10 Standards Organizations That Affect You (Whether You Know It Or Not)

There are thousands of standards organizations around the world, and they can standardize pretty much anything to make life easier, safer, and more productive. Often, these bodies have agreements to cooperate with each other. They may endorse each other's standards, build upon them, or purposely avoid duplicating efforts.

But human nature being what it is, standards bodies also complete with each other. The electronics industry is affected by these myriad standards and the organizations that produce and endorse them. Here is a sample of a mere 10 of those organizations, in no particular order, and you might not be familiar with several of them.

ISO

The International Organization for Standardization (ISO) was founded in 1947 and is headquartered in Geneva, Switzerland. ISO has three official languages: English, French, and Russian. Its membership comprises national standards organizations, one from each of 163 countries.

Each member represents its country's standardization activities to ISO and, in turn, represents ISO back to its own country. ANSI represents the United States (more on ANSI later). Even Fiji is a member, participating in 10 ISO technical committees and represented by its Department of National Trade Measurement and Standards.

ISO defines a standard as "a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose." Products and services that follow ISO standards can be deemed to be high quality, safe, and reliable. Businesses that use ISO standards can save money and time. New markets can be stimulated around ISO standards, as is true for effective standards in general.

Since its inception, ISO has published over 19,500 standards. Perhaps the most familiar is the ISO 9000 family of quality management standards. ISO's standards deal with a wide range of aspects of everyday life, including food, water, health care, cars, climate change, energy efficiency, and sustainability. More than 250 technical committees produce the standards.

Some of the interesting ISO standards that pertain to electronics include gas cylinder valve connections for use in the microelectronics industry, radio frequency

identification for item management, a security framework for ubiquitous sensor networks, and the determination of chemical emission rates from electronic equipment.

IEC

The International Electrotechnical Commission (IEC) creates and publishes standards for electrical and electronic technologies. It was founded in 1906 and is headquartered in Geneva, Switzerland. Members of the IEC are called National Committees. Each country can have just one National Committee in the IEC. There are 82 members. ANSI represents the United States.

Countless electronic and electrical products around the world use IEC standards and their corresponding conformity assessment systems. IEC standards help ensure that these products work properly, connect to each other, and perform safely.

IEC has more than 170 technical committee and subcommittees, along with about 700 project/maintenance teams that produce and maintain their standards. Individuals who work on IEC standards do so through their country's National Committee. Voting on IEC standards follows a "one country, one vote" model.

The technical committee that primarily addresses standards for the semiconductor industry is called TC 47. Its purpose is to produce standards for design, manufacturing, use, and reuse in a broad range of areas. Standardization covers areas from wafer-level reliability to physical environmental testing to device specifications and even applications. Electronic design automation's beloved SystemVerilog has also been ratified as an IEC standard, called "Unified Hardware Design, Specification, and Verification Language IEC 62530."

ITU

The International Telecommunication Union (ITU) is a specialized agency of the United Nations. Its original name was the International Telegraph Union, and it was founded in Paris in 1865. It serves the field of information and communications technology. Now headquartered in Geneva, it has a membership of 193 countries and over 700 private-sector entities and academic institutions. It operates using the six official languages of the United Nations: Arabic, Chinese, English, French, Russian, and Spanish.

The ITU allocates global radio spectrum and satellite orbits. It also develops technical standards for interconnecting networks and other technologies in international

telecommunications. Some of its standards work deals with economic and policy issues as well.

Standards from the ITU are called "Recommendations," and there are more than 4000 of them. The 10 primary study groups producing standards within the ITU address categories such as broadband cable and TV, quality of service and experience, protocols and test specifications, security, and future networks. They also work on multimedia, environment and climate change, and transport, access, and home.

An example of an ITU standard that has made its way into semiconductor intellectual property (IP) is the H.264 standard. It's advanced video coding for generic audiovisual services. Semiconductor IP that implements the standard's baseline and main profile decoder can be purchased. The standard was produced with cooperation of the ITU and ISO. ISO calls it "MPEG-4 part 10, Advanced Video Coding."

JEDEC

The Joint Electron Device Engineering Council (JEDEC) is a semiconductor engineering trade organization that also develops standards for the microelectronics industry. It was created around the same time that the IC was invented, in 1958, by the Electronics Industry Association (EIA). EIA had previously helped establish the Joint Electron Tube Engineering Council, which was responsible for assigning and coordinating type numbers of electron tubes. As solid-state electronics evolved, it became time for the council to address semiconductors as well.

JEDEC's headquarters are located in Arlington, Va. It is accredited by ANSI and has almost 300 member companies. More than 4000 people from these companies volunteer on JEDEC's standards committees. Voting on JEDEC standards follows the "one company, one vote" model.

Some interesting standards that come from JEDEC committees include the electrostatic discharge (ESD) symbol used worldwide on semiconductor devices; specifications for computer memories such as DRAMs, DDR components, and flash; standards for removable memory cards and embedded memory storage; and standards for solid-state drives and flash storage.

One of JEDEC's most popular standards came from its work to address the migration to lead-free manufacturing processes. Perhaps not as glamorous, but no less important, JEDEC develops and publishes a manual of common terms and definitions for the semiconductor industry as well.

ANSI

The American National Standards Institute (ANSI) was founded in 1918 and is headquartered in Washington, D.C., with an operational office in New York City. Its mission is "to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity."

The private, non-profit organization oversees the development of voluntary, consensus-developed standards. It is dedicated to strengthening the U.S. in the global marketplace while ensuring the health and safety of consumers and the environment. Its annual budget is a modest $22 million.

ANSI's membership comprises companies, governmental agencies, academic institutions, international bodies, other organizations, and individuals. It represents the interests of more than 125,000 companies and 3.5 million professionals. Internationally, ANSI officially represents the U.S. standardization activities in ISO and IEC.

While ANSI doesn't directly develop standards, it oversees and accredits the standards that come from approximately 200 standards-developing organizations, government agencies, companies, and other groups. ANSI approval of a standard helps ensure that the principles of openness, consensus, and due process were followed during its development. Standards from more than 180 standards publishers are available through the ANSI store.

There are currently around 10,000 American National Standards. They are dispersed throughout a wide variety of industries and services, touching just about every business sector. Areas such as construction, energy, and livestock production benefit from standards that come from ANSI-accredited organizations.

ANSI published the first standard for the C programming language. Beginning in 1983, an ANSI committee worked on a specification of C. Ratified in 1989, the standard was officially named "ANSI X3.159-1989 Programming Language C" and commonly referred to as "ANSI C."

Most of the IEEE's standards are accredited by ANSI. Additionally, there are many standards-developing organizations accredited by ANSI whose standards affect the electronics industry. These include the Consumer Electronics Association (CEA), Electronic Components Association (ECA), Association Connecting Electronics Industries (Institute for Interconnecting and Packaging Electronic Circuits - IPC),

National Marine Electronics Association (NMEA), and Optics and Electro-Optics Standards Council (OEOSC/ASCOP).

ACM

Headquartered in New York City, the Association for Computing Machinery (ACM) was founded in 1947. ACM is dedicated solely to computing. This scientific and educational society has more than 100,000 members around the world from industry, academia, and governments. The current president of ACM is Vint Cerf, well known as one of the "fathers of the Internet" (along with Bob Kahn).

ACM has many special interest groups (SIGs), and some of them address standardization in their fields of interest. For example, one of ACM's SIGs standardized the Ada programming language.

The SIG for "Knowledge Discovery in Data," SIGKDD, helps promote adoption of standards, which is equally as important as developing them. SIGKDD's mission is to advance the field of knowledge discovery and data mining from data stored everywhere. It encourages adoption of standards for common terminology, methodologies, and evaluation.

The SIG for spatial information, SIGSPATIAL, is dedicated to all applications and research involving spatial information. It participates in standardization for terminology, methodologies, and evaluation.

The "Hypertext and the Web" SIG, SIGWEB, encourages research and development for all things related to hypertext, from digital libraries to document engineering to social networks. It advocates for the development of standards in its field, reaching members of its community around the world.

NIST

The National Institute of Standards and Technology (NIST) is part of the U.S. Department of Commerce. It was founded in 1901 as the National Bureau of Standards. In 1988 its name was changed to NIST to include a general technology direction for its standards in addition to its original charter of measurement standards. NIST's overall goal is to enhance industry in the U.S. through standards-related tools and information to more effectively compete in the global marketplace. NIST standards touch a wide range of technologies including the smart power grid, nanoscience, and semiconductors.

NIST is a non-regulatory (it does not make laws) agency of the government. Its 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." According to the group, "NIST will be the world's leader in creating critical measurement solutions and promoting equitable standards. [Its] efforts stimulate innovation, foster industrial competitiveness, and improve the quality of life." NIST's three core competencies are measurement science, rigorous traceability, and the development and use of standards.

There are three major programs at NIST: the NIST Laboratories, which conduct research with industry to advance the technology infrastructure in the U.S.; the Hollings Manufacturing Extension Partnership, which offers technical and business assistance to smaller suppliers to improve their effectiveness; and the Baldrige Performance Excellence Program, which stimulates and recognizes performance excellence in all organizations.

NIST recognizes that an effective standards infrastructure plays a significant role in innovation and market success. Its Standards Coordination Office oversees its standards work. This office works closely with NIST Laboratories to find opportunities and drive NIST participation in standards activities. It also works with industry and other government agencies on efforts and programs for global standardization and conformity assessment.

The Standards Coordination Office also manages the Commerce Standards Committee and coordinates the activities of the Interagency Committee on Standards Policy. Additionally, it supports the NIST Director and Undersecretary for Standards and Technology's leadership of the National Science and Technology Council's Subcommittee on Standards.

The standards that come from NIST are interesting in that they go beyond documents. They are actual materials that can be used as a canonical reference for calibration, measurement, quality, and control of experiments. NIST standards are called Standard Reference Materials (SRMs), and there are approximately 1300 of them.

Examples of NIST standards at work in the semiconductor industry include SRM 2841, used in the measurement of the composition of thin films, and SRMs 2541 through 2547, which are used for measuring sheet resistance and resistivity. These standards are chips and wafers, not just a written document like most technical standards.

Ecma International

Ecma International is a private, non-profit organization based in Geneva. It enables the creation of standards for consumer electronics (CE) and information and communications technology (ICT). It was formed in 1961 as the European Computer Manufacturers Association (ECMA). In 1994 it changed its name to Ecma International, dropping the acronym and full capitalization, to signify the global nature of its activities. Today, Ecma's Web site specifically calls out its versions in the Belorussian and Romanian languages.

Members of Ecma come from industry, academia, and other non-profit organizations. There are more than 60 members, divided into categories that tier the membership fees for them.

Ecma approaches standards from a business perspective. It believes this practice brings less bureaucracy and more efficiency to consensus-driven standards. Ecma prides itself in taking this direction and considers the standards produced this way to be faster and better. It is driven by industry to meet industry's needs, as opposed to being driven by technology alone. Its standards promote competition and differentiation, leading to a vigorous marketplace and increased consumer confidence.

Ecma's organizational structure is quite interesting. It's simple and flat. Technical Committees perform technical work. Twice a year, the Technical Committees can submit their work to the General Assembly for approval. The General Assembly consists of representatives from member organizations and includes the likes of Adobe, AMD, Apple, Broadcom, eBay, Fujitsu, Google, IBM, Intel, Microsoft, NEC, and Nvidia.

Ecma standards are diverse within the CE and ICT sectors. They include standards for programming languages, communications, product safety, environment, acoustics, and optical storage. There are over 400 standards and 100 technical reports from Ecma, and more than two-thirds of them have been recognized internationally.

The ECMA-334 standard specifies the C# programming language. It defines the form and interpretation of programs written in C#. The ECMA-372 C++/CLI language specification defines requirements for implementations of the C++/CLI binding. The RapidIO Interconnect Specification, officially called Standard ECMA-342, is an architecture for a high-performance, low-pin-count, packet-switched system-level interconnect used for chip-to-chip and board-to-board communications.

CENELEC

CENELEC is the European Committee for Electrotechnical Standardization. It was founded in 1973 as a merger of two previous European organizations and is headquartered in Brussels, Belgium. It is a non-profit organization set up under Belgium law and is responsible for standardization in electrotechnical engineering. The European Commission has designated CENELEC as one of the three European Standards Organizations, along with the European Committee for Standardization (CEN) and the European Telecommunications Standards Institute (ETSI).

CENELEC's charter is to produce voluntary European standards that improve trade, enable new markets, reduce costs of compliance, and support the development of a "Single European Market." European standards foster technology advancement, promote interoperability, ensure consumer health and safety, and help protect the environment.

There are 33 members of CENELEC. Each member is a national standards organization representing a single country. The member must be recognized both nationally and at the European level to be qualified to represent its country's standardization interests. Each country may have only one member in CENELEC.

Technical experts from industry, academia, administrative bodies, and other nongovernmental organizations create CENELEC standards. They are consensus-driven and open to participation by interested parties. CENELEC has more than 300 technical committees.

As with all effective standards, CENELEC standards enable new business opportunities. An attention-catching business claim by the company, Cenelec Standards Inspections Ltd. offers "the expertise to assist you in potentially explosive atmospheres in your work environment." This service company helps other companies that deal with potentially explosive products such as those in the semiconductor industry ensure they comply with CENELEC safety standards.

JEITA

JEITA was formed in 2000 from the merger of two long-standing previous organizations, the Electronic Industries Association of Japan (EIAJ) and the Japan Electronic Industries Development Association (JEIDA). Its charter is to further Japan's economy by advancing its electronics and information technology industries. JEITA supports manufacturing, trade, and consumption internationally of products from these industries.

JEITA's mission is "to foster a digital network society for the 21st century, in which IT advancement brings fulfillment and a higher quality of life to everyone." Its broad interests include computers, assemblies, A/V equipment, radio systems, electronic components, broadcasting equipment, medical electronics, measuring instrumentation, displays, software, and semiconductors.

Recognizing the value of international standards, JEITA promotes and supports the activities of ISO and the IEC. It helps develop Japan Industrial Standards (JIS), which are developed under the process of the Japan Industrial Standards Committee and published by the Japan Standards Association.

JEITA also produces its own standards. For example, the JEIDA memory card standard was popular when memory cards became a popular part of laptops. JEIDA memory cards were used to add system memory or as solid-state storage drives. Prior to the JEIDA standard, memory cards in laptops were not interoperable. They were proprietary to each manufacturer and sometimes differed between models from the same manufacturer.

When JEIDA memory cards and interfaces took off in Japanese products, the U.S. government took notice. In the mid-1980s, the U.S. government recognized that the Japanese had overtaken its leadership in the semiconductor industry. It formed Sematech as a partnership between the U.S. government and 14 U.S.-based manufacturers to overcome problems with semiconductor manufacturing and secure competiveness.

The success of the JEIDA memory card prompted Sematech to help initiate the Personal Computer Memory Card International Association (PCMCIA) and its competing standard. Eventually, JEIDA and PCMCIA came together to merge the competing standards into JEIDA 4.1/PCMCIA 2.0 in 1991.

Learning More

As one explores the history and modern activities of standards organizations all over the world, a whole new dimension of human activity is revealed. The sheer amount of daily effort that goes into standardization is astonishing. To learn more about standards and standards organizations, start with Google searches on the Internet, which was built on standards.

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