What Price Speed?

By Albert L. Batik

It is well established that speed costs. A jet flight costs more than a bus trip. A racing car costs more than the family van. A hasty decision can have untold costs. For example, in the panic that seized the nation after it was found that asbestos contributed to lung cancer, the U.S. Environmental Protection Agency (EPA) quickly established a standard (regulation) that asbestos used in fireproofing buildings was to be removed. It is now known, after the expenditure of over 20 billion dollars, *in-situ* stabilization would have been less hazardous, and far less costly.

This is not to say there are times when speed is not essential. Treatment of cardiac arrest, response to fires, and defense against incoming bombers should not be delayed. Even in the field of standards, there are times when speed is critical. In the early 1970s, the Arab oil embargo against the United States created a shortage of gasoline. One way to ease the shortage was the reformation of the octane content of gasoline. What was needed was a revised standard method of testing for octane content. The willing parties to such a revised test method were the petroleum companies, the auto manufacturers, and state and federal authorities. A new standard was developed, written, published, and on the market in 87 days. What determined speed? Need.

Every good journalist is taught that a news story must answer at least three of the following six questions: Who, what, why, where, when, and how. When a standard is to be prepared, in one way or another, all six must be answered. The first question, and the most important one, is “Who needs the standard?” If it will be used only within one-company, let that company prepare it. If this standard is needed within only one industry, without impact outside the industry, or if this standard will affect one industry and only a select few others, the “who” in this case will to a great extent determine the “how.”

For example, the American Petroleum Institute (API) publishes standards. Some of these have widespread applications, but others have no impact outside the petroleum industry. Thus, there are some API standards that are of use to petroleum producers and no one else. These are trade association standards, and may not be full-consensus standards. The speed with which they are produced is dictated by the need within the industry.

By far, the largest group of standards are those that serve both the industry that produces the product in question and its users. In general, these are full-consensus standards because both producer and user must agree on the content. If they do not, there is no purpose to the standard. It is not always necessary that a full-consensus standard start within the scope of a standards development organization. An example will make this clear. When compact disks were first developed, there were four key players. There were those that owned the technology to produce the disks – Phillips and Sony. There were those who wanted to use the new medium – IBM, and, there were those who could mate the technology with reality – Microsoft. Moving swiftly, these prime movers held a conference in the mountains of California and produced what became known as High Sierra Standards for Compact Disks Read Only Memory (CD-ROM). These were consortium standards. It then became evident, that to be even more widely accepted, they needed the imprint of a Standards Development Organization (SDO). Thus the CD-ROM standard became ISO 9660.

One problem with consortium standards is that these may never became full-consensus standards because they were developed without a rigid approval process. In other words, some directly- or materially-affected parties may have been excluded from the process and there was no allowance for negative votes. While the standard may, or may not, be technically valid, the lack of due process puts a blemish on commercial application of the standard. In more than a number of cases, this has lead to both civil and criminal litigation. To avoid this, the full-consensus, voluntary consensus standards have been significantly better in this regard. Over more than 100 years, and with more than 40,000 voluntary consensus standards published, there have been fewer than nine instances where such standards have been challenged in the courts.

As one can see, the key element in the preparation of a standard is "who?" They in turn will dictate "what" is needed. Is a test method needed? Is a specification needed? Or shall it be a design criteria that is called for? At this point a selection must be made as to "where" the standard is to be prepared.

This question is not as easily determined as is may it sound. There are over 572 standards development organizations in the United States alone. Some have very defined objectives. Others cover widely differing areas of concern. In theory, the American National Standards Institute (ANSI) has the authority to assign the proper organization that will generate a standard. Practice is another matter. Those who need a standard either will turn to a familiar trade, professional, or standards-producing body to help generate a needed standard, or will take it upon themselves to generate a standard.

There are three reasons that there are now frequent instances where a standard is produced outside the normal standards development organizations. The first is ignorance. Since the topic of standards is no longer on the curriculum of engineering schools, there exists a large body of professionals who have no idea who generates standards. Nor do they know how they are generated. It may seem strange, but they may not even know where to obtain a standard, or even know that one exists. More is the pity.

The second reason is that there is a perception that to produce a standard within the standards development organizations is time consuming. If a standard is needed, it is needed right now, if not sooner. The fact that this perception is wrong has no bearing on the situation, since we now live in an instant gratification society.

The last reason is the most pernicious of them all. It is often stated that standards developed within the SDO process cost too much. The argument states that a few knowledgeable people, working on the Internet, can produce a workable standard that can then be freely disseminated on the same network. The argument continues that to go to meetings costs time and thousands of dollars and the final printed version may cost up to several hundred dollars. This specious argument is, more often than not, put forward by those in academia or those with no prior experience in preparing a standard. The root of their argument is that their way is faster and cheaper. Studies have shown that academia as users of standards constitute less than 0.04% of the marketplace. Thus, we have a case of a hair on the tail of the Great Dane wagging the dog.

The vast majority of standards are used in industry, commerce, and government. Yes, there is need to prepare standards, with all good haste, but not at the risk that the standard will not be useful to most, if not all, of the parties concerned. The investment made by business and government in standards, including the cost of buying the final document, is a mere fraction of the value of the products tested, designed, sold, and used according to the standards that cover them. This applies to service, safety, and standards used in communications and electronic transfer of information, as well as standards applied to tangible things. In a study conducted by ANSI, it was estimated that industry and government have over the years invested more than 70 billion dollars in standards-related activities. This investment in standards was not for philanthropic reasons. It was done because the value of the trade covered by the standards far exceeded the investment. As shown earlier, when speed is needed, the standards developing bodies can accommodate that need.

It has been demonstrated earlier in this paper that a standard can be prepared in a very short time. However, the standard in question preexisted and was modified by a preexisting committee. What then of a situation where no standard exists and the starting point is ground zero? Huge databases exist in electronic format listing corporations and government agencies active in a particular field, and the products and services within a particular field. Equally available are lists of trade associations and standards development organizations along with their particular interests. When it appears that a standard is needed, it is a relatively easy task to post a notice in a chat-room or send notices to various parties known to have an interest in a particular topic at hand. Alternatively, since most databases include names of individuals and their e-mail addresses, in a matter of moments all concerned parties can be notified and polled as to their interest in developing standards. While this procedure is not widely used at the moment, some SDOs have the capability at the present.

Based on the interest shown, a network committee can be formed. This committee, in turn, can select a standards development organization to interest them in their project and determine when and where an initial meeting is to be held. The facilities to do this exist now. The choice to use electronic means only and to avoid a face-to-face meeting rests with those needing the standard and with the organization with which they are working.

Be that as it may, certain standards can be developed more rapidly than others. There are many kinds of standards, but more than 90% fall into four main kinds. These are design criteria, dimensional, specifications, and test methods. The dimensional standards generally take the least time to develop. Design criteria and specifications will take longer, because the commercial interests are not always identical from one organization to the next and there will be much debate as to which set of criteria is best suited for standardization. By far, the most time consuming is developing a standard test method. The reason for this is, that to have an accurate test method, it must be used in a series of round-robin tests to ensure reproducibility. More often than not, several iterations may be needed before a workable test method can be agreed upon. In essence, speed is determined by need and the difficulty in reaching an agreement.

What is the role of standards developing organizations? To the uneducated, it is the belief that the organizations with their own staff prepare standards. With the exception of Underwriters Laboratories, and a few others, this is not the case. Rather, the role of the SDO is to manage the process. What exactly does that mean? It means that the organization will make every effort to see that every voice is heard and that there will exist a due process procedure allowing for all to intervene at any time during the rigorous approval cycle. This openness is one reason that the standards development organizations have stood the test of time. Interestingly, in one case that was tried in a Federal Court in the mid 1960s, the court found for ASTM and considered their operations “in the public good.”

It may be, in a certain case, that the pace of development is slowed by the established procedures. However, in exchange, market-relevant, technically acceptable documents are produced. At this time all standards developers are not able to provide their committees with full service interactive electronic service. Be that as it may, the trend has been set. It is just a matter time before the technical committees will have their web sites, electronic rules and regulations, electronic formats, access to databases needed to prepare standards, directories of acceptable terms of definition, electronic commenting sites, and standards balloting procedures. But, and this is a big but, such electronic software costs money. To gain the speed of light both developers and users will have to find ways to set up these systems. Speed costs. Such systems will have many attributes, including, but not limited to, access to comments, summarization of multiple comments, built-in editorial systems including graphics, ability to download for additional study, and lastly a security system to prevent unauthorized tampering of a document in progress.

Such systems will have an additional advantage. The system will allow world-wide review of work-in-progress. Thus, in the process of developing a domestic standard, the possibility exists for the same document to become internationally accepted without intercontinental travel. Not only will this speed the process of standards development, but because of the huge savings in travel and associated costs, more smaller organizations may be able to participate, ensuring harmonization of domestic and international standards. Thus wider participation both here and abroad will stimulate world-wide trade.

Already most domestic and some foreign and international standards are available to users in a few moments either from standards developers or from central distributors that provide these documents via facsimilie, in exchange for credit cards, open accounts, or subscriptions. Distribution of standards now is available in almost every media, including paper, CD-ROM, standards online, standards on local area networks, standards downloaded on demand, and automated updating systems. Not all standards developers have all these options. Those who do not or cannot afford the expense of setting up these systems increasingly are being served by third party distributors who pay royalty to the originating body.

The biggest deterrent to speed in developing standards, obtaining standards, and using standards is ignorance. In the mid-1960s, collegiate level instruction concerning standards stopped. The void eventually created very serious problems. First, fewer engineers and other technical personnel had any information or understanding about standards. This has led to delays in forming new standards committees and preparation of new and revised standards in existing committees. Worst of all, it had led to an unacceptable level of catastrophic failures because practitioners have pushed far beyond acceptable limits without realizing that available standards could have helped.

A number of attempts to bring standards back into curricula, for the most part, have failed. However, to their credit, a number of standards developers took it upon themselves to provide, in part, some education in the field. Among these are ASME, IEEE, ISA, SES, and ASTM. All have a variety of training courses. This training covers such things as standards development, standards program management, technical and professional training in the application and use of standards, laboratory proficiency training and also certification of quality systems, personnel, and products.

In the past few months, there has been a giant step forward with the establishment of the Center for Global Standards Analysis housed at Catholic University in Washington, D.C. This center hopes to develop programs that within a few years will reintroduce engineering standards into engineering curricula. If successful, this program will significantly increase the speed with which standards can be developed, because there will be an increased body of trained personnel to do the work, and also to use the results.

The ultimate in speed will come with the advent of transparent or invisible standards. These will be robotic-driven and computer transported. An example will make this clear: at the present time, an auto factory can produce 100% more cars with 40% less personnel and with 25% less imperfections than was possible about a decade ago. This is done by using computer driven robots.

Now, look at the standards field. At the present time, universal testing machines, chromatographs, spectrometers, and a host of other testing and analysis instruments are automated to the point they can run all day and all night and test or analyze samples without human intervention. The results then are compared by a technician against the appropriate test method. But why stop there? Why not imbed in a micro-chip the standard test method, with all appropriate precision and accuracy standards, as well as, bias standards? The testing will then automatically reject non-conformance without human review.

Computer assisted design is in its infancy. It still requires an engineer to create the product at hand using the computer to do the routine calculations and drafting. What if the dimensional standards and the materials standards were previously encoded in a micro-chip and included in the computer and linked to a robotic testing machine. All that would be needed would be for the engineer to enter the design parameters. The automatic testing would select the appropriate material that would be designed into the product by an automated computer driven design instrument. But, the chain continues. By adding cost and catalog data in digital form, the design instrument could select the vendor, quantity of material and parts needed, and order on-line.

Just-in-time delivery to robots would speed manufacture or construction, since these machines would have previously been informed electronically of what was coming, and what was to be done. Based on results in the market place, the failure of certain materials or products, revisions to existing test methods, specifications, quality and certification standards could be brought up-todate automatically with only an overview program to ensure that a single party or consortium did not bias the system in favor of one company or group. From start to finish, from the first draft of a standard to the product coming off the line, working 24 hours a day, 7 days a week, could reduce the effort to one month. Talk about high speed. The cost would be high unemployment.

Speed for the sake of speed is mindless. Any standard developed in haste may do more damage than none at all. Above all, a standard must meet the requirements of the market, in substance, quality, and acceptability. To do otherwise, has proven significantly more expensive than a standard developed with due process and accountability.

The future beckons. Before we know it, it will be 2001. "Hal," said the engineer, "You don't understand. It requires human to develop, publish, and use standards." "That's what you think," responded Hal.

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