

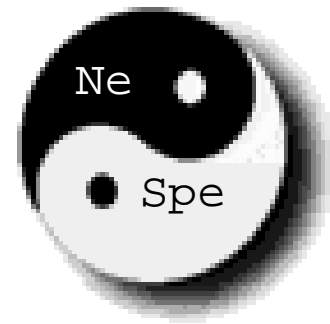
**1999 World Standards Day Paper Competition  
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## The Yin and Yang of Standards Development

By Stephen C. Lowell

There is an ancient Chinese concept called yin-yang that holds that everything in the universe consists of opposite aspects (for example, hot-cold, dark-light, or life-death), which must be kept in balance for an entity to thrive. The yin and yang are opposing forces that constantly change, are in continual conflict, but are dependent on each other for survival. These opposites drive each other towards creativity and excellence, while at the same time, they restrain each other to ensure harmony. To the ancient Chinese, there was nothing in life that was exempt from the natural order of yin-yang, including standards.

In today's world, there are two opposing forces when it comes to standards development. On one side is the more traditional, formal standards development process, which is based on consensus, openness, and due process. The formal standards process is represented by the yin, which has the qualities of calmness and deliberateness. On the opposite side is the consortia standards process, which is more market driven, and the principles of consensus, openness, and due process may be limited or all together ignored. Consortia standards are developed jointly by companies or organizations that have similar strategic standardization goals, and are characterized by the need to develop standards quickly enough to meet market demands or to harmonize or differentiate requirements within a specific industry. In some cases, formally chartered groups develop consortia standards. In other cases, two or more companies may informally work together towards a common standard because it meets their business goals at that time. The consortia standards process is represented by the yang, which has the qualities of strength, action, and speed.



While formal and consortia standards have co-existed for a while, some have suggested that the importance and relevancy of formal standards is waning, and that it can no longer keep pace with the rapid changes in technology, particularly in the areas of telecommunications and information technology. The argument is that the formal consensus process inherently takes too long because it must respond to a wide variety of interests, including those who are considered “non-stakeholders” in the standard. There are criticisms that standards generated by the formal consensus process are technically inferior because in order to achieve consensus, they may have to accommodate the lowest common denominator. Somewhat

contradictorily, there are also criticisms that these standards generate unrealistic requirements that focus on pedagogy and technological utopia rather than responding to “real world” market pressures.

Supporters of the formal consensus process, however, suggest that the pressure to bring products quickly to market can result in standards that may have safety, reliability, or environmental problems, which might be avoided with a wider review and more careful consideration. There is also the criticism that the consortia standards approach can result in sub-optimal standards that reflect the designs and processes of a select or influential group of producers or users rather than taking the time to evaluate what might be better solutions. And although some consortia standards have achieved the status of international *de facto* standards, there is concern that *ad hoc* approaches result in balkanized standardization rather than the single global standard desired by many producers and users.

Whether the formal standards process is superior to the consortia process or vice versa is not only a question without an answer, it is the wrong question. Either side can cite examples to illustrate why their process is best. Either side can cite examples of each other’s shortcomings. What would be more productive is to identify those situations where business, technological, and public interests would be better served by one process or the other, and perhaps more importantly, to identify ways in which these different standards development processes might complement each other.

### **Look Before You Leap**

There are some situations that demand careful, widespread consideration where only formal consensus standards will do. For example, only formal standards would be considered for use in government regulations because they are developed following the principles of consensus, due process, and balance between producers, industrial users, and public consumers. The goal for regulatory standards is fairness and trying to represent the public interest rather than market considerations. While some consortia standards may have degrees of consensus and due process, they would rarely, if ever, satisfy the criteria for balance demanded by regulatory agencies. This is not to say that regulatory agencies are not concerned with the speed at which standards are developed. They are. Public safety, for instance, demands that standards be available as soon as possible. But regulatory agencies must also balance speed with costs to industry and the consumer, trade impact, social implications, and political backlash.

While much press play is given to government regulations, the government actually prefers not to issue regulatory standards. Regulatory standards only become necessary in the absence of formal consensus standards that are voluntarily adhered to by industry. For example, the Consumer Product Safety Commission has issued fewer than 50 mandatory regulatory standards. But there have been over 300 product safety situations where industry preempted the need for a mandatory federal standard by

working together to develop a formal consensus standard, and then, voluntarily enforcing the standard within the industry. Drawstrings on children's clothing, window pull cords, five-gallon plastic containers, hair dryers, and bicycles are just a few areas where this has happened. But once again, it needs to be emphasized that a consortia standard with limited participation and balance would not preempt a regulatory standard, since it would be viewed as reflecting only the self-serving interests of the producers of the standard.

Product liability is another area where only formal consensus standards will satisfy the need in industry. Directly or indirectly, the existence or absence of formal standards becomes an issue in every product liability case involving alleged design defects. Except for those cases where a manufacturer failed to comply with the formal standard, a defending manufacturer is better off when there is a formal standard than if there is no standard or only a consortia standard. Most design defect cases come down to whether a jury believes the experts of the defendant or the plaintiff. A formal standard provides judges and juries with an impartial yardstick against which to measure safe and adequate product design. Manufacturers argue that their compliance with a formal standard demonstrates that they acted reasonably and responsibly. An important aspect when citing standards in product liability cases is the process used to create the standards. Formal standards created under conditions of fairness, balance, consensus, and due process carry considerable positive weight for the defense. Consortia standards can actually create a negative impression if the plaintiff paints a picture of a company more interested in having a standard designed to capture market shares than a standard based on consumer safety and product quality. While formal standards do not guarantee victory in product liability cases, it is common for an industry to initiate formal standards development when they deem the liability risks unacceptably high. For example, earlier this year, liability lawsuits involving fires produced from glass candle holder breakage motivated candle manufacturers and glass companies to join with consumer groups on the ASTM Committee F-15 on Consumer Products to begin development of labeling and performance standards for glass candle holders.

### **Haste Makes Waste**

Sometimes trying to develop a standard too quickly or prematurely can be costly and wasteful. There is certainly a high price to be paid for those companies that align themselves with the losing standard or for consumers who purchase products to short-lived standards. Any company or consumer who thought that Betamax would triumph over VHS as the *de facto* standard for videocassette recorders can attest to this.

Sometimes the effort to develop a consortia standard quickly, but without adequate input from prospective users, can have the unintended consequence of slowing down standardization. In May 1997,

after two years of work, Visa and MasterCard issued Version 1.0 of their SET standard, which was to create secure Internet transaction protocols to prevent credit card fraud. They predicted that SET would become the *de facto* standard for Internet transactions in the United States (U.S.) by mid-1998. As of today, SET has very little usage in the U.S. even though it has the support of the largest credit card companies. Everyone has a theory on why the SET standard failed to catch on. Some critics say it is too cumbersome and complicated for Internet customers. Some say there are too many other competing Internet security systems. Some say that Visa and MasterCard should have also involved the other major credit card companies. Some blame a lack of marketing. While it would seem that having common security protocols for Internet transactions would be a high priority for credit card companies, banks, Internet vendors, and Internet buyers, there is still no universal standard. The formal standards process is criticized for taking too long, but it does have the virtue of trying to bring all of the common stakeholders together to develop mutually satisfactory solutions. And given that at least four years have elapsed without the emergence of a dominant standard for secure Internet transactions, it is difficult to imagine that speed is really an issue here.

There is also the situation where a project is so large and the financial risks so high that manufacturers and users are unwilling to make major capital commitments until an accepted body of formal standards are in place. Such is the case with the Intelligent Transportation System (ITS) effort. ITS is an ambitious program that seeks to build a U.S.-wide intelligent information infrastructure to reduce traffic congestion, save energy, reduce transportation costs, and improve safety by integrating information on traffic signal control, freeway management, transit management, accident management, electronic toll collection, railroad crossings, emergency services, and traveler information. Standards will be the key to the future success of ITS since there must be a body of uniform standards that will:

- define the interoperability requirements among many different systems to allow for the transparent exchange of information across the U.S.;
- allow equipment from different manufacturers that perform the same function to be interchangeable;
- ensure equipment compatibility so devices from one system do not interfere with devices of another system;
- promote the rapid development of new technologies; and
- allow for systems to be upgraded easily and economically as new features and capabilities become available.

Because the stakes are so high and the tasks so complex in the ITS effort, the U.S. Department of Transportation is sponsoring the ITS National Architecture Project to identify where standards are

needed. Nearly a dozen formal standards organizations will be involved in developing the standards. While timeliness is important, it is even more important that a deliberative, consensus process be used to ensure understanding, input, and acceptance from the many different stakeholders.

### **He Who Hesitates Is Lost**

While rushing to develop or adopt the “wrong” standard can be disastrous for a business, taking the time to develop the “right” consensus standard can leave a company eating its competition’s dust. Historically, formal standards developing organizations have excelled at rationalizing differences in materials, products, and technologies that changed slowly or in a predictable manner. Today, standards development processes must be more agile to respond to technologies that are in a state of flux. Standards must be able to guide the emergence of new technologies. This is especially true in the electronics area where most of the consortia standards groups can be found.

Even if a formal standards group manages to establish “the standard,” individual companies or consortia may try to preempt the formal standard with their own standard. For example, the International Standards Organization issued the Open Systems Interconnection (OSI) reference model, which was to be the ultimate compatibility standard for computer systems. OSI, however, turned out to be a pedagogical standard that was too cumbersome and expensive to implement, and was generally supplanted by the market-generated Transmission Control Protocol/Internet Protocol (TCP/IP).

Another example of the marketplace showing it has a mind of its own when it comes to standards is in the selection of a digital standard for airwave transmissions for cellular phones. After many years of effort, the Electronic Industries Alliance appeared to have united U.S. industry behind one standard called time division multiple access (TDMA). But in the electronics arena especially, no standard is safe, and several major U.S. companies defected to an informal consortia standard called code division multiple access (CDMA). To add to the mix, the Europeans took advantage of the division in the U.S. and unified behind a *de facto* standard called global system for mobile (GSM) communication. All of this competition between different standards and technologies resulted in incompatible mobile phone digital formats, which sometimes presented a problem to consumers who wanted to use their cellular phone while traveling. Ironically, standards created a lack of standardization. As the old joke goes, “Standards are everywhere, but not always the same ones.” Happily, the cellular phone standards war may be coming to an end since earlier this year, the Universal Wireless Communication Consortium, which supports TDMA, signed an agreement with the North American GSM

Alliance to make TDMA and GSM systems interoperable. But in the fast-changing world of electronics, another competing consortia standard could be looming just around the corner.

### **Too Many Cooks Spoil the Broth**

Ironically, the strength of the formal standards process – that is, its diversity of participation – is also its weakness. If producers, users, and other stakeholders all share the same vision and need for a standard, then it is possible to issue a formal standard relatively quickly. There are plenty of examples of formal standards that have been developed and issued in less than a year, and such speed certainly rivals that of most consortia standards setting organizations. In addition, most formal standards setting organizations have provisions for quickly issuing interim standards when it can be demonstrated there is an urgent need and time is of the essence. Typically, these interim standards have a finite life span, but they do serve the purpose until a final formal standard can be approved.

The problem with the formal standards process occurs when there is no motivation to have a common standard, or worse yet, if major stakeholders have self-interest reasons to oppose any type of standard. There are at least three scenarios where self-interests make it difficult or impossible to have a formal standard. In these situations, consortia standards are better suited to fill the void.

The first scenario involves a situation where one group of stakeholders wants a standard, but a different group of stakeholders opposes any type of standards. For example, a group of users may strongly support the development of standards to establish a minimum baseline for quality, reliability, performance, and common test methods. But some producers may oppose the user standards, especially if their products do not meet the proposed standards or if the creation of formal standards would threaten their market shares. In such situations, producers use the consensus and due process procedures of formal standards setting organizations to ensure that standards are not approved. If enough users feel frustrated by producer objections to develop what the users perceive as “good” standards, and if there is sufficient common need on the part of users, they will come together to form their own consortium.

The second scenario where consortia standards seem to be the only option is when a group of stakeholders have such widely divergent preferences that approval of a formal industry-wide standard would be unlikely. For example, the Open Group Consortium wants to develop standards to enable anyone to access any information to which they are entitled from anywhere at anytime. They want new software and hardware applications to be capable of being integrated as easily as connecting a telephone. The Open Group consists of Compaq, Fujitsu, Hewlett-Packard, Hitachi, IBM, NCR, Siemens, and Sun Microsystems. Notably absent from this group is Microsoft, and therein lies at least one major obstacle to formal standards in this area. The Open Group, as its name suggests, wants to promote open software standards. Microsoft considers itself to be the *de facto* global standard (as do many others), and that is a

status it wants to protect. While it is only a hypothetical question, “Do you think that Microsoft and its supporters would oppose the development of open system standards under the formal standards development process?”

The third scenario, which prompts the development of consortia standards rather than formal standards, is more of a nuisance than a showstopper, and that is the involvement of non-stakeholders as voting members in the formal standards process. Non-stakeholders are individuals who will not be materially affected by a standard, and represent themselves rather than a company or organization. While such individuals may offer a wealth of experience and knowledge, they sometimes assume a “purist” position that is out of step with the economic, technical, social, and legal realities that users, producers, and other stakeholders will face once a standard is approved. Some formal standards developing organizations already have procedures that limit non-stakeholders participation in standards development by allowing them to contribute as advisors but not voting members. But many of the largest formal standards developing organizations have individual memberships rather than organizational memberships, and as long as you pay your membership dues, stakeholders and non-stakeholders all have equal voting privileges. While non-stakeholders rarely, if ever, stop a formal standard, they can delay it for a long time through negative votes and parliamentary appeals. In general, consortia groups do not face such frustrating delays because participation and votes is not by individuals but by companies or organizations.

### **Two Heads Are Better Than One**

While most formal and consortia standards groups appear to either compete, coexist, or ignore each other, there are a few who have forged a symbiotic relationship that takes advantage of each other’s strengths. The cooperation between the United States Council for Automotive Research (USCAR) and the Society for Automotive Engineers (SAE) is an example of such a successful relationship.

The USCAR consortia was formed in 1992 by Chrysler, Ford, and General Motors to work together to address common technological problems and opportunities. Shared standards were one of the outcomes from this joint effort. These standards were developed comparatively fast since consensus was only needed among the big three U.S. automotive manufacturers. The benefits from this pooling of resources was soon evident. USCAR’s partnership on electrical wiring components reduced the number of cigarette lighter designs from 30 to 4, which improved the quality of the lighter and reduced the cost of design, testing, manufacturing, assembly, and supply. Similar efforts are underway to achieve the same types of results for tire jacks, fasteners, belts, fuel filters, light bulbs, gas caps, and any other common part that is not a market discriminator in influencing sales.

Given USCAR's early success and aggressive agenda, some pondered SAE's future role as the preeminent developer of automotive standards in the U.S. But what happened was not a fierce competition, but joint cooperation. USCAR recognized that while their consortia process could generate standards quickly, the standards did not necessarily enjoy recognition and usage outside of the big three U.S. auto manufacturers. With the globalization of markets and suppliers, international recognition and use of the USCAR standards was important. SAE had both the reputation and experience needed to market the USCAR standards to a much wider audience.

A partnership was born when SAE's Cooperative Research Program agreed to provide USCAR's Strategic Standardization Board with document facilitation services, which included services to transform USCAR consortium standards into formal SAE standards. The result is that consortia standards, which initially had limited exposure, are now becoming the global standard. For example, SAE adoption of a battery abuse-testing standard originally developed by USCAR's Advanced Battery Consortium has generated overseas interest, and the Europeans and Japanese are using the SAE standard as guidelines for their own national standards, resulting in a harmonized *de facto* global standard. USCAR's horn connector standard is being considered for adoption as a SAE standard. The result is participation by five of the world's leading horn suppliers – FIAMM, Bosch, Denso, Hella, and FER – in the development of a standard that will have worldwide acceptance.

A few other formal standards developing organizations appear to be following the SAE lead. For example, the Institute of Electrical and Electronics Engineers (IEEE) established the IEEE Industry Standards and Technology Organization (ISTO) in January 1999 as an independent, not-for-profit corporation to help consortia and other special interest groups to develop IEEE standards rapidly. IEEE offers consortia groups many benefits, including world-wide use and recognition of standards bearing the IEEE label, publication and document management, administrative support for meetings and conferences, on-line services, and marketing. In February 1999, the Medical Device Communication Industry Group (MDCIG) became the first program to operate under the IEEE ISTO. The MDCIG's goals are to accelerate the development process for the IEEE 1073 series of standards for medical device communications, and then foster the use of these standards in the health provider and medical device manufacturer communities.

### **We Need to Speed the Need**

While the need to protect public interests is often more important than speed, this does not mean that the pace of the current formal standards development process is acceptable. In 1991, the National Institute of Standards and Technology (NIST) publication *Standards Activities of Organizations in the United States* only briefly acknowledged the existence of consortia standards organizations and did not



provide any data about them. By 1996, this same NIST publication contained substantial information on consortia groups and their standards, noting that there were now 150 informal standards developers who had produced around 2000 standards. The number of consortia standards organizations has grown dramatically in recent years largely in response to a formal process that many companies perceive as being too slow. This is a trend that has caused some formal standards developing organizations to change their processes, but more needs to be done. As a minimum every formal standards developing organization should consider:

- Better use of current information technology tools to conduct electronic document development, coordination, and resolution of comments, and hold virtual meetings. We are rapidly approaching a point where a computer and an email address will be considered as necessary as a telephone. While requiring all committee members to have a computer and email address may prevent some people from participating, such a requirement can hardly be considered a barrier to participation and is one of the keys to speeding up the document development process.
- Restructuring the voting process to ensure that only valid stakeholders are permitted to approve standards and developing a process to address quickly and fairly situations where participation by stakeholders appears to be for the purpose of blocking standards development. While formal standards developing organizations must take care to ensure balance, consensus, fairness, and due process, if they cannot solve the dilemma of negative or non-value added participation, the approval process will continue to be slow or impossible for certain committees.
- Providing professional draft development services. One of the most difficult and time-consuming tasks is developing the first draft for committee members to consider. While committee volunteers may have the interest in a standard, they may not have the time or the technical writing skills to develop it in a timely manner.
- Strategic planning to identify those standards that are most important to industry, the public, and government, and therefore, need to be placed on a faster track. NIST reports in their *Standards Activities of Organizations in the United States* that 80 percent of the orders for individual formal standards are for just 15-20 percent of the total number published. Many standards are no longer used because they are obsolete, but there are also many that have rarely been used because their development was driven more by individual desires than organizational needs.

## **Dynamic Balance**

True to the principles of yin and yang, standards users and developers need both the more deliberative and balanced processes of the traditional standards developing organizations and the faster processes of consortia standards groups. The opposing processes complement each other in many ways and serve diverse purposes. They also challenge each other to do better. There are occasions when market demands require for a standard to be developed more quickly than the traditional processes typically allow. At the same time, there are occasions when the public needs or high market risks associated with choosing the wrong standard require a more deliberative process that engages as many stakeholders and experts as possible. The yin and yang symbolize the dynamic balance in the world, including the standards world. As stated in the ancient *Tao Te Ching*:

**“All life embodies the yin  
And embraces yang,  
Through their union  
Achieving harmony”**

Despite the many changes that have occurred in recent years, there is still balance between the contemplative yin (the formal standards process) and the dynamic yang (the consortia standards development process). There is and will probably always be a need for the formal standards process. But unless more can be done to expedite the formal standards development process, the union and harmony between the standards yin and yang will likely not last.