



Council to Secure the
Digital Economy

CSDE Primer on Technology Standards and Specifications

USTELECOM
THE BROADBAND ASSOCIATION

Consumer Technology
Association

What is a technical standard?

A technical standard is “an agreed-upon formula that describes the best way of doing something”¹ with enough clarity that:

1. Companies can make products that are **interoperable** with other companies’ implementations, and
2. The product can be **assessed for compliance** with the requirements in the technical standard.

Examples of technical standards include: interfacing between products (e.g., standards for 5G or USB); characteristics of a product (e.g., IEC 62301:2011 which is used in EnergyStar); managing a process or delivery of a service (e.g., the widely-used ISO 9000 quality management system); or supplying a material (e.g., API 520 — for pressure safety valves).

How do technical standards differ from guidance?

Technical standards are developed by **accredited organizations or similar organizations (e.g., industry coalitions or alliances)** in a **consensus process** and lend themselves to **conformity assessments**.


1. The process and oversight brought to the development of a technical standard by an accredited organization typically drives broader industry acceptance.
2. An open consensus driven process means that all materially interested stakeholders can have a voice.
3. Conformity assessment is the process of checking that an implementation meets the technical standard.

Documents that don’t have these characteristics may be considered “guidance” or “best practices.” Some examples are:

- ▶ **NIST Cybersecurity Framework (CSF):** NIST is accepted as an authority on this topic, but the CSF is not designed to be used for conformity assessment.
- ▶ **CISA Performance Goals:** The Goals were not developed in a consensus process and many elements are difficult to assess.
- ▶ **Executive Order:** Typically has principles that are stated by fiat, **not consensus**, and cannot be **assessed** objectively for conformance.

What is the difference between National, Regional, and International Standards?

International: International standards come from a few very large recognized bodies. Examples include **ITU** (International Telecommunication Union, an agency of the United Nations); **IEEE** (Institute of Electrical and Electronics Engineers, a professional association which develops standards); **ISO** (International Organization for Standardization, an NGO); **IEC** (International Electrotechnical Commission); and **3GPP** (3rd Generation Partnership Project, a global partnership of seven regional standards organizations which develops specifications for cellular telecommunications technologies that are standardized by each of the seven regional partners).



International standards bodies are sponsored and organized differently from other standards development organizations. International standards facilitate technical interoperability between products and systems in different countries, which is critical for many industries, especially international telecommunications.

International standards may be developed under a “one country, one vote” process; this process can disadvantage larger economies. On the other hand, the international standards process also lends itself to international geopolitical challenges, such as the concern that one large economy — e.g., China — may control a particular standard by applying overwhelming resources and by assembling voting blocs of other nations.

Global standards bodies — other than ones controlled by governments (e.g., the ITU) — are governed in ways **to prevent one country from dominating the standards setting process**. In fact, it has been a goal to drive countries away from setting country-specific standards by encouraging participation in these global standards setting activities.

National/Regional: National and regional standards can make a solution that is more optimized for a particular economy or region. For example, “American National Standards” are developed by standards bodies that are accredited by ANSI, the American National Standards Institute. Input on the development of the standard still comes from the international community.

ICT standards are largely developed through industry-driven, voluntary, consensus-based, and sector-focused standards bodies.

Why are standards (and the model in which they are created) important in the ICT sector?

Competitiveness and Innovation

- ▶ Because standards are critical to product design and to cross-border acceptance, a nation’s strength in setting standards is part of its economic competitiveness.
- ▶ As NIST notes, standards are the technical foundation enabling competitiveness and innovation.²

Cybersecurity/National Security

- ▶ Cybersecurity is a difficult practice. Standards distill the knowledge and expertise of skilled industry practitioners.
- ▶ Industry standards are developed in a transparent process. This openness leads to greater scrutiny and technical engagement.

Economic Efficiency

- ▶ Standards that reflect the consensus of all interested stakeholders drive significant economies of scale.^{3,4} Efficiency gains enabled through global standards are a key driver of economic growth.

What are the different types of conformity assessments and how do they differ?

In general, conformity assessments are demonstrations that specified requirements relating to a product, process, system, person, or body are fulfilled.⁵ Conformity assessment has been used for decades in many industries and is the primary mechanism by which trust is established and maintained in otherwise opaque business processes.

Common types are:

- ▶ **(3rd Party) Certification.** Certification is **written assurance provided by an independent, 3rd party body** that a product, process, service, person, or management system meets specific requirements.
- ▶ **Supplier’s Declaration of Conformity (SDoC).** SDoC or “self-attestation”⁶ is written assurance **from the provider** that a product, process, service, person, or management system meets specific requirements. SDoC “is by far the most common conformity assessment practice used for products being placed in the market globally.”⁷
- ▶ **Accreditation (of an organization).** Accreditation is written assurance provided by an independent, 3rd party body that an organization has a certain well-defined capability. Often accreditation is used to ensure a test house can carry out a specific kind of conformity assessment.

In short, a company can *self-attest* that their product meets the requirements in a standard, or have a 3rd party organization *certify* that the product meets the requirements. In the latter case, the 3rd-party organization may need to be *accredited* for such certification work.

What is a candidate for conformity assessment? Here are a few categories where conformity assessment is used.

Aerospace
Automation
Automotive
Chemical
Construction
Cybersecurity

Environmental
Fire Protection
Food Safety
Forestry
Health & Safety
HVAC

Information Technology
Lead
Manufacturing
Medical
Physical Security
Plastics

Product Quality
Radio Emissions
Sanitary Engineering
Sustainability
Telecommunications
Wood & Paper

What is the role of Small and Medium-Sized Enterprises?

- ▶ CSDE represents some of the largest global stakeholders in the standards ecosystem. However, there are many other smaller companies that have the expertise to participate in standards development efforts, including some small and medium-sized enterprises (SMEs).
- ▶ Policymakers should engage the SME community to better understand what would incentivize them to take a more active role in standards development and craft policy accordingly.

Research Sources:

ANSI: <https://www.ansi.org/standards-faqs>

ISO: <https://www.iso.org/standards.html>

NIST: <https://www.nist.gov/services-resources/standards-and-measurements>

Multi-association paper: <https://ustelecom.org/research/international-standards-and-specification/>

NSTAC Report/Letter: https://www.cisa.gov/sites/default/files/publications/NSTAC%20Letter%20to%20the%20President%20on%20Standards%20%285-24-22%29_508.pdf

NIST Testimony: <https://www.nist.gov/speech-testimony/setting-standards-strengthening-us-leadership-technical-standards>

NIST PowerPoint: <https://www.nist.gov/system/files/documents/2021/11/19/03-Warren%20Merkel-Use%20of%20Self%20Declaration%20for%20EO%20Workshop.pdf>

NIST ABCs: <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.2000-01.pdf>

NIST Conformity Assessment Considerations: <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.2000-02.pdf>

ENDNOTES

- 1 ANSI: <https://www.ansi.org/standards-faqs>
- 2 NIST Testimony <https://www.nist.gov/speech-testimony/setting-standards-strengthening-us-leadership-technical-standards>
- 3 NIST Testimony <https://www.nist.gov/speech-testimony/setting-standards-strengthening-us-leadership-technical-standards>
- 4 NSTAC Letter https://www.cisa.gov/sites/default/files/publications/NSTAC%20Letter%20to%20the%20President%20on%20Standards%20%285-24-22%29_508.pdf
- 5 NIST Special Publication 2000-01: ABC's of Conformity Assessment: <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.2000-01.pdf>
- 6 As defined in ISO/IEC 17000, attestation is “an issue of a statement, based on a decision following review, that fulfilment of specified requirements has been demonstrated”. The attestation intends to convey assurance about the conformity of the object to consumers, regulators, buyers, or other interested parties. (NIST)
- 7 <https://www.nist.gov/system/files/documents/2021/11/19/03-Warren%20Merkel-Use%20of%20Self%20Declaration%20for%20EO%20Workshop.pdf>