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Internet Technology

The Standards Industry

Corporate consortia are supplanting traditional rule-making bodies

By Larry Seltzer

Just about everything you do on a computer, especially things you do on the Internet, is based on some sort of industry standard. This has always been the case, and everyone knows it to some extent, but the business of standards in the computer industry has been changing over the last few years, fed mostly by shorter product life cycles and the insatiable desire of Internet firms to develop new technologies that interact with existing infrastructures.

The word "standard" itself is one of the most flexible terms you'll encounter. There are many types of standards but, very broadly speaking, in today's computer industry there are two main types.

› **De jure standards**, the conventional type, are those in which some official body has set rules for implementing a technology. ASCII–The American National Standard Code for Information Interchange–the standard used by most software for encoding Roman characters, is defined in the American National Standards Institute (ANSI) document X3.4-1986, for example.

› **De facto standards** are standards which are set, typically, by virtue of marketplace success. For example, Windows is not a de jure standard, but it is the de facto standard desktop operating system by virtue of its market share. Some people object to referring to such a case as a type of "standard," but this use of the term does have meaning.

A de facto standard is a real standard when people treat it like one. When there are multiple implementations and when no one organization is able to change the specification unilaterally–when it quacks like a standard–it's a standard. Consider Intel's x86 microprocessor instruction set. There are

multiple implementations from multiple vendors. If one of these vendors came out with a new instruction that the others didn't implement, it would be considered a proprietary extension and used only with caution. Thus, the x86 instruction set is clearly a de facto standard.

We've always had de facto standards, even before Microsoft. Remember when IBM owned the computer industry? But the world of de jure standards has changed in recent years, as the established standard bodies have been displaced by new, upstart organizations.

One really big advantage of formal standards through standards organizations is that they let companies work together while avoiding charges of collusion. If the result of the standards process is available to all, either free of charge or under what is termed "reasonable and nondiscriminatory pricing" ("RAND"), then the benefit accrues to the entire industry and, one hopes, to consumers as well. Or at least that's the idea.

The Old Guard

The problem with the older bodies, such as the International Organization For Standardization (ISO) is that they are quasi-governmental organizations, and act the part. The members of ISO are countries, and each country gets a vote. ISO standards carry a lot of weight, because they are inherently international, but standards development can take years. ISO standardizes some of the most fundamental and important things in life, such as the measurements of screw threads, but it's not a great way to bring a new and dynamic technology standard to life.

ISO has a special organization for technology standards called Joint Technical Committee I–Information Technology (JTCI). Like many ISO groups, JTC1 is divided into subcommittees (SC) on narrower topics: SC 22 covers "programming languages, their environments and system software interfaces," for instance; SC 35 covers "user interfaces"–a vague enough topic for a group that appears to be mostly dormant.

Within each subcommittee there are working groups (WG). In SC 22, the WGs are mostly built around specific languages–WG 4 for COBOL and WG 21 for C++, for example–but there are other types. WG 19 standardizes formal language specifications, a general standard that affects all the other WGs, while WG 20 deals with internationalization.

ISO is widely respected as the ultimate standards bodies for established technologies. Thus, though it took the ISO years, working through ANSI, to create a standard for the C

programming language, that standard is viewed as de rigueur in the industry, and therefore assists in portability of software.

Where ISO has tried to be more forward-looking in its development of standards it has been less successful. A number of ISO's critics invoke the specter of Open Systems Integration (OSI), a standard for system architecture developed over many painful years that never achieved any real-world importance.

Another of the gray ladies of the standards world is ANSI. What ISO is internationally, ANSI is to the United States, functioning largely as a clearinghouse for standards development in this country. Most ANSI standards are actually developed by one of its 271 affiliated organizations, which range from the Air Movement And Control Association, which covers airflow measurement and testing methods for fans, louvers, and dampers, to the Water Quality Association, which covers water quality improvement products and systems used for household, commercial, and industrial applications). There is even a body called the Turkey Roasters of Thanksgiving (TROT), which work on turkey preparation. In technological fields, ANSI works with the Telecommunications Industry Association (TIA), the National Information Standards Organization (NISO), and the Institute of Electrical and Electronics Engineers (IEEE), among others. In recent years, however, ANSI has not been involved in significant technology standards.

Other established standards bodies do continue to play important roles, both directly and peripherally related to the Internet, in the technology industry. Consider the European Telecommunications Standards Institute (ETSI). ETSI's mission is to develop telecommunications standards for use "throughout Europe and beyond." Its membership is largely composed of European companies. Some of its standards become the basis for European Community directives and regulations.

Important standards currently being worked on by ETSI include the Third Generation Partnership Project (3GPP), which aims to develop technical specifications for a third-generation mobile system based on evolved GSM core networks and radio access technologies. 3G is one of those areas where basic technologies are still fighting to control the market, so an advanced standard adopted throughout Europe would affect the industry significantly. ETSI's M-COMM, or Mobile Commerce, group has also received a lot of press.

ETSI coordinates its work with the International Telecommunications Union (ITU), a United Nations organization in which which governments and the private sector meet to coordinate global telecom networks and

services. There are three "sectors" within the ITU. In 1993, the ITU Telecommunication Standardization Sector (ITU-T) replaced the *Comité Consultatif Internationale Téléphonique et Télégraphique* (CCITT), whose origins date back to early work on the telegraph in the 1860s. Like ISO, ITU-T is subdivided into groups called "study groups" (SG). Some of these are purely technical, such as SG 11–"Signalling requirements and protocols"– and some are more policy-oriented, such as SG 3–"Tariff and accounting principles, including related telecommunication economic and policy issues."

The Young Turks

But the real action in the standards world in recent years has taken place in consortia. One of the most famous of the consortia is the World Wide Web Consortium (W3C), founded and still led by the inventor of the Web, Tim Berners-Lee. Berners-Lee personally signs off on all standards coming out of the body, though the membership is diverse. Members are companies–usually of the caliber of Microsoft, Netscape, Sun, and IBM–with an interest in the technologies under study for acceptance as standards.

The W3C is one of the hot standards bodies these days. It's popular with the leading technology companies in the business for several reasons: because Berners-Lee inspires near-universal confidence, because W3C rules allow companies to develop standards relatively expeditiously, and perhaps most importantly, because not everyone can join.

Many of the most important Internet standards come out of the W3C: HTML, cascading style sheets (CSS), and the Document Object Model (DOM), and numerous XML-based standards, along with more cutting-edge technologies such as the Platform for Privacy Preferences (P3P)–a controversial standard for a technology that would allow users to maintain privacy by controlling what personal information sites can obtain–and standards for micropayments technology.

The W3C is focused on relatively high-level software-based solutions for the Web. For example, even though Berners-Lee initially developed HTTP, that standard is now handled by the Internet Engineering Task Force (IETF), which concerns itself with lower-level software layers.

Another consortium that has become more important in recent years is ECMA, formerly known as the European Computer Manufacturers Association. As in the W3C, members of ECMA are typically companies with an interest in the technologies under consideration. ECMA first became widely known for its efforts to produce a standardized JavaScript known as ECMAScript, an effort led jointly by Microsoft and Netscape. Microsoft has since taken C# ("C-

sharp") and the Common Language Infrastructure (CLI) portion of Microsoft.NET to ECMA for standardization.

There are other types of consortium that are less independent than the W3C and ECMA. Consider the USB Consortium, founded largely by Intel to define and promote the Universal Serial Bus. Such industry-founded organizations seem to be mostly based around hardware initiatives, which require a much greater degree of coordination among vendors, but there are examples of software consortia as well. RosettaNet, for example, is a nonprofit organization that exists to create business-to-business software standards for the Internet.

These focused, industry-sponsored organizations are the most interesting of the bunch. They provide most of the same advantages to participants as the more independent standards bodies, and it's clear that they have a goal of promoting the technology. It's true that some of the openness of an "official," de jure standard is lost, but standards written by the companies that have to implement them tend to be more cost efficient and time sensitive.

Power To the People

If you're a fan of democracy, the standards world also has a sort of "left wing." Two formal and well-established standards bodies, the Internet Engineering Task Force (IETF) and the Institute of Electrical and Electronics Engineers (IEEE), are open to anyone with enough interest, expertise, and time on their hands to participate. In some ways, this is both their greatest strength and their greatest weakness.

IETF and IEEE both tend to focus on the lower levels of communications technology, though the IEEE does work in almost every field of engineering, and standards are only a part of its business. It publishes a large number of high-quality technical journals on just about any engineering discipline that you can name.

IEEE's standards efforts, even within IT, cover a wide variety of topics. Though it has committees working on high-level software–including IEEE 1063, which attempts to set standards for software user documentation–its most famous and significant efforts happen at the protocol level. IEEE 802, the LAN/MAN Standards Committee, defines many of the basic protocols of network communications, from Carrier Sense Multiple Access/Collision Detect (CSMA/CD), an Ethernet carrier transmission access protocol, to 802.11, a popular wireless LAN protocol. The IEEE is very democratic: The groups that create standards set rules governing who participates and votes, even allowing non-IEEE members to vote at times.

The IETF is the home of some of the most fundamental Internet standards, including HTTP, SMTP, TCP, FTP, and LDAP. It's an interesting and very democratic organization. Anyone can join and participate. There are physical meetings, but you can be an effective participant simply by joining and writing to the IETF's numerous mailing lists.

Especially admired is the IETF's requirement that any specification have two independently developed, compliant reference implementations in order to be adopted. Because these reference implementations must be either free or licensable under RAND rules, they are often licensed broadly by other companies, which add value to the reference implementation.

The downside to the democratic process employed by both the IEEE and the IETF is that its openness can provide a platform to troublemakers. It's also possible that different participants will have significant disagreements. In some cases, such as HTTP, standardization efforts can last for years, to the point at which established implementations become de facto standards and make the de jure specification obsolete. Both groups need to have a strong chair to keep the group focused. Clearly, the open structure of these groups discourages some parties from taking new technologies to them, a factor leading to the rise of industry consortia.

Open Source

The open source movement represents another new type of standard, or perhaps another type of challenge to the standards movement, depending on your point of view. The classic, most famous open source efforts, such as Linux, Perl and Apache, are controlled by a small number of leaders and caretakers, sometimes a single person. Linux is the perfect example: Decisions about new releases of the kernel of the Linux operating system are made solely by Linus Torvalds, although there are other people involved in the decision-making and development process, and membership in that group is informally structured and meritocratic.

In the open source world, the implementation itself is the standard, not some document describing what the implementation should be, except to the extent that it implements some other standard, such as the implementation of the TCP/IP stack in Linux. In this sense, the open source movement is a rejection of the standards process as practiced by international and national standards bodies and industry consortia.

In the real world, however, open source projects do produce informal specifications, sometimes unintentionally. Authoritative books have been written on many open-source technologies–DNS and Perl are examples–often by the

creators of the product, and the procedures described in these books obtain a protected status. It would be very difficult, for example, for a new version of Perl to transgress the behavior described in the "Camel Book," the popular nickname for Wall and Schwartz's 1991 book *Programming Perl*.

Some open-sourcers recognize the need for changes in these processes. The Linux Standards Base, for example, is an effort to formalize a specification for Linux. It has received much lip service from important players in the Linux business, although there isn't much to show yet in the way of formal specifications.

Roll Your Own Standards

A few years ago, Sun created yet another type of standards organization when, after it failed to come to terms with the ISO and ECMA over a proposed Java standard, it created the Java Community Project (JCP), a Sun-owned organization for defining the direction of the Java language and environment.

Sun's experiences with the ISO and ECMA are illustrative of some of the strengths and weaknesses of conventional standards bodies. In the end, Sun decided to withdraw from the ISO process because ongoing control of the Java standard would devolve to JTC1's Subcommittee 22, and Sun was reportedly uncomfortable with ceding control to SC 22.

The company then moved its standards efforts to ECMA, because it could retain more control of the process after the initial standardization. But ECMA rules required Sun to relinquish certain intellectual property rights in Java. Furthermore, the chairman of the relevant ECMA technical committee was a Microsoft employee. Sun claims that Microsoft led a charge to make changes in Java through the standards process in both ISO and ECMA, and that this was a factor in the decision to organize the more "independent" JCP. However, the e-mail ar-chives of ISO's JTC1/SC22 show that the clear consensus of the group was that Microsoft's actions were relatively restrained; Sun, on the other hand, was seen as being difficult.

In any event, building credibility is at least as important as building standards, especially for a group with such controversial origins as the JCP's. The current rules of the JCP do seem to be designed to solicit real input from other vendors in the Java community. Sun owns the process, but there is nothing in the rules that allows the company to dominate it or any particular standards effort.

Where The Action Is

The rise of fast-moving consortia may not sound the death knell for organizations like ANSI and ISO, but it clearly indicates a decline in their influence. In a world where product life cycles run less than 18 months, a standards process that takes years is doomed to diminished relevance.

The consortia, whether they're organized by academic interests like the W3C or corporate interests like the USB Consortium, are more focused and nimble and hence better suited to the needs of industry in the age of the Internet. IW

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