U.S. GOVERNMENT NATIONAL STANDARDS STRATEGY FOR CRITICAL AND EMERGING TECHNOLOGY (USG NSSCET):

IMPLEMENTATION ROADMAP

For Public Comment

FOREWORD

Notes to Respondents

The actions proposed in this document are not yet finalized as USG policy nor are they as yet a position held by NIST or the USG. Furthermore, the consolidated input includes comments received through response to the Request for Information (RFI) https://www.federalregister.gov/documents/2023/09/07/2023-19245/request-for-information-on-implementation-of-the-united-states-government-national-standards (further summarized in **Appendix B***). The roadmap does not intentionally recommend actions for non-USG organizations or stakeholders but does seek to align efforts of the USG with private sector activities. Respondents are asked to review the document to identify:*

1. *Accurate capture and reflection of feedback submitted previously,*
2. *Ways to further clarify the USG's commitment to working as a stakeholder in the private sector-led U.S. standards system and,*
3. *Where possible, affirm or clarify actions listed that directly promote the U.S. standards system.*

NIST requests feedback on the Implementation Roadmap for the USG NSSCET. **The public comment period is open through July 12, 2024.** NIST welcomes the public to contact NIST with feedback throughout the implementation of the USG NSSCET by contacting SCO@nist.gov.

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

The ability of the United States to sustain a position of global technological leadership is directly related to sustained strategic and tactical U.S. engagement in standards for critical and emerging technologies (CETs). The United States' approach of leveraging the contributions of private sector innovators and government supported research and development has fueled competitiveness and technological progress to the benefit of the U.S. and global economy. These contributions have also ensured strong and impactful technical contributions to standards. The U.S. Government (USG) is committed to standards development processes built on transparency, shared private and public sector leadership, and stakeholder engagement that reflects the U.S. commitment to free and fair market competition in which the best technologies come to market. Enhancing coordination of U.S. private sector and USG engagement in standards for CET will strengthen our economic and national security in the dynamic global landscape.

This document provides immediate and long-term actions for the USG to reinforce its support for the private sector-led system and work in partnership with private sector stakeholders to address opportunities and challenges related to standards development activities for CET.

The Implementation Roadmap facilitates a comprehensive approach to CET standards coordination within the USG and coordinated engagement by USG stakeholders operating in (1) the framework of a private sector-led system and (2) a dynamic international standards landscape that is rapidly evolving, with attendant implications for U.S. economic and national security.

In the short-term, it is recommended that the USG take immediate action, to include but not limited to: identifying opportunities to increase USG pre-standardization R&D and standards participation efforts; tracking and evaluating current USG CET standards education grants and programs that promote, foster, and remove barriers to U.S. stakeholder participation in international standards activities; and tracking and evaluating current USG technology cooperation agreements with other governments, as well as international mechanisms for standards-related communication and cooperation.

For long-term sustained implementation outcomes, it is recommended that the USG: (1) enhance standards coordination across the federal government; (2) enhance standards coordination with the private sector; (3) enhance standards policy coordination between the USG and foreign governments; (4) recognize and incentivize federal agency engagement in standardization; (5) provide strong and sustained funding for CET R&D and pre-standardization coordination; (6) engage academia as a critical partner in standards development efforts; (7) enhance educational efforts in standards; (8) develop and sustain communications about standards; and (9) remove barriers to participation in standardization.

The U.S. Government (USG) is committed to standards development processes built on transparency, shared private and public sector leadership, and stakeholder engagement that reflects the U.S. commitment to free and fair market competition in which the best technologies come to market.

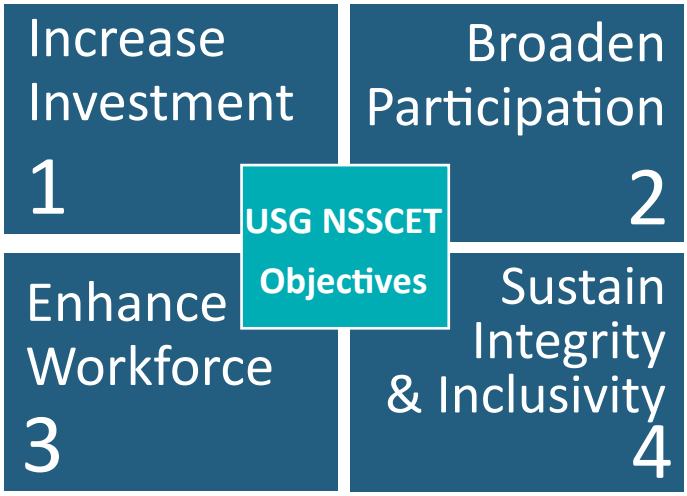
2.0 OVERVIEW OF THE STRATEGY AND IMPLEMENTATION ROADMAP

The USG NSSCET sets forth a vision for how the USG can ***increase investment in pre-standards development activities for CETs, broaden CET standards participation, grow a CET standards-savvy workforce, and ensure inclusivity and integrity*** in developing CET standards by working with stakeholders. The USG NSSCET[1] raises the profile of CET standards development and identifies CET standards as a key component to U.S. national and economic security.

The USG NSSCET complements the United States Standards Strategy (USSS) published by the American National Standards Institute (ANSI)[2] and supports, complements, and further communicates USG priorities for CET standards development. It signals a broad emphasis across the government aimed at strengthening U.S. competitiveness, innovation, national and economic security via standards-related policies and actions.

This Implementation Roadmap is intended to operationalize the four objectives and eight LOE spelled out by the USG NSSCET. It describes near-term actions and longer-term outcomes in order to prioritize, focus, and better coordinate the USG's CET-related investments and actions. This Roadmap calls on U.S. departments and agencies to take stock of their current CET-related standards activities and plans to re-focus and recommit to working with stakeholders to improve both their effectiveness and efficiency.

Actions and outcomes spelled out in this roadmap will facilitate a thoughtful approach to CET standards coordination and engagement by USG stakeholders operating



in the framework of a private sector-led system that is part of a dynamic international standards landscape with attendant implications for U.S. national and economic security.

The USG NSSCET supports a private sector-led system that enhances U.S. leadership in international fora. The four objectives cited above are further defined by and organized around eight Lines of Effort (LOEs):

1. **Increase R&D funding to ensure a strong foundation for future standards development.**
2. **Support the development of standards that address risk, security, and resilience.**
3. **Remove and prevent barriers to private sector participation in standards development.**
4. **Improve communications between public and private sectors on standards.**
5. **Enhance USG and like-minded nations' representation and influence in international standards governance and leadership.**
6. **Promote the education and empowerment of a new standards workforce with intention to include those underserved in the international standards system.**
7. **Deepen standards cooperation with allies and partners to support a robust standards governance process.**
8. **Facilitate broad representation in standards development.**

[1] United States Government National Standards Strategy for Critical and Emerging Technology (https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf)
[2] United States Standards Strategy (USSS) (https://share.ansi.org/Shared%20Documents/Standards%20Activities/NSSC/USSS-2020/USSS-2020-Edition.pdf)

3.0 BACKGROUND ON THE STRATEGY AND THE IMPLEMENTATION ROADMAP

The U.S. standards system is unique compared to that of other countries. It is predicated largely upon a voluntary, decentralized, and private sector-led standards development process that provides meaningful opportunities for all interested parties to participate. This approach enables stakeholders to discuss technical standards in open forums, build consensus, and submit standards for final adoption by the relevant standards body.

Government engagement in the U.S. standards system varies widely depending upon individual agencies' missions and functions. Roles include those of user, specifier, participant, facilitator, advocate, technical advisor/leader, convener and source of funding. Agencies at every level of government use standards to support regulation, procurement and policy activities, as well as incorporate standards into voluntary programs. Government agencies also use standards extensively to provide citizen services, enable connectivity of commercial information technology systems to government systems, and support disbursements of grants, loans, and other similar financial tools and incentives[3] **(Appendix A)**.

3.1 Current USG Standards Policy

The USG's standards-related roles and responsibilities and engagement in standards development activities have been clearly scoped, defined, and enshrined in law and policies – notably by the National Technology Transfer and Advancement Act of 1995, Office of Management and Budget Circular A-119, and the Trade Agreements Act of 1979 (as amended) **(see Appendix A)**. A series of statutes, regulations, and administrative orders comprise the legal framework that governs the Federal government's use of standards and its participation in the development and adoption of voluntary consensus standards.

3.2 The Changing International Landscape and a New CET Paradigm

The USG NSSCET follows on earlier actions defining the USG's role in standards development activities. In 2010, the National Science and Technology Council (NSTC) Subcommittee on Standards (SOS)[4] was formed to (1) engage government agencies on standards policy issues; (2) articulate the U.S. model of public-private cooperation in standards setting to domestic and international audiences; and (3) increase awareness within the Federal government of best practices in addressing standards policy issues.[5] This Subcommittee completed its chartered activity at the end of the Obama Administration. The USG NSSCET and this roadmap build on the findings from the SOS and support, complement, and further communicate USG's strategic priorities for CET standards development. Both are consistent with the ANSI USSS, which remains the predominant statement of purpose and ideals that guides how the U.S. develops standards and participates in international standards-setting processes.[6]

Since the SOS completed, the proliferation of initiatives surrounding CET development and associated standards activities[7] – especially at the international level – demands the USG reinforce the value of the U.S. model of public-private cooperation in standards to further global innovation and trade. The rapid pace of change of the international technology standards landscape is driving the need for a new increased level of coordination between U.S. public and private sector stakeholders to track, engage, and lead standards development that represents the equities of the U.S. Supporting a robust U.S. private sector-led standards system in the context of the active international landscape for CET standards requires the USG to improve coordination across departments and agencies and enhance its support of, and participation in, CET standardization activities including by expanding support for the involvement of stakeholders from SDOs, industry (including start-ups and small- and medium-sized enterprises), academia, and civil society.

[3] Federal Engagement in Standards Activities (https://www.nist.gov/system/files/documents/standardsgov/Federal_Engagement_in_Standards_Activities_October12_final.pdf)
[4] Charter of the National Science and Technology Council (NSTC) Subcommittee on Standards (SOS) (https://www.nist.gov/system/files/documents/standardsgov/Approved-Charter-for-Sub-committee-on-Standards.pdf)
[5] Federal Engagement in Standards Activities to Address National Priorities (https://www.nist.gov/system/files/documents/standardsgov/Federal_Engagement_in_Standards_Activities_October12_final.pdf)
[6] United States Standards Strategy (USSS) (https://share.ansi.org/Shared%20Documents/Standards%20Activities/NSSC/USSS-2020/USSS-2020-Edition.pdf)
[7] The European Union, the Blue Guide on the implementation of the product rules (https://single-market-economy.ec.europa.eu/news/blue-guide-implementation-product-rules-2022-published-2022-06-29_en)

3.2.1 Recognition of CET Impacts on Society in Developing Standards

Coupled with the dynamic nature of CET development, the potential for significant national and economic security implications – including those related to the socio-technical aspects of CET – warrants greater U.S. attention, resources, cooperation, coordination, and participation in national and international CET standardization. Standards activities must take place at the appropriate juncture in technology lifecycles, and building greater awareness of the current state of technology is needed to inform standards engagement as CETs potentially will greatly impact the public interest.[8] Also, socio-technical considerations have consistently been a part of the research and standards consideration in areas such as software, privacy, cybersecurity, interoperability, artificial intelligence healthcare and sustainability/public health. As an example, the "socio-technical" impacts cited in NIST's AI Risk Management Framework (AI RMF)[9] characterize AI systems as those influenced by societal dynamics and human behavior which emphasizes the impact on "people and planet" as core considerations for AI risk management. This in turn highlights the importance of a diverse stakeholders' participation in AI standards development efforts.[10]

Furthermore, increasing the diversity of participants in the standardization process is vital to fully consider both technical as well as larger societal concepts. Additionally, CET standards development requires rigorous and sustained engagement across stakeholder communities at many points in the technology and standards development lifecycles. A unique role the USG can and often does facilitate is the creation of strategic frameworks and standards development roadmaps for nascent CET areas.

[8] Small yards, big tents: How to build cooperation on critical international standards (https://www.brookings.edu/articles/small-yards-big-tents-how-to-build-cooperation-on-critical-international-standards/)
[9] AI Risk Management Framework (AI RMF 1.0) (https://nvlpubs.nist.gov/nistpubs/ai/NIST.AI.100-1.pdf)
[10] Small yards, big tents: How to build cooperation on critical international standards (https://www.brookings.edu/articles/small-yards-big-tents-how-to-build-cooperation-on-critical-international-standards/)

4.0 BROAD THEMES FOR IMPLEMENTATION RECOMMENDED BY STAKEHOLDERS

The information collected via a Request for Information (RFI), stakeholder engagements, consultations, and a subcommittee of the NIST Visiting Committee on Advanced Technology (see **Appendix B**) pointed to these recommended broad themes for actions by the USG to work with the private sector to effectively implement the USG NSSCET: (1) enhance coordination across the Federal government; (2) enhance coordination with the private sector; (3) enhance coordination with foreign governments; (4) recognize and incentivize Federal agency engagement; (5) provide strong and sustained funding for CET R&D and pre-standardization coordination; (6) engage academia as a critical partner; (7) enhance educational efforts; (8) develop and sustain communications; and (9) remove barriers to participation.

Enhance coordination across the Federal government and seek to ensure that technical regulations, standards, and conformity assessment procedures are based on relevant international standards, guides and recommendations, are non-discriminatory, and do not create unnecessary obstacles to trade. Similarly, adhere to the WTO Agreement on Sanitary and Phytosanitary Measures and ensure the establishment of risk-based national SPS measures consistent with international standards, guidelines and recommendations, and the plurilateral WTO Agreement on Government Procurement, which commits parties to encourage procuring entities to base technical specifications on international standards, where they exist.

Enhance coordination between public and private sectors and work effectively with relevant private sector organizations to support and promote the development and adoption of CET standards, including those critical to national security, public safety, security, health and environmental health and resilience. Encouraging the development of standards for CETs can also help increase and accelerate their implementation and adoption by the private sector.

Enhance coordination with foreign governments and work with likeminded partners and allies[11] to ensure that CET standards are developed in a way that supports a commitment to free and fair market competition.

Recognize and incentivize Federal agency engagement in CET standardization activities especially where public sector standards support establishes interoperable infrastructure and public system resilience, safety and security, and public and environmental health where there is significant public benefit.

Provide strong and sustained funding for CET R&D and pre-standardization coordination for impactful participation and contributions to standard development. Long-term, sustained investment is a prerequisite for strong and impactful technical contributions to standards.

Engage academia as a critical partner in increasing U.S. engagement in CET standards and training the next generation of standards professionals. Institutions of higher education should renew a commitment to teaching and highlighting the value, development, and use of standards and standardization in a range of career fields.

Enhance educational efforts to explain the return on investment of standards across the executive leadership in industry, government, civil society, academia and others to enhance standards engagement and participation across the stakeholder communities.

Develop and sustain communications by taking the following recommended CET-related actions:

- Provide education and awareness for senior leaders in industry, government, academia and civil society and others on the impact of standards on innovation and economic competitiveness as well as the well-being of the American people.

[11] For the purposes of this document "like-minded partners and allies" refers to those nations committed to an open and transparent standards system.

- Work with stakeholder community to clarify the role of the USG in the international standards system and encourage the use of and participation in voluntary consensus-based development of international technical standards. This is consistent with the U.S. market-driven, private sector-led standards system that is able to flex quickly as market needs evolve, producing standards that are fit for purpose.
- Articulate the value of the standards system to competitiveness, financial security, innovation and sustainability in a range of career fields with institutions of higher education.
- Work across sectors and organizations to increase knowledge of the critical role of standards in promulgating American innovations in the global landscape and offer insights into how to incorporate innovative ideas and novel technology considerations into contributions to international standards development activities.
- Communicate the impact of standards development activities with Congress to bolster its support for R&D in CET and increase investment in pre-standardization research.
- Sustain U.S. commitment to innovation, cutting-edge science, and translational research as these remain the drivers of U.S. influence and leadership in international standards development.

Remove barriers to participation by taking the following recommended actions:

- Reduce visa wait times for foreign visitors participating in U.S.-hosted standards meetings. This will demonstrate USG commitment to international standards processes, encouraging greater participation. Where compliance with visa laws and regulations delay foreign visitor participation in standards activities, the USG will advocate for increased availability of hybrid participation while complying with ITAR regulations.
- Identify and eliminate senior executives' knowledge gaps of activities in international standards bodies and raise awareness about opportunities for technical program leaders in government agencies to support CET standards development.
- Enhance USG participation in standards development activities including where the government is the member such as at the International Telecommunication Union (ITU).
- Make it easier to engage by sharing CET-related standards information and education, and by raising awareness among underrepresented stakeholders, such as start-up companies and representatives of civil society.
- Provide opportunities for funding that targets the participation of underrepresented stakeholders, including small- and medium-sized enterprises (SMEs) and start-ups, academia and civil society.

5.0 CALL TO ACTION

5.1 Immediate Actions

To date, the U.S. approach to standards development has supported the development of international standards that (1) are technically sound; (2) are largely supported by U.S. stakeholders, allies, and likeminded partners; and (3) ease U.S. access to global markets.12 The U.S. economy and the American people have benefited greatly from this approach. It is essential that the U.S. private- and public-sectors remain fully engaged and cooperate to promote technical solutions — particularly in critical and emerging technology areas. **To accomplish the goals of the USG NSSCET, the USG must continue existing coordination efforts, and should take the following immediate actions when they are compatible with agency and departmental missions, authorities, priorities and applicable law. These immediate actions will inform more effective engagement.**

> **"The strategy is a call to action to build on what has made the U.S. approach to standards successful while ensuring that the United States is effectively positioned to address emerging challenges in international standards development."**
>
> – Laurie Locascio, Under Secretary of Commerce for Standards and Technology, Director of the National Institute of Standards and Technology

Objective 1: Investment

- Using annual budget submissions, identify opportunities to increase CET pre-standardization R&D and standards participation activities – including those consistent with the roles and responsibilities enshrined in law and policies (see **Appendix A**).
- Identify opportunities to leverage existing budgetary resources related to CET's to support greater U.S. participation in international standards development activities; support USG engagement through a CET standards coordination platform allowing reports, updates and cross-agency collaboration; provide practical guidance to and departments on how to deploy opportunities for standards engagement.

Objective 2: Participation

- Track current USG programs that promote, foster, and remove barriers to U.S. CET stakeholder participation in international standards developing activities.
- Organize listening session(s) with civil society and other underrepresented stakeholder groups.
- Track current participation of Federal experts/ liaisons in dynamic standard CET areas to ensure coordination, progress and accountability. Provide mechanism for agencies to evaluate/report CET priorities, gaps, coordinate engagement, and propose new participation through a collaboration platform.

[12] Standards and Regulations: Measuring the Link to Goods Trade (https://legacy.trade.gov/td/osip/documents/osip_standards_trade_full_paper.pdf)

- Track and prioritize relevant interagency CET technical standards issues and related mechanisms for coordination with the private sector to expand communication, information sharing, and other cooperative efforts between public and private sector CET communities (e.g., industry groups including SMEs, academia, SDOs, and civil society).
- Provide interagency coordination mechanism(s) to track USG implementation of the USG NSSCET, technical standards engagement and associated standards policy issues as well as utilize existing Federal Advisory Committee activities and other advisory bodies to sustain effective coordination with the private sector.
- Sustain an agile approach to participation in standards development organizations (SDOs) to include the full spectrum of public-private collaboration mechanisms, including consideration of formal standards organizations, industry consortia, and open source software.

Objective 3: Workforce

- Define and track current USG CET standards education grants and programs.
- Define and expand access to training opportunities and formalize a standards mentorship program and identify opportunities to develop and promote standards-related competencies, capabilities, and technical expertise within the existing agency workforce and broadening the community of USG standards participants.
- Using annual budget submissions, identify opportunities to develop and promote standards-related curricula with universities and educational institutions that address technical, business, and policy aspects of standards development, with a focus on promoting a future workforce that is "CET standards ready".
- Identify opportunities to develop and promote standards-related training programs to reduce barriers for professionals currently employed in CET sectors to engage in standards development activities, and to help make this engagement more effective.

Objective 4: Integrity and Inclusivity

- Track current USG extramural funding and science and technology cooperation agreements that support or can be expanded to support international standards engagement.
- Using budget submissions, the USG should consider a multi-year investment for the entire lifecycle of standard development from prestandardization research through publication and adoption.
- Track current international science and technology convening mechanisms to include opportunities for enhanced international standards communication and cooperation with likeminded partners and allies.
- Using annual budget submissions to support identified opportunities to establish international cooperation mechanisms that support robust international standards engagement processes.

5.2 Actions for Sustained Implementation Outcomes

Implementing the USG NSSCET is a long-term endeavor requiring sustained actions to achieve measurable outcomes. To succeed, the USG must work closely with likeminded partners and allies to promote the inclusion of all nations and participants in the international standards system. These joint efforts are required to uphold the integrity of international standards development processes – including the principles of transparency, openness, impartiality and consensus, effectiveness and relevance, and coherence.[13] The USG must build on current coordination to strengthen and sustain departments' and agencies' involvement in CET standards development. It must continue to work closely with stakeholders to define opportunities to advance common goals to ensure successful implementation of the strategy.

To accomplish the goals of the USG NSSCET, the USG should take the following long-term actions, consistent with budgetary resources, authorities and applicable law:

Actions for Sustained Implementation Outcomes

1. Increase investment in CET R&D and standardization to sustain U.S. technical leadership.
2. Increase support for Federal programs to remove barriers and promote U.S. stakeholder participation in international standards development.
3. Enhance coordination across U.S. Government departments and agencies to sustain and grow participation in standardization.
4. Expand communication, information sharing, and other cooperative efforts between U.S. Government and private sector.
5. Enhance educational efforts to inform current and future standards leaders.
6. Enhance U.S. Government and like-minded nations' representation and sustain influence in international standards system.
7. Enhance academia engagement providing critical partnerships to s ustain the standards innovation ecosystem of the world.

[13] Principles taken from the Decision of the Committee on Principles for the Development of International Standards, Guides and Recommendations, with relation to Articles 2, 5, and Annex 3 of the WTO Agreement on Technical Barriers to Trade, found in G/TBT/1/Rev. 16

OUTCOME 1

Increase investment in CET R&D and standardization to sustain U.S. technical leadership.

Maps to LOE 1: Increase R&D funding to ensure a strong foundation for future standards development.

Maps to LOE 2: Support the development of standards that address risk, security, and resilience.

1.1 Expand and enhance efforts to support private sector stakeholders in the development and regularly update of strategic standards roadmaps within and across CET categories including high-urgency, high-impact standardization needs.

- Support events convening stakeholders from industry, academia, civil society, standards developers, conformity assessment organizations, and others within and across CET categories to explore opportunities for frameworks to establish strategic standards priorities.
- Support private sector stakeholder-led road mapping efforts that build on consensus to identify and update strategic standards needs within and across CET communities.
- Use the resulting roadmaps as guides to inform agency standards efforts.

1.2 Expand and enhance efforts to work with private sector stakeholders to develop frameworks to support alignment of a standardization for CETs.

- Support efforts to develop metrics to assess standards readiness for a given technology, which may vary from low levels requiring R&D to develop needed science and engineering principles; to medium levels appropriate for consensus frameworks, best practices, and guidelines efforts; to high levels ready for formal standards processes.
- Work with private sector stakeholders to assess standards readiness when developing agency approaches to standardization.
- Coordinate efforts to communicate, value and monitor evolving CET areas and associated standards activities, work with NSTC bodies to maintain CET list, and update stakeholders on changes and revisions to the CET list.
- Support R&D efforts that provide the foundational science and engineering to advance strategic standards needs from low to high standards readiness levels.

1.3 Expand and enhance efforts to work with private sector stakeholders in standards development for CET industries (including small and medium-sized enterprises), academia, and civil society groups that support fundamental R&D for CET to:

- inform USG efforts to coordinate support for pre-standardization R&D,
- foster engagement in standards development,
- inform USG efforts to coordinate and lead standards development activities across CET areas,
- track and incentivize participation by Federal R&D grantees and funding recipients working in SDOs and in other standards development activities.

1.4 Update proposal and award policies and procedures to explicitly recognize as within scope SDO participation by Federal R&D grantees and funding recipients. When appropriate, provide incentives for participation in standards development activities that align with strategic priorities.

1.5 Work with the private sector to collect and publish case studies and exemplars to articulate examples of standardization stories and interventions.

1.6 Consistent with consortia and CET collaboratives (called for in LOE 1 USG NSSCET), create or draw on established communities of practice to define, develop, and promote the adoption of sector-specific standards development activities as critical to national security, public safety, security, health, and environmental health and resilience.

1.7 Draw on established communities of practice in sector-specific standards development processes to facilitate adoption of CET standards.

1.8 Work with stakeholder organizations including ANSI, SDOs, and other associations, to reduce barriers to increased engagement in CET standards development activities by civil society organizations.

1.9 Led by the National Science and Technology Council, develop a process for revising and updating the evolving CET list every two years. The USG NSSCET identified several rapidly advancing and dynamic Critical and Emerging Technology areas including: communication and networking technologies, semiconductors and microelectronics, artificial intelligence, biotechnologies, positioning/navigation, digital identity, clean energy, quantum information and other specific CETs for our security and economy such as automated and connected infrastructure, biobanking, cybersecurity and privacy, carbon capture, and critical minerals supply. This implementation roadmap incorporates specific actions for these identified areas and aligns activities with the evolving CET list.

OUTCOME 2

Increase support for Federal programs to remove barriers and promote U.S. stakeholder participation in international standards development.

Maps to LOE 3: Remove and prevent barriers to private sector participation in standards development.

2.1 Expand and enhance efforts to support for private sector-led efforts that enhance innovation and strategic cooperation such as:

- Standards incubators and accelerators that nurture innovative standards ideas, arising from new and continuing contributors, in growing from ideation to mature and successful standards efforts.
- New and expanded consortia and standards setting organizations focused on consensus strategic priorities and providing a viable path through relevant standards development steps, ranging from best practices and guidelines to de facto standards and, where appropriate, formal consensus standards.

2.2 Identify, and where necessary, clarify existing authorities for providing financial support through grants, contracts, and procurements to enable the USG to fund or host meetings of standards setting organizations in the United States and to expand participation in those meetings, especially those addressing CET standards.

2.3 Expand and enhance efforts to work with the academic community and civil society organizations to understand and remove barriers to their contributions to the private sector-led system for developing CET standards.

2.4 Continue to engage with foreign governments to provide balance and efficiency around FRAND licensing.

OUTCOME 3

Enhance coordination across USG departments and agencies to sustain and grow participation in standardization.

Maps to LOE 4: Improve communications between public and private sectors on standards.

3.1 Identify, expand and enhance current channels for communication of USG engagement in standards development activities across CET industry sectors and evaluate their effectiveness as well as gaps in knowledge sharing.

3.2 Develop CET standards committee participation analytics, reports and metrics for USG participants to be updated annually in a robust USG CET standards platform and database. This database and report should include agency, SDO, activity, standards in process and developed, associated technical publications where appropriate, and priority. Each agency should update the database biannually and be accountable for accuracy of meeting the reporting requirement.

3.3 Expand and enhance efforts to build partnerships with state, local, and tribal entities to develop CET standards in the delivery of government services.

OUTCOME 4

Expand communication, information sharing, and other cooperative efforts between USG and private sector.

Maps to LOE 4: Improve communications between public and private sectors on standards.

Maps to LOE 7: Deepen standards cooperation with allies and partners to support a robust standards governance process.

4.1 Expand and enhance efforts to work with private sector standards organizations, to develop/or support public and private sector mechanisms for data and information sharing on standards engagement opportunities. These may include standards related information, standards development activities across various SDOs, and how to engage in standards development activities.

4.2 Expand and enhance current efforts under the Interagency Committee on Standards Policy to work with stakeholder organizations including ANSI to create CET standards landscapes and assessments that survey, coordinate, and harmonize activities taking place in different organizations (may include areas such as standards ballots/proposals, standards roadmaps, R&D efforts, and events). This work should be informed by Federal Advisory Committees including the Industry Trade Advisory Committees (ITACs) and the NIST VCAT.

4.3 Work with likeminded partners and allies to create coordination tools that enable information sharing on public international standards development activities, such as sharing new CET standards proposals to understand technical merit, and best practices and lessons learned in our respective standards systems.

4.4 In bilateral and multilateral science and technology cooperation agreements, seek to include harmonization of CET research and development efforts that could lead to standards as well as ongoing efforts and plans related to CET standardization and pre-standardization activities.

4.5 Enhance efforts and promote standards adoption by the private sector and industry in vertical areas such as healthcare, environment, public health and safety, etc. Promote the value of standards adoption nationwide and incentivize the utilization of standards by industry with different mechanisms and policies. Monitor and track the value and adoption of standards nationwide with metrics and share the results with the public.

OUTCOME 5

Enhance educational efforts to inform current and future standards leaders.

Maps to LOE 6: Educate and empower the new standards workforce.

5.1 Support the inclusion of training and educational components, including fellowships and internships, in standardization including USG funded standards incubators and accelerators.

5.2 Participate in standards development training and mentorship, including standards leadership courses, to enhance engagement and understanding of the value of standardization to USG and increase participation in CET standards development.

5.3 Expand and enhance efforts to work with stakeholders including civil society organizations as well as CET research, development and innovation communities in government, industry, nonprofit, and academia (including the national laboratories and the National Academies) to enhance knowledge of the value of standards development as a fundamental element of the global innovation ecosystem for CET.

5.4 Develop and distribute standards excellence awards to create meaningful career recognition and/or compensation incentives for high-quality CET standards work in the USG.

OUTCOME 6

Enhance USG and like-minded nations' representation and sustain influence in international standards system.

Maps to LOE 5: Enhance USG and like-minded nations' representation and influence in international standards governance and leadership.

6.1 Ensure that USG engagement with like-minded nations in CET standards is robust in the face of a dynamic and evolving international landscape. The USG should ensure government-to-government engagements are informed by consultations with diverse stakeholders and carried out in a manner that respects and takes advantage of the role of the private sector. CET standards matters will be included in joint goals and agendas, helping to improve communications and collaboration.

6.2 Reinforce and sustain the USG's commitment, active leadership, and partnership, for U.S. participation in international CET standards development activities especially in critical in early-stage, precompetitive CET standards development as well as technology interoperability, standards adoption, and conformity assessment schemes.

6.3 Study, apply lessons learned, and develop best practices and benchmarks for CET initiatives using experiences of other likeminded partners and allies in standards education and incentives programs.

6.4 Engage existing USG talent and capacity building programs (including OPM Presidential Management Fellows, U.S. Digital Corps, and U.S. Digital Service) critical to CET initiatives to ensure they are aware of standard and conformity assessment schemes as they engage in digital transformation of the USG resources and services.

OUTCOME 7

Enhance academia engagement providing critical partnerships to sustain the standards innovation ecosystem of the world.

Maps to LOE 8: Facilitate broad representation in standards development.

7.1 Provide expanded opportunities for engagement and partnership with educational institutions and the National Academies to develop and integrate CET standards-related curricula with universities and educational institutions. These efforts should address technical, business, and policy aspects of CET standards development and focus on developing standards skillsets in underrepresented communities, including SMEs, civil society groups, and global emerging economies.

6.0 ADAPTING AND RESOURCING IMPLEMENTATION

The US NSSCET strategy makes it clear that USG should build on its historic support for the international standards system as well as department and agency investments in CET research and development. The government should use its core competencies of CET subject matter expertise to complement its standards development expertise and leadership to bolster support for the private sector-led standards system of the United States as CET standards are developed and put in place.

The immediate Actions cited in Section 5.1 above should be resourced via existing budgets as part of the USG's support for CET technologies that are vital to U.S. national and economic security. To address the Actions for Sustained Implementation Outcomes cited in Section 5.2 above, it is incumbent upon departments and agencies to develop thoughtful, creative proposals – and explain the value of – additional CET standards funding as part of their work to advance CET technologies, subject to administration requests and Congressional appropriations. All plans for devoting resources to CET standards must be compatible with agency and departmental missions, authorities, priorities and applicable law. Further, they must be based on USG standards statutes and policies as well as the principles in the US NSSCET strategy and the guidance in this implementation roadmap. All plans should be coordinated closely with other CET standards -related efforts by the USG and the private sector.

APPENDIX A: LAWS, REGULATIONS AND POLICIES FOR USG PARTICIPATION IN STANDARDIZATION

Specific laws and regulation define how the USG engages in the international standards system.

A1. National Technology Transfer and Advancement Act of 1995

The National Technology Transfer and Advancement Act (P.L. 104-113 or NTTAA) directs Federal agencies to use technical standards "that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments,[14]" except where inconsistent with applicable law or impractical. The National Institute of Standards and Technology (NIST) is charged with coordinating Federal agency implementation of standards and conformity-assessment-related NTTAA provisions.

A2. OMB Circular A-119

The policies outlined in the Office of Management and Budget Circular A-119 on Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity-Assessment Activities apply to all executive branch departments and agencies, and to independent regulatory agencies. The Circular was last revised in 2016 to reflect the experience gained by U.S. agencies in implementing the Circular since 1998, and concluding and implementing U.S. trade agreements, as well as developments in domestic and international regulatory, standards, and conformity assessment policies. The revisions to Circular A-119 inform agencies of their statutory obligations in standards-setting activities. The Circular directs agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical. It also provides guidance to agencies on participation in the development of voluntary consensus standards and articulates policies relating to the use of standards by Federal agencies.

A3. Trade Agreements Act of 1979 (as amended)

The Trade Agreements Act of 1979 (as amended) prohibits U.S. agencies from engaging in standards-related activities that create unnecessary obstacles to trade and gives the U.S. Trade Representative (USTR) the responsibility to coordinate the consideration of international trade policy issues resulting from, and to develop international trade policy as it relates to, standards and related measures, such as conformity assessment procedures.

A4. How the USG Engages

USG engagement in the U.S. standards system varies widely depending upon individual agencies' missions and functions. Roles include those of user, specifier, participant, facilitator, advocate, technical advisor/leader, convener, and source of funding. Agencies at every level of government use standards in regulation, for procurement and policy activities, and in voluntary certification programs. Government agencies also use and rely on standards to provide safe and secure financial and other services to citizens. Government agencies also use standards extensively to provide citizen services, enable connectivity of commercial information technology systems to government systems, and support disbursements of grants, loans, and other similar financial tools and incentives

In instances where the USG acts as a standards user, government agencies and their staff often participate in the development of standards to ensure that specific standards meet their legislative and mission requirements. In FY 2010, Federal agencies reported that 2,837 employees participated in 531 private-sector SDOs in roles including standards development, management of standards activities, workshops, seminars, etc.[15] It is important to note that this number does not capture the very large number of state and local government officials from the approximately 3000 counties and other local jurisdictions in the United States who participate in the development of model codes (primarily for building construction and related activities), which are widely adopted as local building construction codes, or other standards activities. Competition agencies, primarily the U.S. Department of Justice and the Federal Trade Commission, have an interest in ensuring that private-sector standards setting organizations and associated standards development activities are not used in ways that harm competition, or violate antitrust, intellectual property and/or consumer protection laws. In these instances, the Federal government's interest goes beyond specific technologies and has a focus on private-sector competitive behavior.

[14] http://standards.gov/standards_gov/nttaa.cfm
[15] 14th Annual Report on Federal Agency Use of Voluntary Consensus Standards and Conformity Assessment, June 2011, currently in the clearance process.

APPENDIX B: SUMMARY OF STAKEHOLDER INPUT

To understand the challenges faced by CET stakeholder communities, working on behalf of the U.S.G, NIST (1) issued a Request for Information (RFI); (2) facilitated a series of stakeholder listening sessions, business roundtables, and stakeholder engagements; (3) held formal consultations; and (4) established a NIST Visiting Committee on Advanced Technology (VCAT) Subcommittee on U.S. International Standards Development Activity.[16]

B1. USG NSSCET Request for Information

NIST published a Request for Information (RFI) in September 2023 seeking public input that would support the development of the most effective implementation of the USG NSSCET.[17] The Bureau sought public input on the best ways to partner with relevant stakeholders, remove barriers to participation in international standards development, and enhance the U.S.'s support for an international standards system that is open, consensus-based, and led by the private sector. The RFI posed several questions in each of four broad categories: investment, participation, workforce, and integrity and inclusivity. While specifically seeking input on these topics, NIST welcomed all responses that stakeholders believed would support a robust and successful implementation of the strategy.

The RFI was complemented by a companion Request for Comment on the intersection of standards and intellectual property undertaken by NIST, ITA, and the U.S. Patent and Trademark Office. The feedback received represented multiple sectors of the economy domestically and abroad. Inputs from all sources were reviewed and combined with insights from across the Department of Commerce, including the U.S. Patent and Trademark Office and Bureau of Industry and Security; as well as the Department of State and other agencies.[18] These combined efforts afforded the USG with an informed understanding of the issues and challenges faced, as well as the opportunities to foster greater engagement in international standards development.

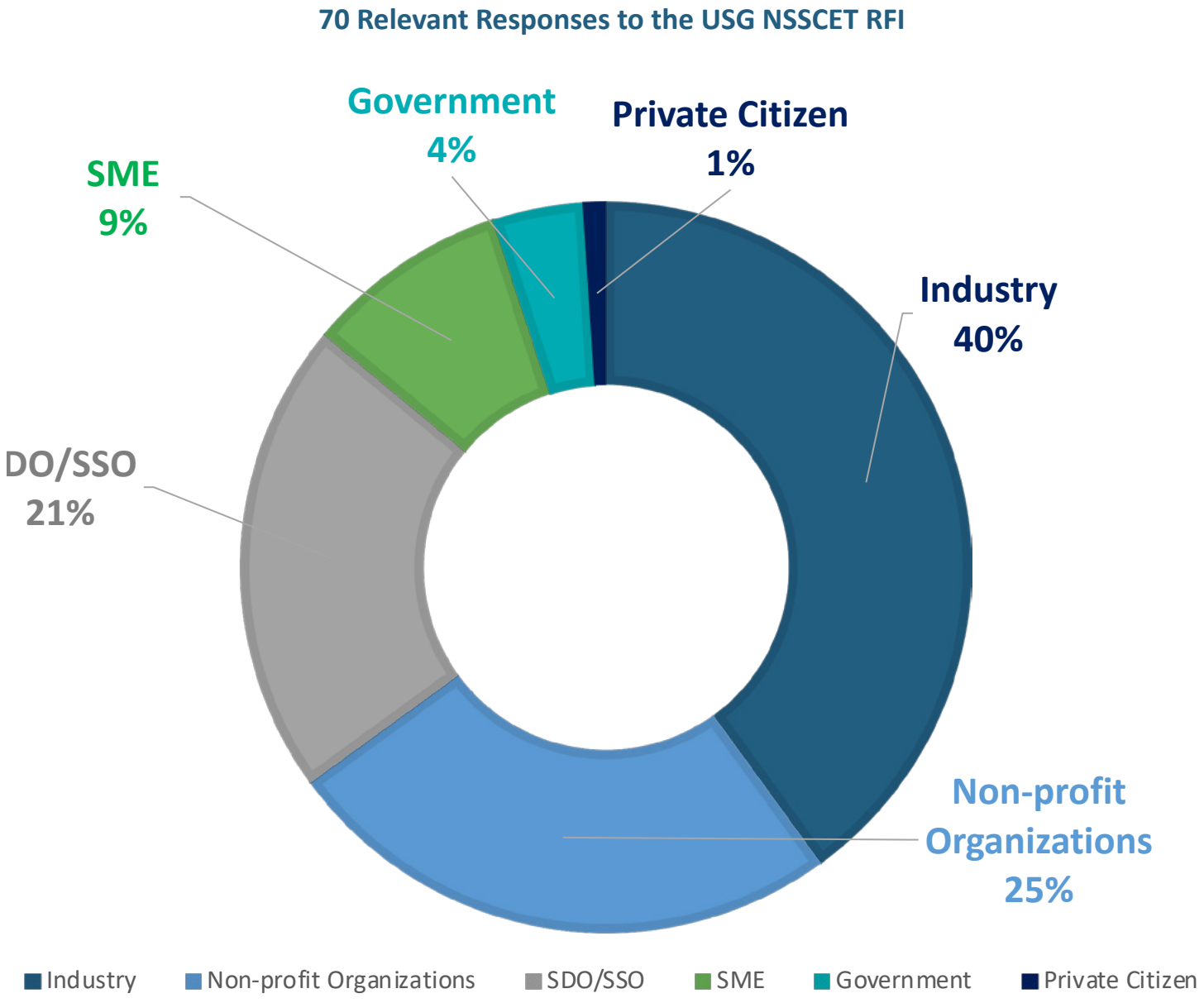
- **The U.S. Patent and Trademark Office—America's Innovation Agency:** Some standards developing organizations (SDOs) provide policies allowing for the incorporation of patented technology in a technical interoperability standard. Often those SDOs seek the widespread and efficient licensing between standards essential patent (SEP) holders and those who seek to implement standardized technologies by requiring licensing on fair, reasonable and non-discriminatory (FRAND), or similar, terms and conditions. FRAND licensing promotes technological innovation, furthers consumer choice, and enables industry competitiveness. This is especially true for emerging technologies and market entry of new and small-to medium-sized entities, whose participation in the standards ecosystem is important to promoting innovation and job creation in today's dynamic marketplace. To support these objectives and the FRAND ecosystem, the USPTO plans to continue to engage with foreign governments to provide balance and efficiency around FRAND licensing.

[16] https://www.nist.gov/director/vcat
[17] Published RFI comments on Regulations.gov (https://www.regulations.gov/document/NIST-2023-0005-0001 and https://www.regulations.gov/document/NIST-2023-0005-0034)
[18] A high-level overview and findings can be found at www.standards.gov

B2. Profile of the USG NSSCET RFI Respondents

A total of 105 responses were received to the USG NSSCET RFI issued in September 2023, with 70 relevant submissions comprising 568 specific recommendations. Respondents were well-informed on the processes, political climate, and ongoing complexities of domestic and international standards development.

The largest group of commenters were identified as industry (28). The second largest group of respondents were non-profit organizations (18). The remaining consisted of SDO/SSOs (15), small- and medium-sized enterprises (SMEs) (6), government organizations (3), and one private citizen.



B3. Numerical summary of themes identified in the USG NSSCET RFI submissions.

Themes Identified	Number of RFI Theme Responses
Role of U.S. Government	189
Approaches to standards development	47
Intellectual property, SEPs, and FRAND issues	39
Recommendations for incentives	31
Recommendations to overcome communication challenges	29
Recommendations to address leadership in international standards	27
Risks associated with private sector participation in international standards	25
Risks associated with leadership (or lack of) in international standards	23
Recommendations to overcome workforce challenges	23
Education and awareness	22
Value proposition for private sector participation	19
Academic community role in standards development	18
SDO role in private sector participation	14
State, local, and tribal involvement	14
R&D investment and participation in international standards	13
Broadening stakeholder engagement	10
Priority setting	7
Recommendations to support standards that address risk, security, and resilience	7
Recommendations for collaboration	4
Interoperability across the system	4
Recommendations for open-source	3
Total RFI theme responses	**568**

B4. Listening sessions, stakeholder engagements

NIST, along with other USG Departments and Agencies and ANSI, held a series of over 120 listening sessions, business roundtables, and stakeholder engagements focused on the USG NSSCET Implementation and RFI. Participants included domestic and international CET stakeholders from standards developing organizations, industry, small- and medium-sized enterprises, and academia. The purpose of the events was to inform CET stakeholders, gather information from stakeholders, and generate excitement and support for the USG NSSCET implementation.

B5. Formal consultations, and VCAT Subcommittee

Formal consultations with several ITA Federal Advisory Committees and chartering a Subcommittee on U.S. International Standards Development Activity established under the NIST Visiting Committee on Advanced Technology (VCAT).[19] The VCAT Subcommittee was charged with developing specific recommendations for deliberation of the full VCAT to assess the opportunities to enhance NIST's engagement in, support of international standards development activity. The VCAT Subcommittee convened numerous independent stakeholder engagements and issued a report with 37 recommendations on how USG can better support the U.S. private sector-led standards system.[20]

[19] https://www.nist.gov/director/vcat
[20] Published RFI comments on Regulations.gov (https://www.nist.gov/document/2024-vcat-subcommittee-us-international-standards-development-activity-report)