



Comments from the American National Standards Institute on National Institute of Standards and Technology Request for Information on Artificial Intelligence Standards

Docket Number 190312229-01

The American National Standards Institute¹ (ANSI) welcomes the opportunity to provide its input to the NIST Request for Information on Artificial Intelligence (AI) Standards.

About ANSI

ANSI is a federation whose members are government agencies, trade associations, standards developing organizations, professional societies, companies, academic and international bodies, and consumer organizations looking to harness the power of standards to position themselves for long-term success. ANSI represents the interests of more than 270,000 companies and 30 million professionals worldwide. As the voice of the U.S. standards and conformity assessment system, ANSI empowers its members and constituents to strengthen the U.S. marketplace position in the global economy while helping to assure the safety and health of consumers and the protection of the environment.

Voluntary consensus standards for products, processes, and services are at the foundation of the U.S. economy and society. The United States has a proud tradition of developing and using voluntary standards to support the needs of our citizens and the competitiveness of U.S. industry in world markets.

ANSI oversees the creation, promulgation, and use of thousands of norms and guidelines that directly impact businesses in nearly every sector: from acoustical devices to construction equipment, from dairy and livestock production to energy distribution, and many more. Across the broad range of topic areas where ANSI oversees work, information and communications technology standards are both a horizontal and vertical focus area. Through the ANSI National Accreditation Board (ANAB), the Institute is also actively engaged in accreditation of conformity assessment bodies – assessing the competence of organizations determining conformance to standards. And via its Workcred affiliate, ANSI supports efforts to strengthen workforce quality by improving the credentialing system, ensuring its ongoing relevance, and preparing employers, workers, educators, and governments to use it effectively. Workcred's independence as a separate legal entity maintains separation from and respects the impartiality of ANSI's accreditation services.

¹ www.ansi.org

International Standardization

ANSI promotes the use of U.S. standards internationally, advocates U.S. policy and technical positions in international and regional standards organizations, and encourages the adoption of international standards as national standards where they meet the needs of the user community.

The Institute is the sole U.S. representative and dues-paying member of the two major non-treaty international standards organizations, the International Organization for Standardization (ISO) and, via our U.S. National Committee (USNC), the International Electrotechnical Commission (IEC). As a founding member of ISO, ANSI plays a strong leadership role in its governing bodies while U.S. participation, via the USNC, is equally strong in the IEC.

To formulate and advance consensus U.S. positions with respect to ISO and IEC work, ANSI accredits U.S. Technical Advisory Groups (TAGs) to ISO and approves USNC TAGs to IEC. The primary purpose of these TAGs is to develop and transmit, via ANSI, U.S. positions on activities and ballots of ISO and/or IEC Technical Committees (and, as appropriate, subcommittees and policy committees). ANSI's International Procedures provide the due process-based framework within which U.S. TAGs develop and coordinate U.S. positions.

ANSI is a permanent member of both the ISO Council and Technical Management Board. ANSI and its members participate in more than 75% of ISO Technical Committees (TCs) and Subcommittees (SCs) and administer 14% of TC and SC Secretariats. ANSI's USNC is a permanent member of the IEC Council Board, Standardization Management Board, and Conformity Assessment Board. The USNC participates in over 92% of IEC TCs and SCs, and administers 13% of TC and SC Secretariats. Jim Shannon, former CEO, National Fire Protection Association (NFPA), is currently the IEC President.

American National Standards

Domestically, ANSI accredits standards developing organizations (SDOs) and approves standards from these organizations as American National Standards (ANS). To achieve the ANSI-Accredited Standards Developer (ASD) designation – the first step for developing ANS – SDOs must comply with ANSI's [Essential Requirements](#) and demonstrate commitment to a set of principles that includes openness, balance, due process, and consensus. The principles contained in the Essential Requirements are consistent with the World Trade Organization (WTO) TBT Agreement principles for the development of international standards. Conformance to these principles means that the U.S. can set an example globally for what open and trusted standardization looks like.

ANSI's many checks and balances, including impartial audits, accreditation requirements, and an appeals process, underpin the integrity of the ANS process, regularly assuring adherence to the Institute's procedures and safeguarding the value of the ANS designation. This voluntary consensus standards process is time-tested, and has been relied on by many government agencies to the benefit of the public, government, industry and many other stakeholders. ASDs meet the definition in OMB Circular A-119, *Federal Participation in the Development and use of Voluntary Consensus Standards and in Conformity Assessment Activities*, of "voluntary consensus body."

ANAB Conformity Assessment

ANSI's work in the conformity assessment arena also includes a complete portfolio of third-party accreditation programs under ANAB. These programs include accreditation of management system certifiers, certification bodies, calibration and testing labs, product certification bodies, personnel credentialing organizations, forensic test and calibration service providers, inspection bodies, greenhouse gas validation and verification bodies, reference material producers, and proficiency test providers.

ANSI Collaboratives

More than twenty years ago, ANSI launched the standards collaborative model to address the needs of both government and private-sector stakeholders for a mechanism to coordinate and accelerate the development of private sector-led standards and conformity assessment programs to address national and global priorities. While each collaborative is unique, several have addressed cross-sector needs in emerging technology areas ranging from nanotechnology and nuclear energy to electric vehicles, additive manufacturing, and unmanned aircraft systems. In each of these instances, federal agencies have been active participants and have publicly acknowledged the valuable role and contributions of ANSI-led collaboratives.

Particularly in rapidly evolving, interconnected technology areas such as Artificial Intelligence (AI) – transforming nearly every industry and market worldwide – effective, responsive standards and conformity assessment are critically important, demanding even greater investment, leadership, engagement and public-private partnership.

ANSI-NIST AI Collaborative

ANSI supports NIST's efforts to identify priority areas for federal involvement in AI standards-related activities, and is pleased to offer its input on the current state, plans, challenges, and opportunities in AI standardization from the perspective of the U.S. voluntary standardization community. With respect to convening both public and private sector stakeholders in the AI standard space, ANSI offers to partner with NIST on a standards collaborative, leveraging the convening capabilities of our two organizations to create a common standards framework.

I. AI Technical Standards and Related Tools Development: Status and Plans

In late 2017, the U.S. assumed leadership of the newly formed ISO/IEC Joint Technical Committee (JTC) 1, Subcommittee (SC) 42 on *Artificial Intelligence*, with ANSI serving as the Secretariat. The scope of JTC 1/SC 42 is as follows:

Standardization in the area of Artificial Intelligence

- Serve as the focus and proponent for JTC 1's standardization program on Artificial Intelligence
- Provide guidance to JTC 1, IEC, and ISO committees developing Artificial Intelligence applications

JTC 1/SC 42 is the first standardization committee of its kind looking at the full AI IT ecosystem. Artificial Intelligence is not just one technology, but is a variety of software and hardware enabling technologies (machine learning, deep learning, knowledge representation) that can be applied in various ways in a potentially unlimited number of applications in almost every industry sector. From transportation to healthcare, financial services to retail, robotics, manufacturing, and more, AI will increasingly drive global innovation to new heights. ANSI, as the coordinator of the U.S. private-sector led standardization system, is broadly engaged in most if not all of these segments of industry activity.

The global impact of JTC 1/SC 42 is far-reaching, with engagement from over 38 National Bodies at either the Participating “P” membership level or the Observing “O” membership level.

JTC 1/SC 42 is tasked with engaging all relevant stakeholders, both within and outside of the IT standardization community, to ensure broad consideration is given to the varied aspects and impacts of AI, as input to the comprehensive development of AI standards. More than 150 subject matter experts are active in the work of SC 42, including multiple NIST experts, and 12 projects are already underway. SC 42 engages with a variety of ISO and IEC Committees, as well as external organizations involved in the development, implementation and advancement of AI. ANSI encourages NIST not only to maintain their engagement in SC 42 but to use that work as the basis for any additional work undertaken. Details of the SC42 work program can be found in Attachment 1.

With respect to the development of AI standards and tools by U.S.-domiciled standards developers, work is underway or planned by several ANSI-accredited SDOs. Some of this work is intended to result in ANS or be submitted to ISO or IEC committees. Examples of ANSI-accredited SDOs already working on or considering working on AI standards include the following:

- The InterNational Committee for Information Technology Standards - INCITS - established a technical committee for Artificial Intelligence, INCITS/AI in January 2018. INCITS/AI is the U.S. TAG to JTC 1/SC 42.
- The Institute for Electrical and Electronics Engineers (IEEE) has established an AI and Autonomous Systems Policy Committee and has standards work underway on related both to cybersecurity and the ethics of AI.
- SAE International is focusing on AI for aviation and aerospace systems.
- Both the Consumer Technology Association (CTA) and the Association for the Advancement of Medical Instrumentation (AAMI) are working on AI in the healthcare space.
- The Robotics Industries Association (RIA), CSA Group, Alliance for Telecommunications Solutions (ATIS), National Information Standards Organization (NISO), National Council for Prescription Drug Programs (NCPDP) and the Instrument Society of America (ISA) also report work underway or under consideration.

ANSI is pleased to offer our assistance to NIST in engaging U.S.-based standards developers, including but not limited to ANSI-accredited developers, and those groups or individuals working on behalf of the

United States through ISO and IEC TAGs, to advance U.S. standardization and conformance goals in the area of AI.

II. Defining and Achieving U.S. AI Technical Standards Leadership

ISO/IEC JTC 1 serves as an example of what sustained U.S. leadership at the international level looks like. JTC 1 a highly productive collaboration between ISO and IEC working in areas such as 3-D printing and scanning, IT security (cybersecurity), privacy, Internet of Things (IoT), cloud computing, biometrics, software development languages, IT governance, and artificial intelligence. More than 4,500 experts from 32 participant member countries come together to develop mutually beneficial standards that advance global trade. Since the committee was formed 30 years ago, the U.S. has served as its chair, with ANSI as the secretariat. The current chair of JTC1 is Phil Wennblom of Intel Corporation. One of the largest and most prolific technical committees in the international standardization community, ISO/IEC JTC 1 has had direct responsibility for the development of over 3,000 published ISO/IEC standards, with more than 500 currently under development - making a tremendous, ongoing impact on global industry at every level and across every sector.

As noted above, the United States currently leads ISO/IEC JTC 1 activities relative to AI through SC42. In this leadership position, the U.S. has driven much of the technical content for the Big Data core standards such as the overview, vocabulary and reference architecture. This included the U.S. consensus work on Big Data that was driven by the NIST Big Data Public Working Group.

The U.S., through ANSI, nominated and supported the international convenor for the Big Data Working Group, who was confirmed originally as the Convenor of JTC 1/WG 9, and now as Convenor of JTC 1/SC 42/WG 2. The U.S. also successfully nominated and supported the international project editors for a number of Big Data projects. These include ISO/IEC 20546, *Information technology – Big data – Overview and vocabulary* (published 2019), where the U.S. Project Editor was responsible for coordinating and implementing the inputs of international experts to create a document for those industries utilizing extensive datasets and address their needs to develop effective data processing systems.

In summary, the United States has and continues to play an important leadership role in ensuring the timely development of integral standards in a rapidly changing technology that impacts a variety of IT systems. In this context, ANSI would like to note that U.S. leadership positions help facilitate active, consistent engagement of U.S. industry and government representatives, who are providing high-quality technical contributions and sending subject matter experts to meetings. These experts drive our agenda and work collaboratively with other experts from around the world to establish the consensus necessary for standards outcomes to be accepted globally. The rules of the system protect against dominance by any single interest. ANSI advocates that NIST, and other federal agency experts, continues to be active and engage alongside U.S. industry by bringing quality contributions representative of U.S. government interests and technical requirements appropriate to the particular forum at issue.

III. Prioritizing Federal Engagement in AI Standardization

The vibrancy and effectiveness of the U.S. standardization system in enabling innovation depend on continued private sector leadership and engagement. Reliance on private sector leadership, supplemented by Federal government contributions to discrete standardization processes as outlined in OMB Circular A-119, *Federal Participation in the Development and use of Voluntary Consensus Standards and in Conformity Assessment Activities* remains the primary strategy for government engagement in standards development. ANSI welcomes and endorses the statement by NIST that its approach to developing a plan for Federal engagement in the development of standards in the AI space will be consistent with relevant provisions of the Circular, which has guided Federal agency implementation of the National Technology Transfer and Advancement Act of 1995 for more than two decades.

In limited policy areas where a national priority has been identified in statute, regulation or Administration policy – such as AI – prioritizing Federal government engagement in key standardization activities can help catalyze advances, promote market-based innovation, and encourage more competitive outcomes. In these cases, the Federal government should respect market dynamics, clearly define its role and then work with private sector standardization organizations in the exercise of that role.

In all cases when engaging in the standards arena, agencies should ensure effective intra- and inter-agency coordination of engagement in standards development activities. They should take into account the impact of their standards-related choices on innovation and the global competitiveness of U.S. enterprises, including the impact of intellectual property incorporated into standards, consistent with international obligations. To the extent feasible and appropriate, agencies should provide continuous support for their technical experts' participation and leadership activities in mission-critical standards-setting activities and standards organizations, to include maintaining adequate resource levels throughout the life of priority standards activities.

As noted above, AI is not just one technology, but a variety of software and hardware enabling technologies (machine learning, deep learning, knowledge representation) that can be applied in various ways in a potentially unlimited number of applications, ranging from manufacturing to financial services, and health care to transportation. In the federal space, potential applications of AI technology vary as widely as do individual federal agency missions. There are, however, cross-cutting AI standards that need to be in place at an early stage to enable specific applications of AI technology. These include terminology standards, data reference architectures, safety and security-related standards, and standards related to bias in AI systems.

ANSI recommends that the Federal government prioritize engagement in the development of AI technical standards and tools that have broad, cross-sectoral applications, such as those being developed under the auspices of JTC1/SC42. Having these standards and tools in place will enable more rapid development of application-specific standards and tools as follow-on activities.

Federal agencies whose technical staff are currently participating in the work of JTC 1/SC 42 include both the Department of Commerce (NIST is leading SC 42 work on Big Data) and the Department of Defense (through DoD's Joint Artificial Intelligence Center). Additional agencies that could be engaged include the Food and Drug Administration, the Departments of State and Transportation, the National Institutes of Health (NIH) and other agencies engaged with the World Health Organization.

In addition to JTC 1/SC 42, ISO TC 229 on *Nanotechnologies* also serves as an excellent model of federal engagement in standards for emerging technologies. In 2004, the Office of Science and Technology Policy asked ANSI to coordinate U.S. standards work in this area and that successful initiative, built on a private-public partnership, continues today. The initiative includes ANSI accrediting and administering the U.S. TAG to TC 229. TC 229 is one of ISO's most active committees, publishing 70 documents since its formation in 2005. The committee currently has 42 projects in progress in the five Working Groups (WGs) directly under TC 229 leadership or in collaboration with other groups.

The U.S. TAG to TC 229 has been successful in part because of broad and effective participation from the U.S. government. To ensure the U.S. is strongly represented throughout TC 229's areas of activity, the U.S. TAG formulates and delivers U.S. positions and proposals to ISO in all areas of nanotechnology. Mirroring ISO TC 229's Working Group structure, the U.S. TAG is made up of U.S. private- and public-sector experts in nanotechnology who serve as delegates for ISO TC 229 meetings, with Dr. Ajit Jilavenkatesa of NIST serving as overall TAG Chair. ISO TC 229 has strong participation from the U.S. government across the board (NIST, NIOSH, EPA, FDA, U.S. Army, CPSC) and U.S. government technical experts occupy leadership positions both within the U.S. TAG and at the international level.

A valuable lesson learned from the participation of Federal agencies in ISO TC 229 activities is the importance of establishing certainty within each agency's budget relative to participation in standards activities. Such budget certainty helps ensure consistent representation by U.S. government technical experts from year to year.

Conclusion

ANSI commends NIST for reaching out broadly to solicit input on the plan for Federal Engagement in AI Standards and for the recognition of the importance of the public-private partnership that has made the U.S. private sector-led standardization system so successful.

ANSI encourages NIST to consider the full range of issues - both technical and societal – associated with standards for AI applications in developing its plan for Federal engagement in the development of technical standards and related tools that will be used to create reliable, robust, and trustworthy systems that use AI technologies.

Attachment 1

JTC 1/SC 42 – Artificial Intelligence:

○ Structure

JTC 1/SC 42's program of work is developed under a structure of 5 Working Groups (WGs) and one Joint Working Group, in collaboration with JTC 1/SC 40, IT Governance. These WGs are:

- WG 1 – Foundational standards
- WG 2 – Big Data
- WG 3 - Trustworthiness
- WG 4 - Use cases and applications
- WG 5 - Computational approaches and computational characteristics of AI systems
- JWG 1 - Governance implications of AI

As SC 42 is a horizontal standards committee, the documents being developed by this committee are applicable to multiple industry sectors.

Published documents:

JTC 1/SC 42 has three published documents, which were originally developed under JTC 1/WG 9, Big Data. After the inaugural meeting of SC 42 in April, 2018, the work of JTC 1/WG 9 was transferred to SC 42, in recognition of the synergies between Big Data and AI.

- Information technology – Big data – Overview and vocabulary
 - Scope: This document provides a set of terms and definitions needed to promote improved communication and understanding of this area. It provides a terminological foundation for big data-related standards.

This document provides a conceptual overview of the field of big data, its relationship to other technical areas and standards efforts, and the concepts ascribed to big data that are not new to big data.

- Information technology – Big data – Big data reference architecture -- Part 2: Use cases and derived requirements
 - Scope: This document provides examples of big data use cases with application domains and technical considerations derived from the contributed use cases.
- Information technology -- Big data reference architecture -- Part 5: Standards roadmap
 - Scope: This document describes big data relevant standards, both in existence and under development, along with priorities for future big data standards development based on gap analysis.

Documents under development:

The current list of SC 42 projects under development is below. For more detailed information on project scopes, please contact ANSI.

- Information technology – Artificial Intelligence (AI) – AI Concepts and Terminology
- Information technology – Artificial Intelligence (AI) – Framework for AI Systems using Machine Learning
- Information technology -- Big data reference architecture -- Part 1: Framework and application process
- Information technology -- Big data reference architecture -- Part 3: Reference architecture
- Information technology -- Artificial Intelligence (AI) -- Bias in AI systems and AI aided decision making
- Information technology -- Artificial Intelligence (AI) -- Overview of trustworthiness in Artificial Intelligence
- Artificial Intelligence (AI) -- Assessment of the robustness of neural networks -- Part 1: Overview
- Information technology -- Artificial Intelligence -- Risk Management
- Information technology -- Artificial Intelligence -- Overview of Ethical and Societal Concerns
- Information technology -- Artificial Intelligence (AI) -- Use cases
- Information technology -- Artificial Intelligence (AI) -- Overview of computational approaches for AI systems
- Information technology -- Governance of IT -- Governance implications of the use of artificial intelligence by organizations