses can safeguard their ideas. The bureau leverages scientific and technical expertise to evaluate the novelty and utility of inventions, particularly in cutting-edge fields like biotechnology, artificial intelligence, and energy, employing rigorous analysis to assess patentability and ensure compliance with legal standards. Additionally, the USPTO conducts

research and data analysis to track innovation trends, such as patent filing patterns, which inform policy recommendations and economic forecasting.

Minority Business Development Agency (MBDA)
MBDA promotes the growth of minority-owned businesses by providing technical assistance, access to capital, and market opportunities to foster economic inclusion. The agency helps entrepreneurs navigate federal programs, secure contracts, and expand their businesses. MBDA's Office of Data, Research, and Evaluation (ODRE) performs economic and demographic research on minority-owned businesses, focusing on their performance, challenges, and contributions to the national economy.

Economic Development Administration (EDA)
EDA fosters sustainable job growth and resilient regional economies through strategic investments in infrastructure, innovation, and regional collaboration. The EDA leverages data and statistics, such as those from tools like StatsAmerica and the Comprehensive Economic Development Strategy (CEDS) Resource Library, to inform grant writing, assess economic distress, and measure program impacts, ensuring targeted support for communities to enhance economic competitiveness and growth.

National Technical Information Service (NTIS)
NTIS serves as a central repository for scientific, technical, and engineering information, collecting and disseminating government-funded research to support innovation and economic growth. NTIS maintains a vast archive of technical reports, data sets, and analytical tools, making them accessible to businesses, researchers, and the public to drive advancements in fields like technology, healthcare, and environmental science. By partnering with federal agencies and private organizations, NTIS facilitates data-driven solutions and provides services such as data management and analytics to enhance decision-making and foster collaboration across sectors.

Office of the Under Secretary for Economic Affairs
The Office of the Under Secretary for Economic Affairs oversees and coordinates the economic and statistical programs of the Department, ensuring the production of accurate and timely data to support informed policy-making and economic growth. This office provides leadership to key bureaus, such as the Bureau of Economic Analysis (BEA) and the U.S. Census Bureau, guiding their efforts in generating critical economic indicators, demographic statistics, and data analyses, like GDP estimates and population surveys. By fostering collaboration among agencies and advising the Secretary of Commerce on economic trends, the Office plays a pivotal role in shaping strategies that enhance the nation's economic competitiveness and resilience.

Office of the Secretary
The Office of the Secretary at the U.S. Department of Commerce serves as the principal administrative and leadership hub, overseeing the Department's strategic direction and policy implementation to promote economic growth, innovation, and competitiveness. Led

by the Secretary of Commerce, the office coordinates the activities of the Department's diverse bureaus. It advises the President on economic and trade policies, manages budgetary and legislative affairs, and fosters interagency collaboration to advance initiatives in areas like technology, trade, and environmental stewardship, driving sustainable economic development across the nation.

Implementing Gold Standard Science at the Department of Commerce

The Department of Commerce is working diligently to implement Gold Standard Science across its bureaus and offices. The Deputy Secretary of Commerce is tasked with leading this effort, ensuring that the highest levels of leadership in the Department are invested in implementing Gold Standard Science.

Part of this process includes drafting and adopting a new Department Administrative Order (DAO) that formalizes the implementation of the tenets of Gold Standard Science across all bureaus and offices of the Department. This new DAO will replace DAO No. 216-23, which was signed on January 15, 2025. DAO 216-23 included mandates to create scientific integrity officers in each of the bureaus, and to enforce "diversity, equity, inclusion, and accessibility" in the hiring of scientists and in the generation of scientific data. Implementation of DAO 216-23 has been paused throughout the Department while a new DAO is drafted. We expect to have a new DAO in place by the end of the calendar year.

Gold Standard Science Efforts Across all Bureaus

There are four bureaus that are involved in the generation of science at the Department of Commerce: NIST, NOAA, the Census Bureau, and BEA. These efforts of these four bureaus are included in more detail in the next section. Here, we describe the overall efforts across all bureaus and offices at the Department, including those bureaus and offices that do not generate science, but rather ingest, use, and communicate scientific information.

Implementing the Tenets of Gold Standard Science

Reproducible

The Department prioritizes reproducibility by embedding rigorous methodologies in its scientific and analytical processes. For instance, BEA employs standardized econometric models and data validation protocols to ensure its economic indicators, such as GDP estimates, can be independently verified using consistent datasets and methods. The Department's culture fosters reproducibility through training programs that emphasize robust statistical practices, and funding opportunities prioritize projects that incorporate open data-sharing protocols to enable independent replication. Budget allocations support the development of standardized tools, such as BEA's public data repositories, to facilitate reproducible analyses.

Transparent
Transparency is a cornerstone of the Department's scientific activities, with bureaus like the USPTO requiring detailed documentation of patent evaluation processes, including technical assessments and data sources, to ensure public accessibility. The Department's culture encourages clear reporting, with budget resources allocated to digital platforms that make research outputs, such as BEA's economic datasets, publicly available. Award selection processes, particularly for research grants, mandate full disclosure of methodologies and data, reinforcing accountability and public trust.

Communicative of Error and Uncertainty
The Department emphasizes clear communication of errors and uncertainties in its scientific outputs. Other bureau and office budgets support the development of accessible summaries and visualization tools to make uncertainty metrics understandable to stakeholders, while award reporting requires explicit acknowledgment of methodological constraints.

Collaborative and Interdisciplinary
The Department fosters collaborative and interdisciplinary approaches by encouraging cross-bureau partnerships and external collaborations. Funding opportunities prioritize interdisciplinary projects, with budget allocations supporting joint initiatives, such as USPTO's partnerships with technology firms to study innovation trends. The agency's culture also promotes shared infrastructure, like data-sharing platforms, to facilitate collaboration across sectors, enhancing the robustness of scientific outcomes. For example, NIST uses public workshops, solicits public feedback on draft reports of research findings and conducts research through centers of excellence such as the National Cybersecurity Center of Excellence (NCCoE), which brings together experts from industry, government, and academia to accelerate the adoption of practical cybersecurity solutions.

Skeptical of Its Findings and Assumptions
A culture of constructive skepticism is cultivated across the Department's scientific activities. BEA routinely subjects its economic models to stress testing and external validation to challenge underlying assumptions, such as those in trade balance forecasts. The Department also allocates resources to support replication studies and critical evaluation forums, embedding skepticism into its research culture. This effort is also furthered by funding and award selection processes which prioritize projects that demonstrate rigorous testing of assumptions, and include reporting mechanisms that encourage exploration of alternative explanations to strengthen scientific integrity.

Structured for Falsifiability of Hypotheses
The Department designs its research to enable falsifiability, ensuring hypotheses can be empirically tested and potentially disproven. USPTO's patent examination process, for instance, structures technical evaluations to test claims of novelty and utility against prior art, allowing for rejection based on evidence. The Department's budget allocations also fund

pre-registration of study protocols to enhance falsifiability, while agency culture promotes transparent reporting of null results. For example, award selection criteria favors research with sound experimental designs that prioritize falsifiable hypotheses.

Subject to Unbiased Peer Review

The Department upholds unbiased peer review to ensure the integrity of its scientific outputs. The Department's culture emphasizes impartial evaluation, with budget resources supporting reviewer training and viewpoint diversity. The Department's award selection processes also incorporate strict peer review protocols, and include reporting mechanisms require documentation of review processes to ensure transparency and credibility.

Accepting of Negative Results as Positive Outcomes

Recognizing negative or null results as valuable contributions is integral to the Department's scientific approach. For example, BEA publishes null findings in economic studies, such as when expected correlations in regional economic data are not observed, to inform future research. Further, the Department allocates budget resources to platforms like dedicated journal sections for null results to foster a culture that values all outcomes. Finally, award selection criteria reward researchers who transparently report negative findings, and while agency actions encourage their integration into policy recommendations.

Without Conflicts of Interest

The Department enforces strict conflict-of-interest policies to ensure unbiased scientific activities. For example, the USPTO's culture promotes integrity through mandatory training on conflict-of-interest protocols, and its budget allocations support automated tools, such as AI-driven disclosure management systems, to enhance compliance. Award selection and reporting processes also require rigorous conflict-of-interest disclosures, ensuring research remains free from undue influence.

Development of Standardized Metrics to Measure Adherence to the Tenets of Gold Standard Science

Each office and bureau within the Department of Commerce is charged with designating and maintaining a comprehensive set of standardized metrics tailored to each tenet, combining quantitative indicators (e.g., percentages, scores, and indices) with qualitative assessments (e.g., peer feedback and case studies) to measure adherence to the tenets of Gold Standard Science, and evaluate impacts on scientific quality, such as improved accuracy, reduced errors, and enhanced policy relevance. Many of the practices outlined by OSTP's guidance are already practiced throughout the Department of Commerce. The priority moving forward will be to expand and enhances these practices across the Department.

Some examples of standardized metrics that are used to measure adherence to the tenets of Gold Standard Science are:

- **Reproducibility** metrics, which include the proportion of research outputs with publicly shared code and data repositories. These are tracked via annual audits in BEA's economic modeling reports; impact is assessed through replication success rates and citation metrics for reproducible studies.
- **Transparency** metrics focus on the accessibility of methodologies and datasets, such as the number of open-access publications from USPTO's innovation trend analyses, with quality impact measured by user feedback surveys on data usability.
- Metrics for **communicating error and uncertainty**, which involve scoring systems for the inclusion of confidence intervals and sensitivity analyses in outputs.
- **Collaborative and interdisciplinary** tenets which are gauged by the diversity of team compositions and cross-sector partnerships and assessing quality via interdisciplinary citation indices.
- **Skepticism of findings** which is measured by the frequency of assumption-testing protocols in research designs, such as BEA's stress-testing of economic forecasts, with impacts on quality reflected in lower rates of retracted or corrected findings.
- For **falsifiability**, metrics track the percentage of hypotheses framed with testable predictions, with quality impacts assessed through empirical validation rates.
- **Unbiased peer review** which is evaluated via reviewer diversity scores and bias-detection audits in processes to measure quality by review outcome consistency.
- **Acceptance of negative results** which is quantified by publication rates of null findings, integrated into BEA's economic indicator reports, with impacts on scientific quality shown through broader knowledge bases and avoided confirmation biases.
- **Absence of conflicts of interest** is monitored through disclosure compliance rates and independent audits in all bureaus, with quality impacts evaluated by trust indices from stakeholder surveys.

Evaluation mechanisms include annual self-assessments, audits, and integrated reporting systems aligned with the new guidance from OSTP. AI will be leveraged and incorporated into evaluation mechanisms to facilitate data collection and analysis, enhancing efficiency and objectivity.

Training to Ensure Compliance with Gold Standard Science

Each of the bureaus and offices within the Department of Commerce are required to implement mandatory training programs. For those bureaus actively engaged in the generation of scientific information, training programs to effectively teach and communicate the tenets of Gold Standard Science are in development.

To support this new training regime, the bureaus and offices will be developing dedicated online portals, toolkits, and guidelines that are accessible to their personnel. Where practicable, the bureaus plan to integrate AI-driven tools to streamline compliance and training. For instance, AI-powered platforms will automate checks for reproducibility in economic datasets or flag potential conflicts of interest. The USPTO is exploring AI for

analyzing patent trends to ensure skeptical evaluation of assumptions. These tools will be embedded in training modules to demonstrate their use, with AI simulations providing interactive scenarios for practicing tenets like falsifiability and unbiased review.

The new forthcoming DAO on Gold Standard Science will mandate these training and resource plans, establishing oversight mechanisms and annual audits to assess effectiveness. By embedding Gold Standard Science into agency culture through these initiatives, the Department of Commerce aims to enhance the quality and trustworthiness of its scientific activities.

Leveraging Technology to Implement Gold Standard Science

The Department of Commerce is planning to leverage artificial intelligence (AI) to implement the nine tenets of Gold Standard Science. Bureaus will implement machine learning to validate economic datasets or run simulations for consistent technology risk assessments. Al models are also being used to quantify uncertainties and highlight errors in datasets. Where appropriate, double-blind AI systems are being used for selection of peer reviewers. Al is also being deployed to identify and promote null results, integrating them into reports to inform policy. Conflict-of-interest management is also bolstered by AI monitoring, which helps flag potential issues for review.

Challenges

The Department of Commerce faces several challenges in implementing the nine tenets of Gold Standard Science. These include:

- **Resource Constraints.** Implementing Gold Standard Science requires significant financial and human resources, which can be a challenge for smaller bureaus and offices. Al-driven tools can help lower the strain on resources faced by the smaller bureaus and offices, but usually require a large investment at the front end. Sharing resources may help alleviate these challenges.
- **Cultural and Workforce Adaptation.** Shifting agency culture to embrace the tenets of Gold Standard Science presents some challenges. Comprehensive training programs are needed to foster this cultural shift, but developing and scaling these across diverse bureaus, while ensuring staff buy-in, is logistically complex and time-consuming.
- **Technical and Methodological Complexities.** The technical demands of implementing Gold Standard Science create some hurdles. Inconsistent data formats and legacy systems can hamper changes in how research is funded and structured, as well as reporting mechanisms. Ensuring AI tools are ethical, unbiased, and interoperable across bureaus adds further complexity, requiring significant investment in technical expertise and infrastructure.
- **External Pressures and Stakeholder Expectations.** External pressures from stakeholders, including industry, scientific peers, policymakers, and the public, pose challenges to adherence to the tenets of Gold Standard Science. In addition, the

broader scientific community can sometimes present a challenging environment for maintaining unbiased peer review and conflict-of-interest safeguards.

- **Coordination and Compliance Monitoring.** Coordinating implementation across diverse bureaus with distinct missions is a logistical challenge. Developing consistent metrics and evaluation mechanisms is complicated by differing scientific methodologies and priorities. Ensuring compliance through regular audits and reporting requires robust oversight systems, but varying levels of technical expertise hinder uniform adoption. Integrating AI-driven compliance tools, while promising, creates challenges to ensure that these systems are accessible to all personnel and do not introduce unintended biases that may necessitate ongoing validation and refinement.

Individual Bureau Reports

In implementing the tenets of Gold Standard Science efficiently, the Department directed each of its four science generating bureaus to develop individualized bureau reports documenting their targeted implementation strategies and unique challenges. Given the diverse mission areas the Department of Commerce's science generating bureaus cover, the individual bureau reports allow the bureaus to provide a more tailored approach to ensure effective implementation.

National Institute of Standards and Technology (NIST)

Introduction

NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. As industry's national laboratory, NIST is dedicated to supporting U.S. competitiveness in areas including artificial intelligence (AI), quantum information science, next-generation communications, cybersecurity, and advanced manufacturing. Working with industry at every step, NIST carries out its non-regulatory science mission through a combination of intramural laboratory research and extramural collaborative programs.

NIST's core values of integrity and excellence are woven into NIST's culture and are evident in every step of the scientific process, from the development of ideas to the publishing and communication of scientific findings. NIST formally established a Scientific Integrity Program in 2011. Therefore, NIST has had Responsible Conduct of Research and Scientific Integrity Orders and Directives in place that defined principles and requirements for all NIST researchers to follow. These directives ensure scientific research conducted or supported by NIST is carried out with the highest regard for maintaining an unadulterated research record while also safeguarding the integrity of scientific information, to build and maintain the public's trust in NIST's efforts to advance measurement science, standards, and technology. Additionally, NIST annually publishes a Scientific Integrity Program Annual Report, which provides a summary of activities and updates about the program, summarizes

responses to scientific integrity concerns that have been reported and conducts an overall program evaluation.

Although NIST's research has historically been built on tenets similar to those defined by Executive Order 14303 – Restoring Gold Standard Science, NIST has made, and will make, multiple strides to ensure that all of the tenets are reflected in NIST's culture, funding opportunities, budget and resource allocations, and award selection and reporting. As part of this process, NIST has begun developing standardized metrics and evaluation mechanisms to assess adherence to the tenets and plans to provide training and resources to NIST staff. These efforts will be described below, along with how technology will be leveraged for the implementation of Gold Standard Science and challenges encountered.

Addressing the Gold Standard Science Tenets

The NIST Research Protections Office, housed within NIST's Associate Director for Laboratory Programs directorate, has provided and will continue to provide all of the resources necessary for full implementation of Gold Standard science. To address each Gold Standard Science tenet, NIST is:

- Updating the Scientific Integrity Program (SIP) directives to incorporate all nine tenets and ensure that NIST staff are in adherence with the Gold Standard Science tenets.
- Updating the SIP training to incorporate all nine tenets and expand on the importance of rigor, welcoming multidisciplinary viewpoints and questioning findings.
- Planning Townhalls across NIST, including for all staff and for individual Operating Units, as appropriate, to address how to incorporate the tenets into the scientific culture and communicate expectations of adherence.
- Ensuring all of NIST's scientific outputs, are reproducible, transparent, structured for potential falsification of hypotheses, undergo unbiased peer-review processes, clearly articulate uncertainties, critically evaluate any and all assumptions, are collaborative and/or interdisciplinary, and accept negative results as positive outcomes, as feasible. NIST will also continue to ensure conflicts of interest are addressed and disclosed, across all of NIST's portfolios, including intramural and extramural research efforts and for grant or award processes.
- Evaluating the ability to update award criteria and reporting requirements, as permissible by law, to ensure that award recipients are adhering to the tenets of Gold Standard Science.

Development of standardized metrics and evaluation mechanisms

To develop standardized metrics and evaluation mechanisms to assess and evaluate adherence to the Gold Standard Science tenets and the impact on scientific quality, NIST plans to:

- Continue Scientific Integrity Program evaluations.
    - NIST will continue to conduct and modify surveys open to all NIST staff (Federal and Associate) that evaluate the Scientific Integrity Program, with a renewed focus on the Gold Standard Science tenets. The resulting data will be analyzed by

data scientists and used as part of NIST's overall Gold Standard Science implementation assessment.

- Evaluate the publication clearance program.
    - NIST's Publication Clearance Program recently updated its policy to streamline many peer-review processes. NIST intends to conduct a survey as part of an ongoing program evaluation. The survey will be open to NIST staff (Federal and Associates) after the new policy has been in place for a year and analyze responses for a comparison of processes before and after implementation of the new policy. Surveys will be planned and conducted to allow for continuous evaluation and feedback to drive any necessary periodic updates. NIST also intends to analyze data found in the NIST Publication System (NPS) to find slow points and target continuous improvement and enable future planning of metrics and analyses that directly address the Gold Standard Science tenets.
- Develop and track standardized metrics, including, but not limited to:
    - Percentage of award solicitations that discuss Gold Standard Science tenets
    - Number of agreements or partnerships with non-NIST entities, including other agencies and the private sector through CRADAs, MOUs, etc.
    - Percentage of peer-reviewed publications that are freely available and accessible and include publicly available full data sets
    - Number of scientific outputs that requested input from the community

Plans for providing Gold Standard Science training and resources

To ensure NIST personnel are aware of, understand, and adhere to the tenets of Gold Standard Science, NIST will update SIP awareness training to include all of the tenets, which is expected to be provided through multiple mechanisms to ensure all NIST staff will have the ability to conveniently complete the training. This training, along with other relevant training, is, and will be, reported in the Commerce Learning Center to track compliance with the training requirement. NIST also expects to develop additional training, host townhalls and provide all-staff messaging to reinforce the Gold Standard Science tenets.

Plans to leverage technology for Gold Standard Science implementation

Currently, NIST uses an online technical review and clearance system to manage peer review of scientific papers, data, and code, which interfaces directly with PubMed Central for public dissemination of papers. NIST papers that are published as technical reports are posted on the NIST website. As mentioned previously, NIST will also offer training via multiple platforms, including in-person, hybrid, and asynchronous online. Finally, NIST will utilize data analysis tools, including AI, to both gather and analyze data, along with utilizing survey platforms to assist with data collection, on Gold Standard Science implementation and adherence to its tenets, as permissible and feasible.

Additionally, NIST is currently beginning to evaluate the feasibility of using different AI systems for uses such as determining adherence to the Gold Standard Science tenets. This evaluation includes ensuring the correct guidelines are in place and understanding the security of these AI systems to ensure there are no resulting security or data risks.

NIST also has published the NIST Research Data Framework (RDaF), which provides stakeholder communities with a structured approach to develop a customizable strategy for the management of research data. Although not specifically labeled as such, many of the Gold Standard Science tenets are outlined in this Framework. NIST will use the RDaF as a guide to implement Gold Standard data practices.

Challenges in implementing Gold Standard Science

Although no direct challenges have been encountered thus far, NIST suspects some challenges may arise, potentially including:

- Not all tenets may apply to all research or NIST's wide range of scientific outputs and will require different approaches for determining and measuring adherence to the Gold Standard Science tenets. As a result, adherence to some tenets may be more difficult to measure or evaluate.
- The difference in processes for intramural and extramural research may pose challenges, including potentially requiring different timelines and/or methods for measuring adherence to Gold Standard Science.

National Oceanic and Atmospheric Administration (NOAA)

Introduction

The National Oceanic and Atmospheric Administration (NOAA) is committed to upholding the highest standards for the generation, management, and use of scientific information to advance understanding and support decision-making. As the nation's premier oceanic and atmospheric agency, NOAA is dedicated to understanding and predicting changes in the Earth's environment, from the depths of the ocean to the surface of the sun, and is committed to conserving and managing our coastal and marine ecosystems and resources. NOAA's work is fundamentally rooted in rigorous and innovative research, the translation of scientific knowledge and technologies into products and decision support tools, and timely sharing of scientific information to protect the public, the Nation's ecosystems, and key economies.

The integrity of our research and the responsible use of scientific information are paramount to fulfilling NOAA's mission for the American people and maintaining public trust. Executive Order 14303 (EO 14303), Restoring Gold Standard Science (GSS), aims to reinforce foundational principles of research and scientific integrity within federal agencies. NOAA's contribution to DOC's report on GSS implementation outlines our commitment to fully aligning with EO 14303, and the accompanying guidance from the Office of Science and Technology Policy (OSTP) for GSS.

Conduct Internal Reviews to Evaluate Alignment with Executive Order 14303 and OSTP Guidance

NOAA maintains over a dozen agency-wide policies that govern the generation, management, and communication of scientific information, ensuring agency policies are in alignment with rigorous scientific standards and federal government-wide requirements such as the *Information Quality Act* (Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001) and open science initiatives. As part of NOAA's commitment to research and scientific integrity, transparency, and accountability, NOAA will undertake a comprehensive review of its policies, procedures, and actions to ensure alignment with EO 14303 and OSTP GSS Guidance. These actions will enhance consistency and further build public trust in the generation, dissemination, use, interpretation, and communication of scientific information. Additionally, NOAA will assess policies and procedures related to the conduct and management of science, including training, awareness, practices for building a culture that embraces innovation and healthy debate, and procedures to address deficiencies in NOAA's misconduct review and investigation process. This includes the establishment of safe and transparent channels for raising concerns regarding adherence to NOAA's EO 14303-related policies and procedures.

NOAA's Actions

- Review all NOAA policies and procedures governing scientific activities to ensure alignment with EO 14303 and the nine GSS tenets, and identify needed updates and new oversight structures to strengthen compliance and address issues effectively.
- Review NOAA's implementation of the *Information Quality Act* and Public Law 115–435, the *Foundations for Evidence-Based Policymaking Act*, to identify alignment with current statutory tracking and reporting requirements, including for influential scientific information and data cited in peer-reviewed literature; identify areas where greater alignment with one or more of the nine key GSS tenets is needed.
- Review all relevant NOAA regulatory actions and new policies that were developed between January 20, 2021 and January 20, 2025 involving the use of scientific information pursuant to EO 14303 Section 5(c), identifying any aspects not in alignment with the EO, except where consistent with applicable laws, and make recommendations for modifications of previous actions or procedural improvements for future related actions.

Align NOAA Policies, Procedures, and Practices with EO 14303, OSTP Guidance, and DOC Guidance

NOAA will perform a comprehensive update of its policies, procedures, and practices to identify policy gaps, modify the procedures informing the integration of new requirements into workflows across the agency, and strengthen NOAA's research and scientific integrity framework. Additionally, NOAA will align its adjudication of scientific misconduct allegations with Section 7 of EO 14303, ensuring a senior appointee-led process as the sole and exclusive mechanism for evaluating and addressing such violations, consistent with the

Information Quality Act. The actions outlined below position NOAA to advance its longstanding commitment to producing and disseminating high-quality, objective, and trustworthy science.

An update in policies and procedures of this magnitude will take some time; in the near-term, NOAA will prioritize updates to its policies and procedures that would substantially advance NOAA's adherence to the EO and the GSS tenets and align with new DOC-level directives.

NOAA Actions:

- Update, including possible rescissions of, NOAA policies and procedures (e.g., NOAA Administrative Orders, procedural directives, and handbooks) to incorporate requirements into existing processes and workflows across the agency, including addressing gaps identified in the review noted above, and establishing alignment with the DOC-level policies developed in response to EO 14303.
- Update NOAA's *Information Quality Guidelines* and guidance associated with implementation of the *Foundations for Evidence-Based Policymaking Act* to address findings from the review noted above, including requirements for Line Office-level protocols and inventories of influential scientific information and public data sets associated with publications. Revise responsibilities for ongoing oversight and reporting, and determine the necessity and scope of existing oversight roles.
- Update NOAA's procedural practices associated with the use of scientific information in agency decision-making processes, including incorporating the process improvements identified in the review noted above to ensure alignment, particularly rigorous documentation of uncertainties and assumptions, alignment with relevant legal standards, and the use of a weight of evidence approach related to EO 14303, Section 4; take measures to modify previous agency actions as determined necessary per EO 14303, Section 5(c).
- Update NOAA procedural practices for contracts and financial assistance awards to incorporate updated language from NOAA's Administrative Orders and other guidance documents such as those related to open science, including incorporating GSS adherence and reporting requirements into solicitations, merit-based peer review and proposal selection processes, and standard award terms and conditions.
- Update NOAA-wide standards for merit-based peer review of proposals, technical peer reviews, and external peer reviews of program/research performance, including core merit review criteria, reviewer guidelines, program staff guidelines, protocols for avoiding/addressing conflicts of interest, and improving consistency and quality in overall processes and documentation.
- Update NOAA internal policies and procedures associated with central components of EO 14303, to include updated processes, roles, and responsibilities, including ensuring a senior appointee–led process that is the sole and exclusive mechanism for evaluating alleged violations and taking appropriate measures to respond.

NOAA will identify opportunities to expand capabilities of existing Line Office or corporate-level business systems to more consistently and efficiently implement new or updated processes and workflows.

Expand Open Access to Scientific Data, Models, and Peer-Reviewed Publications

NOAA currently operates under federal government-wide open science and public access requirements, including the *Information Quality Act (IQA)*, *Foundations for Evidence-Based Policymaking Act*, OSTP public access requirements, and agency-specific directives for disseminating the results of publicly sponsored research. Expanding on existing IQA and open science frameworks will enable NOAA to further advance the goals of EO 14303 and the GSS tenets, particularly, transparency, reproducibility, and accepting negative results as positive outcomes. By broadening access to NOAA's scientific data, models, and peer-reviewed publications, expanding existing infrastructures to facilitate access, and removing barriers that limit timely sharing, NOAA will strengthen the overall integrity of its research. These efforts will also broaden the utility of NOAA's research to the public, the scientific community, and public and private sector entities that use NOAA data for decision-making.

NOAA Actions:

- Identify and address barriers to public access compliance, including ensuring all NOAA-funded scholarly publications and associated data authored or co-authored by NOAA employees, contractors, affiliates, or grantees, are made freely available and publicly accessible without any embargo or delay at the time of publication.
- Consistent with the review noted above, take necessary steps to make influential scientific information publicly available in a timely, user-friendly manner, including data, analyses, reports, and models (including code) associated with that information.
- Develop guidance, procedures, and incentive structures to support public access to as much NOAA-sponsored research and information as possible, including raw data, analyses, software tools (including code), and null or negative findings.

NOAA will leverage NOAA's Library Institutional Repository, National Centers for Environmental Information (NCEI), NOAA Open Data Dissemination (NODD), and other approved data repositories such as credible open science platforms, to expand public access to NOAA-sponsored publications, scientific data, and software. NOAA will also identify technologies (including AI-based tools) to create efficient workflows, remove administrative burdens, and increase researcher participation in open science practices. Increased use of persistent identifiers will further enhance open access to and discovery of research products.

Engage NOAA Community through Outreach and Education

Efforts to create and maintain a culture of research and scientific integrity among NOAA employees and affiliates require more than policy and procedural changes. It requires a fundamental culture shift across the Bureau, with intentional, systemic, and sustained efforts from NOAA leadership, managers, and supervisors to ensure a supportive operating

framework and daily reinforcement. Early-career researchers learn scientific excellence, integrity behaviors, and best practices from mid-career and senior scientists; quality mentorship on these topics is essential. Equally important are effective outreach, training, and supporting mechanisms and tools for the NOAA community that embed GSS tenets into the daily workflows of research, as well as rigorous practices for the use of scientific information in agency decision-making. These efforts will help foster a shared understanding of NOAA's fundamental recommitment to sound research practices.

NOAA Actions:

- Promote the tenets of GSS as integral to the responsible and ethical conduct of research, including through NOAA communications to create greater awareness of NOAA policies, procedures, and practices.
- Develop checklists and best practices associated with incorporating the GSS tenets into standard workflows such as solicitations, development and review of Fundamental Research Communications, and implementation of NOAA's *Information Quality Guidelines*.
- Identify relevant online training modules to incorporate GSS tenets as part of regular training requirements for NOAA employees and affiliates, including options for interactive, case-based discussions and topical seminars, and for supporting communities of practice.
- Consider guidelines, tools, and incentives to encourage positive reinforcement of GSS tenets by managers, supervisors, and among peers. Informational resources and ongoing communications and reinforcement are critical to fostering a culture of sound, unbiased science that will once again earn the public's trust. NOAA will identify opportunities to leverage the e-learning modules of the Commerce Learning Center to update or create new online learning tools. NOAA will also consider the development of central digital platforms for sharing informational resources, including checklists and validated protocols for using GenAI tools in standard workflows, tools for supervisors, and resources for peer-to-peer learning.

Evaluation of Implementation

Evaluating NOAA's implementation of EO 14303 and OSTP guidance will require a phased and adaptive approach. Comprehensive reviews of NOAA's policies and practices and subsequent updates to those frameworks will take time. Initially, NOAA will focus on near-term metrics that track operational and process milestones. As implementation progresses, NOAA will refine and expand evaluation efforts to include output- and outcome-based metrics that assess the broader impact of fully embedding GSS tenets across the agency's scientific enterprise. This evolving approach will ensure accountability, transparency, and continuous improvement in meeting the goals of the EO. Execution and coordination of this implementation plan will be led by the NOAA Science Council, which is chaired by the NOAA Chief Scientist, or other designees as selected by leadership, with approval and oversight provided by the politically appointed NOAA Policy Team.

Actions to Date and Identified Challenges

This section summarizes NOAA's efforts to date in responding to EO 14303 and the OSTP GSS Guidance, including preliminary planning activities. It also summarizes key challenges NOAA identified associated with implementing the EO, and describes approaches to address them. These early efforts demonstrate NOAA's commitment to aligning its scientific enterprise with the EO's goals, which will require continuous refinement to sustain progress toward full implementation.

NOAA Actions Taken Since May 23, 2025 (per EO Section 3(d)):

- NOAA formed a team of senior career and politically appointed experts to guide the review of the requirements of the EO and OSTP Guidance, developed the initial implementation plan, and initiated discussions among NOAA's senior science managers.
- On June 4, 2025, NOAA established an interim scientific integrity policy consistent with EO Section 5(a), reinstating the NOAA Administrative Order on Scientific Integrity that was in place on January 19, 2021.
- NOAA has reviewed *Information Quality Act* requirements against NOAA's *Information Quality Guidelines* and begun assessing opportunities for greater compliance with the EO.
- NOAA has begun implementing core elements of the *Foundations for Evidence-Based Policymaking Act*, including the establishment of a robust data governance structure, expansion of open access to data and information, and implementation of open data licensing requirements.

Identified Challenges: NOAA has identified the following challenges associated with implementation of the EO and will seek opportunities to overcome these challenges:

- **Applicability of GSS Tenets to Certain NOAA Mission Areas**: Some NOAA mission areas, such as long-term observational studies, social and economic research, and the development of complex models, present inherent challenges to the application of certain GSS tenets, such as "structured for falsifiability of hypotheses." These scientific activities often focus on exploratory work, descriptive analysis, or scenario development where experimental control and formal hypothesis testing are not always feasible. Further, although the GSS tenet "reproducible" is tractable for most experimental research in which the researcher tests multiple variables or treatments, it is likely infeasible for observational research associated with discrete environmental phenomena that are naturally occurring and, by definition, cannot be reproduced artificially or on demand. To address this, NOAA will identify alternative practices (e.g., rigorous documentation of research methods, assumptions, biases, scenarios used, transparency in communication of uncertainty, and peer review) that uphold the intent of the tenets while acknowledging the unique methodological constraints of these research domains.
- **Legal Considerations for Implementation:** There are certain instances where public law establishes requirements for how agency data may be publicly released or how scientific information must be considered in agency decision-making processes (such

as but not limited to the *Privacy Act*, *Magnuson-Stevens Fishery Conservation and Management Act*, *Endangered Species Act*, and *Marine Mammal Protection Act*). NOAA will work to implement the EO consistent with these legal obligations while advancing the principles of transparency, rigor, and accessibility wherever possible. Where constraints exist, NOAA will explore alternative approaches, such as data anonymization, aggregated reporting, and public-friendly summaries, to balance compliance with open science objectives.

- **Resource Considerations for Implementation**: Fully implementing the EO and OSTP Guidance will require significant investments of staff time and resources. Implementation will require staff to conduct and update policies and procedures, update or expand corporate business systems to streamline and record processes, and develop, maintain, or evaluate existing data repositories and other supporting infrastructures. NOAA will work to prioritize efforts, optimize existing resources, and identify opportunities for new technology-enabled solutions to ensure sustained progress toward these objectives.
- **Alignment with Broader Federal Implementation:** Incorporating updated policies and procedures into NOAA's solicitations, contracts, and financial assistance awards will require thoughtful and coordinated planning to avoid introducing new administrative burdens on funded institutions. It is essential that NOAA's implementation approach remains consistent with government-wide practices to ensure alignment and minimize unnecessary complexity for extramural partners. By coordinating closely with the DOC and other federal agencies, NOAA will work to promote a balanced implementation strategy that supports the intent of the EO while promoting efficiency and transparency for the extramural community.

U.S. Census Bureau

Introduction

The Census Bureau's statistical research and production activities span foundational research on innovative statistical methodologies that will inform the next generation of statistical products, to the formal, robust production cycles of our flagship statistical products including Principal Federal Economic Indicators and the decennial census. It is in the context of these activities, both for new/prospective products and for the continuous improvement and evaluation of existing ones, that the Gold Standard Science tenets are most applicable

Legal and Policy Context

The GSS tenets supplement and build upon a broader framework of requirements and standards set in place by the Information Quality Act (2001), which governs the quality of information products disseminated by federal agencies. While most federal agencies developed their own agency-specific guidelines to align with the 2002 Office of Management and Budget (OMB) Information Quality Act guidelines, agencies within the Federal Statistical System were subject to an additional layer of policy oversight and coordination. Statistical Policy Directives No.1 (2014) and No.2 (2006), issued by OMB's Office of the Chief

Statistician of the United States, established additional guidelines for the relevance, timeliness, credibility, objectivity, and trustworthiness of federal statistical products and statistical quality standards governing their design, collection, processing, and dissemination.

The Census Bureau's scientific and information quality standards and requirements invoked by these directives are codified in the Census Bureau's Statistical Quality Standards. These standards are reinforced by professional codes of practice, such as those of the American Statistical Association and the American Economic Association. Integrating GSS tenets into the Census Bureau's scientific activities, building upon existing information quality standards and requirements, will help to ensure the continued quality and credibility of all Census Bureau statistical products.

Implementing Each of the Gold Standard Science Tenets

Each Gold Standard Science tenet is reflected in the Census Bureau's current activities and culture, and more can be done to strengthen the agency's alignment to them. Coordination and stewardship of these efforts is the responsibility of the Census Bureau's Methodology and Standards Council (M&S Council), an interdisciplinary group of senior methodologists and researchers spanning the agency's program and research directorates. The council's dual mission is: (1) to promote continuous methodological improvement and innovation across the enterprise in the development and dissemination of the Census Bureau's statistical products; and (2) to ensure enterprise-wide adherence to the sound methods and practices outlined in the Census Bureau's Statistical Quality Standards. Because the M&S Council, as the steward of the Statistical Quality Standards, already serves as the principal forum for developing and implementing statistical quality responsibilities under the Information Quality Act, it is a logical extension of its mandate to oversee the development and implementation of activities supporting adherence to the Gold Standard Science tenets and their alignment with the Information Quality Act's requirements. The Census Bureau's chief scientist, as chair of the M&S Council, will provide executive oversight and direction of the activities.

Metrics for assessing the Census Bureau's alignment to the tenets will evolve over time. Initially, they will focus on completing key milestones that will enable future progress toward improved alignment. Eventually, once those key implementation milestones are completed, more quantitative and objective measures of researcher activity and research output will be used.

Transparency

The Census Bureau has a well-established record of transparency in its scientific research. Internal researchers regularly share their work publicly at scientific and professional association meetings, conferences, and other public forums, and the agency sponsors a variety of seminar and working paper series that give additional opportunities for sharing intramural and sponsored extramural research with broader audiences. Additionally, the Census Bureau's commitment to open science led to the development of the concept of

operations for the Open Census Initiative. The three pillars of this initiative are Open Data (a cloud-based, public repository to release, reference, and use large noise-infused, nontabulated Census Bureau data), Open Code (a repository for sharing software products and code with data users to increase understanding and transparency of sponsored data products), and Open Science (a research publication platform where products, software, and publications can be released).

Achieving greater transparency into our scientific activities will require full implementation of the Open Census Initiative. In particular, we need to provide better documentation, traceability, and attribution for intramural and sponsored extramural research components, including the use of persistent identifiers—ORCIDs and Digital Object Identifiers (DOIs)—to seamlessly link research, researchers, code, and data to improve access and understanding. In parallel with these new Open Census repositories, we need to update our federal record schedules to ensure that all intramural and sponsored extramural research is properly archived and preserved.

Once implemented, these efforts will enhance transparency into the outputs of the Census Bureau's scientific activities, but fully achieving this tenet also requires improving transparency into the ongoing scientific activities throughout the research cycle. Although senior researchers at the Census Bureau routinely share their current research in various public forums, as an organization, the Census Bureau's engagement strategies with different stakeholder segments are inconsistent. This results in some groups gaining greater transparency into our activities than others. Full alignment with this tenet will require the Census Bureau to implement more expansive, sustained, and coordinated mechanisms for engaging these additional groups regarding our ongoing scientific activities and research.

Measuring Success

- Establishment of Open Data, Open Code, and Open Science repositories.
- Development and implementation of standards, including guidelines and metadata conventions.
- Implementation of process to assign persistent identifiers.
- Coverage of newly generated research, data, and code in the repositories.
- Stakeholder gap analysis and mitigation plan.
- Tracking of researcher engagement with stakeholder groups.
- Inventory of experimental and research-based statistical products and crosswalk to updated record schedules.
- Updated guidance on the preservation and disposition of statistical products in compliance with the Open Census Initiative and appropriate record schedules.

Reproducible

For the Census Bureau, promoting reproducible science has two principal components: (1) ensuring that internal and external stakeholders and researchers have, to the maximum extent practicable and permissible by law, the information necessary to understand and

replicate the statistical methods, processes, and analyses used to produce the Census Bureau's statistical and information products and research; and (2) establishing the expectation that all extramural research sponsored by the Census Bureau, including research performed within the Federal Statistical Research Data Centers (FSRDCs), is properly documented and archived and that mechanisms exist to enable reproducibility of that research by other researchers and peer-reviewed journals, as appropriate.

Data Stewardship Policy (DS027) "Research Transparency and Public Access" affirms the Census Bureau's commitment to ensuring that intramural and sponsored extramural research is relevant, credible, transparent, objective, and open. But greater alignment with this tenet will require addressing existing challenges, most notably the accessibility and documentation of research and production code, as well as navigating the access and use restrictions of Census Bureau data protected under Title 13 and other statutes.

Implementation of the Open Census Initiative's Open Code and Open Data repositories, to include deliberate archiving, curation, and vintaging of data, will be a cornerstone of the Census Bureau's ability to support reproducibility and replicability of research. In addition, including researchers' replication packages within those repositories will facilitate external validation of intramural and sponsored extramural research. Similarly, better versioning and curation of production code and better archiving, curation, and vintaging of data files will facilitate internal replication of research and statistical processing. To help address the issue of replicating analyses and research using data protected under Title 13, the Census Bureau is establishing a process to support requests from editors of external peer-reviewed journals for attestation that the results of internal and external research based on confidential data are accurate.

Measuring Success

- Development and implementation of a data archiving and curation program.
- Number and coverage of replication packages included in the Open Census repositories.
- Number of complete replication requests from external journals.

Communicative of Error and Uncertainty

The proper assessment and communication of error and uncertainty is a foundational component of the professional practice of statistics as a scientific discipline. As such, alignment with this Gold Standard Science tenet is essential for achieving the Census Bureau's mission "to serve as the nation's leading provider of quality data about its people and economy."

Building on the requirements of the Information Quality Act and OMB's Statistical Policy Directives, the Census Bureau's Statistical Quality Standards require information products derived from sample surveys to publish associated margins of error. For example, standard E1-4 requires that "*any conclusions derived from sample data must be supported by appropriate measures of statistical* uncertainty," and standard E2-2 establishes specific

requirements for how error and uncertainty need to be communicated in the information product.

The traditional margins of sampling error that accompany many of the Census Bureau's statistical products only convey a portion of the total error associated with those products. The Census Bureau's new Statistical Quality Framework initiative is developing approaches for assessing total error in statistical products that will define statistical quality and quantify errors that arise from other sources, such as coverage error, operational error, and disclosure avoidance error. Declining response rates heighten the importance of accounting for these other sources of error, as does the increasing use of blended data and other nontraditionally sourced data in producing our statistical products. The M&S Council has established a working group on blended data tasked with developing new standards for assessing and quantifying error and uncertainty in these contexts. A separate M&S Council working group is also developing better standards for effectively communicating uncertainty and inferences in data visualizations to users with varying levels of data acumen. The council plans to launch future working groups to address more facets of uncertainty, including an AI Quality Standards working group.

Communicating uncertainty is insufficient if users do not know how to incorporate uncertainty into their analyses. To fully align with this tenet, the Census Bureau needs improved mechanisms to educate and assist users in incorporating these measures of error and uncertainty into their analyses.

Measuring Success

- Development and operationalization of the Statistical Quality Framework.
- Number of statistical products that publish assessments of total error.
- Development of blended data quality standards.
- Development of improved data visualization standards.
- Training on incorporating uncertainty into statistical analyses based on Census Bureau statistical products.

Collaborative and Interdisciplinary

Collecting, processing, and disseminating the full range of Census Bureau statistical products requires the collective skills and expertise of a wide variety of scientific disciplines, including statistics, economics, demography, geography, computer science, data science, mathematics, communications, linguistics, and social and behavioral science. As a result, much of our scientific work is inherently collaborative and interdisciplinary. Across the enterprise there is a strong culture of internal and external collaboration, with inclusive publication practices and a formal information product review process that often crosses directorates and disciplines.

At times, the realities of functional organizational structures and formal production cycles can make it difficult for staff—especially junior and mid-level—to understand their role in

the broader generation and use of science at the Census Bureau, and how their individual work intersects with these other disciplines. Consequently, they may not realize the value of interdisciplinary collaboration and the importance of adherence to rigorous scientific methods and professional codes of practice relating to scientific activities. To better align with this tenet, the Census Bureau needs to develop and promote bureau-wide training on the role of science in Census Bureau activities, stressing the importance of scientific rigor and the responsible conduct of research reflecting the contributions and norms of the different disciplines.

Measuring Success

- Development of training.
- Number/percentage of staff that have taken responsible science training.

Skeptical of Findings and Assumptions

With its foundational focus on the assessment and quantification of error and uncertainty (discussed above), the professional practice of statistics encourages a healthy skepticism regarding the assumptions driving an analysis or the findings resulting from them. At the Census Bureau, the M&S Council provides a forum for voicing this skepticism when it reviews and evaluates early-stage research and experimental statistical products. It also administers a formal waiver request process for reviewing and approving the dissemination of statistical products when findings and assumptions are incongruent, or when established statistical quality standards are not being met.

Better enterprise-wide training on the role of science in Census Bureau activities—emphasizing the importance of scientific rigor and the responsible use of science—can help the Census Bureau better align with this tenet. But fostering and maintaining a healthy skepticism of scientific methods and approaches requires their ongoing exposure to researchers with different scientific viewpoints, experience, and skills. The close and ongoing collaboration of intramural researchers across the Census Bureau's directorates poses a risk of methodological or scientific "group think." Avoiding this and maintaining continued skepticism of findings and assumptions requires sustained engagement of Census Bureau researchers with external scientific communities and professional associations. This is especially true for junior and mid-level researchers who, due to resource constraints, may have limited opportunities to engage with the broader researcher community but might benefit the most from the free flow of critical and opposing ideas and perspectives in those environments.

Measuring Success

- Number and extent of researcher engagement with various scientific and professional associations.
- Number/percentage of staff who have completed responsible science training.

Structured for Falsifiability of Hypotheses

As the nation's statistical needs change and as the data collection landscape evolves (e.g., declining response rates), the Census Bureau's statistical products need to adapt. We should expect new and innovative statistical products to progress from research-based, to experimental, to core product status, and for new methodologies to be designed, tested, and incorporated into production, to reflect changes in policymaker and data user demand for information. On occasion, we should also expect to decommission some existing products, whether because of quality concerns or because of reduced societal relevance. Historically, these decisions regarding the promotion or decommissioning of a product have been the sole purview of the directorate producing the product. As these products become increasingly interdisciplinary and collaborative, perspectives from other directorates may be important for informing these decisions. The Census Bureau needs to establish better governance processes for deciding when and how these reviews and decisions about product status should be made.

There is growing acceptance across the Census Bureau that not all research will succeed and that not all research-based and experimental statistical products will transition to core product status. The Census Bureau's Statistical Product First initiative and culture encourage a cyclical evaluation of our statistical products' intended uses and purposes, which in turn drives innovation and change within those products and spawns new research questions to advance future scientific research.

Measuring Success

- Development and implementation of periodic review process for existing statistical products.
- Number of reviews conducted.

Subject to Unbiased Peer Review

Effective and unbiased peer review can take many forms: internal and external, formal and informal. Better alignment with this tenet can benefit the Census Bureau's activities across the enterprise and throughout the entire research and information product lifecycle. Formal peer review is imperative for ensuring the overall quality and validity of the completed research and its output. But the importance of informal peer review should not be discounted, as it helps to ensure scientific rigor throughout the entirety of the research lifecycle.

Standard E-3 of the Census Bureau's Statistical Quality Standards establishes formal internal review requirements for all Census Bureau information products. The Census Bureau also encourages researchers to share their research for informal peer review and critique internally through ongoing seminar series, and externally with relevant professional and scientific associations. Researchers are also encouraged to submit their work to peer-reviewed journals for publication.

To better align with this tenet, the Census Bureau can improve upon the formal internal peer review process for disseminated information products. Existing review requirements under Standard E-3 tend to focus on the researcher's supervisory chain, but that review chain may be closely involved with the research they are reviewing. To ensure effective and unbiased reviews, the Census Bureau needs improved standards when the researcher's supervisory chain or other reviewers are closely involved with the research or methodologies under review.

As noted above in relation to the tenets on transparency and skepticism toward findings and assumptions, improving the value of external peer review requires robust and sustained formal and informal engagement between Census Bureau researchers and their external peers via scientific and professional associations. Implementing the Open Census Initiative's Open Data and Open Code—and including complete replication packages for all internal and external research—can also facilitate improved and unbiased external peer review.

Measuring Success

- Development of improved peer review standards.
- Number and extent of researcher engagement with various scientific and professional associations.
- Number/percentage of intramural and sponsored extramural research projects that submit replication packages to the Open Census repositories.

Accepting of Negative Results as Positive Outcomes

In the context of the Census Bureau's broader scientific activities, acceptance of negative results as positive outcomes has implications both at the broader program level and in the context of individual research results. In developing new statistical methods and products, and continuously improving existing ones, Census Bureau programs routinely pursue multiple research paths simultaneously— understanding that not all research projects and proposed methodological innovations will pan out. However, in the context of individual research projects the Census Bureau, like the broader scientific research community, has not generally been supportive of publishing negative findings. As the Open Census Initiative is implemented, the Census Bureau needs to cultivate the expectation among agency and affiliated researchers that negative results should be written up and published in the Open Science research repository.

Measuring Success

- Creation of a publication format for negative results to be included in the Open Science repository.
- Number of negative finding reports included in the Open Science repository.

Without Conflict of Interest

As with other federal agencies, the Census Bureau is subject to a well-established framework of laws and ethical guidelines regarding financial and personal conflicts of interest in contracting, awards, and hiring. However, not all conflicts of interest are necessarily financial or personal. The Census Bureau needs to improve awareness among all internal staff and sponsored extramural researchers about broader issues relating to conflicts of interest, including those regarding conflicts of commitment. We also need to develop a process for raising and addressing potential conflicts that could impede adherence to the Gold Standard Science tenets.

Measuring Success

- Incorporation of conflicts of interest and commitment into the responsible science training.
- Number/percentage of staff who have taken responsible science training.

Opportunities to Leverage Technology and Artificial Intelligence

Technology and artificial intelligence (AI) offer many opportunities to support the implementation of Gold Standard Science at the Census Bureau. The Open Census Initiative, in particular, can benefit from the use of AI, especially for developing the Open Code repository and creating and curating research replication packages. The quality of these replication packages and their accompanying documentation can also be improved through better awareness and adoption of software and coding best practices. AI can also help with the development and delivery of training and resources needed to educate and inform internal and external researchers on these tenets and their implementation.

Bureau of Economic Analysis (BEA)

Introduction

The Bureau of Economic Analysis (BEA) produces some of the most closely watched statistics in the world, providing detailed, timely, and accurate information about the world's largest economy. Ensuring that BEA statistics adhere to the principles of Gold Standard Science is essential to meeting BEA's mission.

The Tenets of Gold Standard Science

BEA statistics and workflows are consistent with the principles of Gold Standard Science laid out in the President's Executive Order of May 23, 2025.[1] BEA statistics are:

1. **Reproducible:** BEA publishes detailed methodology documents that are available to the public.[2] These documents provide detailed instructions that can be used by outside parties to construct reliable estimates of economic activity using other publicly available data sources.

[1] https://www.whitehouse.gov/presidential-actions/2025/05/restoring-gold-standard-science/
[2] https://www.bea.gov/index.php/resources/methodologies

2. **Transparent:** BEA's methodology documents provide a wealth of detail about how BEA statistics are computed and the hundreds of public and private data sources used to construct the estimates.
3. **Communicative of error and uncertainty:** BEA is committed to producing the most accurate and usable statistics possible. Tradeoffs between timeliness and accuracy are unavoidable, and BEA seeks a balance that provides users with actionable information. BEA statistics are publicly revised on a consistent schedule to ensure that new data are incorporated as it becomes available.
4. **Collaborative and interdisciplinary:** BEA works with partners across Federal, state, and local government, as well as hundreds of private sector, academic, and nonprofit organizations.
5. **Skeptical of its findings and assumptions:** BEA publishes extensive detail about revisions and actively researches new data sources and methodologies to ensure U.S. statistics stay at the forefront of economic science.
6. **Structured for falsifiability of hypotheses:** BEA methods are rigorously tested to ensure that they provide accurate and reliable estimates of U.S. economic activity. Methods are continuously updated and refined.
7. **Subject to unbiased peer review:** BEA methods and data sources are tested both internally and externally. BEA researchers regularly engage with academic and private-sector organizations to receive feedback directly from users.
8. **Accepting of negative results as positive outcomes:** BEA staff experiment with new data sources and methodologies relevant to their focus area. The information gained from these efforts serves as an important check on BEA's current processes and helps open up new avenues for further research.
9. **Without conflicts of interest:** BEA is nonpartisan, policy neutral, and operates within a well-established and rule-governed statistical system. Under the requirements of U.S. law and OMB policy, BEA ensures that U.S. economic statistics are consistent with good scientific practice and free from bias.[3]

Metrics and Evaluation Mechanisms

BEA employs an array of mechanisms to ensure that U.S. economic statistics are timely and accurate. New data sources and methods are reviewed rigorously by both internal and external experts to ensure their accuracy and reproducibility. BEA works continuously to reduce the need for revisions by incorporating new source data and modern technologies and produces regular revision studies on the size and sources of revisions.

[3] See https://www.congress.gov/bill/115th-congress/house-bill/4174 and https://www.statspolicy.gov/. See also Titles 15 and 22 of the U.S. Code: https://uscode.house.gov/browse.xhtml.

Training and Technology
BEA staff receive regular training on upholding scientific standards and professionalism in their work. BEA's Office of the Chief Economist provides training on best practices in statistical and scientific conduct, and all staff receive annual training on their legal responsibilities to protect confidential data.

Technology also plays a key role in maintaining BEA's cutting-edge scientific methods. BEA has a long history of leveraging information technology and software to efficiently produce statistics and create new measures. Current efforts to improve BEA's technological capabilities include modernization of internal IT systems, a bureau-wide effort to convert all production code to the Python programming language, and pilot programs to incorporate modern data science and AI tools to speed up and improve workflows.

Challenges
BEA currently does not face any major challenges implementing OSTP's guidance for Gold Standard Science across the bureau. As challenges do arise, BEA will document and adjust its policies and procedures to ensure that it remains in compliance with OSTP's guidance and Executive Order 14303.

National Telecommunications and Information Administration (NTIA)

Introduction
The Institute for Telecommunications Science (ITS) is updating applicable agency policies governing the production and use of scientific information, including scientific integrity policies, to implement OSTP's guidance on Gold Standard Science and ensure that agency scientific activities are conducted in accordance with the EO. Specifically, ITS is incorporating the OSTP guidance into the processes by which ITS conducts, manages, interprets, communicates, and uses scientific or technological information.

Background
ITS is an office of NTIA but also a federally funded laboratory. Absent a specific agency-wide policy that addresses only scientific integrity, NTIA delegates to ITS implementation of Department of Commerce Guidelines issued under Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554, hereafter, "Section 515 Guidelines").

Addressing the tenets of Gold Standard Science
Below, ITS addresses each of the tenets of Gold Standard Science (GSS) and cites the relevant regulation, guidance, policy, and/or process.

ITS has had a peer review process in place since its inception, roughly continuing the guidelines in the "NBS Manual for Scientific and Technical Communications" under which ITS operated before becoming part of NTIA. The process is formalized through the principles laid out in ITS Editorial Review Board, "ITS Publications Handbook Volume I: Policies (Third

Edition)," Handbook NTIA HB-14-503, U.S. Department of Commerce, National Telecommunications and Information Administration, Institute for Telecommunication Sciences, March 2014, https://doi.org/10.70220/kcql9ssz (hereafter, "ITS Publications Handbook"). The handbook also describes the implementation of internal procedures that support the Editorial Review Board.

Authorities referenced in the ITS Publications Handbook for the conduct of peer review include the following Office of Science and Technology Policy Memoranda:

- Executive Office of the President. Office of Science and Technology Policy. Memorandum for the Heads of Executive Departments and Agencies, *Increasing Access to the Results of Federally Funded Scientific Research*, February 22, 2013.
- Executive Office of the President. Office of Science and Technology Policy. Memorandum for the Heads of Executive Departments and Agencies, *Scientific Integrity*, December 17, 2010.

In addition, the ITS Publications Handbook references the following OMB memorandum:

- Executive Office of the President. Office of Management and Budget. Memorandum for Heads of Departments and Agencies M-05-03, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.

The current edition of the ITS Publications Handbook was published in 2014 and therefore predates the follow-on OMB memorandum:

- Executive Office of the President. Office of Management and Budget. Memorandum for Heads of Departments and Agencies M-19-15, *Improving Implementation of the Information Quality Act*, April 24, 2019.

OMB M-19-15 was reviewed by the ITS Publications Officer and the Editorial Review Board when it was issued and it was determined that ITS was already in compliance. ITS will continue to review its current processes and procedures for compliance to GSS.

Reproducible

ITS follows the NTIA Information Quality Guidelines which defines "reproducibility" and provides clear, standardized, and justifiable protocols. With respect to substantially reproducing analytic results, ITS follows guidance that independent analysis of the original or supporting data using identical methods would generate similar analytic results, subject to an acceptable degree of imprecision or error.

NTIA's guidance outlines in broad strokes the pre-dissemination peer review process for scientific documents originating from and disseminated by ITS. ITS is committed to ensuring that our publications are substantive, technically sound, accurate, and clear.

The NTIA Public Access Plan provides for public access to scientific research output. The Plan consists of three components: data management plans (DMPs), a data inventory, and a platform to provide public access infrastructure.

Transparent

The NTIA Public Access Plan requires researchers to provide public access to scientific research outputs. It consists of three components: data management plans (DMPs), data inventory, and a platform to provide public access infrastructure. This platform houses ITS tools and repositories and is publicly available via Github and the ITS website.

ITS fundamental science publications issued as NTIA technical reports or memoranda disclose the sponsor of the research. Disclosure of this information is included in journal submissions, but publication in the final article is subject to the editorial policies of the journal.

When generating or using scientific information, ITS employees must transparently acknowledge and document uncertainties, ERB process, meeting notes, and records – making them transparently available to all ITS staff and permanent retention.

Communicative of error and uncertainty

Per Section 515 Guidelines, ITS technical assessments and measurements are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. This information undergoes quality control before being used or disseminated by ITS. The agency strives for technical objectivity and integrity regarding data collection procedures, level of quality, and limitations. Data and information sources are properly referenced or identified to the extent possible, consistent with confidentiality, privacy, and security considerations and protections. Authoritative treatments are reviewed by technically qualified individuals to ensure that they are valid, complete, unbiased, objective, and relevant. In short, original and supporting data are generated, and analytic results are developed using sound statistical, research, and review methods.

Scientific information reflects the inherent uncertainty of the scientific process. The concept of statistical variation is inseparable from every phase of the scientific process, from instrumentation to final analysis. Therefore, in assessing information for accuracy, the information is considered accurate if it is within an acceptable degree of imprecision or error appropriate to the particular kind of information at issue. This concept is inherent in the definition of "reproducibility" as used in the OMB Guidelines. ITS adheres to this definition of error and uncertainty and annotates data and scientific products accordingly.

Collaborative and interdisciplinary

In FY24, ITS's collaborative and externally-funded research (e.g., from another federal agency) totaled $28.7M under a total of 28 interagency and cooperative agreements.

Sponsors and collaborators of ITS research activities include, but not limited to: NIST (National Advanced Spectrum Communications Test Network, or NASCTN), NSF (SpectrumX, NRDZ), DoD (Under Secretary for Research and Engineering's FutureG

Office, Naval Research Lab), Department of Transportation (Intelligent Transportation Systems Joint Program Office), Department of State (Bureau of Cyberspace and Digital Policy), and others.

ITS regularly engages with other agencies, industry, and academia through cooperative and collaborative exchange of ideas, discussions, and scientific inquiry, in such fora as the Wireless Innovation Forum (Winn Forum), NITRD/WSRD, and IRAC.

ITS allows external stakeholders to virtually connect to the laboratory network and support ongoing research activities remotely. For example, ITS recently completed an upgrade to network capabilities at the Table Mountain Field Site to enable large scale data transfers with the MITRE FFRDC.

Finally, ITS publishes and engages with users on ITS's Github repository, providing an effective means for communication, technology transfer, and collaboration.

Skeptical of its findings and assumptions

ITS follows a strenuous review process to ensure findings and assumptions are thoroughly vetted, reliability of results are critically assessed, and interpretations and conclusion are challenged. The Section 515 Guidelines outline the pre-dissemination review process for scientific documents originating from and to be disseminated directly from ITS, as follows:

- The author of the draft manuscript forwards it and a list of technical reviewers to his/her division chief. The division chief reviews the manuscript to ensure compliance with the author's scientific responsibility; identifies potential policy issues; assigns a project number; and selects two technical reviewers. The division chief also forwards a copy of the manuscript to the publications officer, who serves as the editorial reviewer. A review form ("NTIA-2") is prepared and the manuscript is forwarded to each technical reviewer and, if necessary, to an executive officer with request for a policy review. The executive officer coordinates any policy review with appropriate office heads at NTIA headquarters.
- The technical reviewers, usually two peers, perform a rigorous review of the manuscript for technical significance and accuracy, and complete the NTIA-2 form. The editorial reviewer reviews the draft to ensure technical clarity before completing the review form. All reviewers return copies of the draft manuscript and completed NTIA-2 forms to the division chief. S/he is notified of any policy or technical issues identified by reviewers and returns the annotated copies of the manuscript and the review forms to the author. The author revises the draft manuscript, using the reviewers' comments, as appropriate.
- A manuscript approval form ("NTIA-3") is attached to the "revised manuscript" and the package is submitted to the Editorial Review Board ("ITS-ERB"). This review body ensures technical integrity, substantive value, and scientific accuracy, as well as examines the regulatory and policy impact of the contents of the revised manuscript. (On rare occasions, the division chief approves the revised manuscript

for immediate release.) The ITS-ERB reviews the package and assigns a sponsor, who examines a copy of the manuscript to determine that the author has responded appropriately to reviewers' comments and that there are no remaining policy issues. The sponsor may consult with the author and reviewers, and upon determination all concerns about the draft have been resolved, executes the NTIA-3 and returns the package to the ITS-ERB chair with recommendations concerning publication. The Chair of the ITS-ERB acts on the sponsor's recommendation, signs the NTIA-3 (thereby indicating the ITS-ERB's recommendation), and returns the manuscript package to the division office for revisions, as appropriate. Once finalized, the manuscript is delivered for dissemination.

Structured for falsifiability of hypotheses

Per the Department of Commerce's "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Disseminated Information," ITS is "committed to making the methods, models, and processes that produce our information transparent and rigorous." ITS's approach does not always allow for testing of hypotheses. Much of the research is investigative in nature, trying to measure and characterize the physical traits of radio frequency propagation, interference, and activities. The purpose of this approach is to enable researchers to verify real-world physics, not hypothesize about how telecommunications systems work.

In some cases, where models are used to predict radio wave characteristics, researchers then verify accuracy of the model through measured data and analysis. This approach enables objective and independent validation of results which is not a traditional hypothesis test approach to science.

Subject to unbiased peer review

ITS follows the Section 515 standard for objectivity, which is defined as follows:

- Objectivity consists of two distinct elements: presentation and substance. The presentation element includes whether disseminated information is presented in an accurate, clear, complete, and unbiased manner and in a proper context. The substance element involves a focus on ensuring accurate, reliable, and unbiased information.
- Third-party information from both domestic and international sources, such as states, municipalities, agencies and private entities may be included in information that ITS disseminates. Although third-party sources may not be directly subject to Section 515, information from such sources, when used by NTIA to develop information products or to form the basis of a decision or policy, must be of known quality and consistent with NTIA's and other applicable information quality guidelines. When such information is used, any limitations, assumptions, collection methods, or uncertainties concerning it are taken into account and disclosed.
- The ITS Publications Handbook addresses scientific integrity, acceptance of results, and best practices for standards and documentation of methods, analyses,

and limitations. This includes peer review which evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product. Peer reviewers may suggest ways to clarify assumptions, findings, and conclusions or identify oversights, omissions, and inconsistencies.

Accepting of negative results as positive outcomes

ITS has had a peer review process continues the guidelines set forth in the "NBS Manual for Scientific and Technical Communications" under which ITS operated before becoming part of NTIA. The process is formalized through the principles laid out in ITS Editorial Review Board, "ITS Publications Handbook Volume I: Policies (Third Edition)," Handbook NTIA HB-14-503, U.S. Department of Commerce, National Telecommunications and Information Administration, Institute for Telecommunication Sciences, March 2014, https://doi.org/10.70220/kcql9ssz. The handbook also describes the implementation of internal procedures that support it the Editorial Review Board.

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Without conflicts of interest

ITS follows the Section 515 standard for objectivity, which is defined as follows:

- Objectivity consists of two distinct elements: presentation and substance. The presentation element includes whether disseminated information is presented in an accurate, clear, complete, and unbiased manner and in a proper context. The substance element involves a focus on ensuring accurate, reliable, and unbiased information.
- Third-party information from both domestic and international sources, such as states, municipalities, agencies and private entities may be included in information that ITS disseminates. Although third-party sources may not be directly subject to Section 515, information from such sources, when used by NTIA to develop information products or to form the basis of a decision or policy, must be of known quality and consistent with NTIA's and other applicable information quality guidelines. When such information is used, any limitations, assumptions, collection methods, or uncertainties concerning it are taken into account and disclosed.

Standardized metrics and evaluation mechanisms used to assess adherence to these tenets

ITS requires 100% compliance to the following:

- All ITS projects are required to prepare a project plan to describe the technical approach and management controls of the effort, as well as a data management plan to make the results of federally funded scientific research freely available in publicly accessible repositories. The metric for this requirement is 100% compliance with NTIA's Public Access Plan for Open Science, in accordance with applicable laws and security controls (e.g., classification markings).
- Scientific research covered by ITS data management plans include all peer-reviewed scholarly publications, ITS-developed software, and scientific data arising from unclassified research and programs.
- By default, ITS staff are expected to publish the results of their scientific activities.

Evaluation mechanisms:

- monthly POA&M meetings with the Director
- semi-annual project reviews with the entire ITS staff
- annual performance write-ups in the annual ITS Technical Performance Report (TPR)
- Sponsor meetings and updates (as applicable)
- All congressionally funded projects (i.e., Advanced Communications Research, or ACR) are required by the Director and the updated ITS SOW template to include milestones, deliverables, and timelines
- ITS is reviewing the template SOW and other programmatic documentation to address any gaps in adherence to the GSS tenets

ITS will continue to review current guidelines, policies, and procedures to ensure these tenets are incorporated into the publications process.

Plans for training agency personnel to adhere to the tenets of Gold Standard Science

ITS researchers are trained in the ITS Publications Handbook at the beginning of employment and thereafter as necessary. ITS will prioritize regular (e.g., quarterly) updates and briefings on the latest technologies, tools, etc., for ITS authors and researchers. The current series of briefings, presentations, etc., is styled as a "Brown Bag" series and is open for all ITS staff to attend.

How technology will be leveraged for implementing Gold Standard Science

ITS has long had a public access system for peer-reviewed publications that enables the submission of metadata and final, peer-reviewed manuscripts or final publications.

- For publications dated October 1, 2025 and later, the ITS public access system will accept any additional files of figures, tables, data files, or supplementary information included with the manuscript.

- The ITS repository of full-text peer-reviewed ITS publications leverages well-established search, archival, and dissemination features.
- ITS will investigate methods of incorporating AI, ML, and other technologies to efficiently review and rate compliance of these measures during the QA process.

Challenges encountered

ITS has not yet encountered any challenges in the implementation of this EO.