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STANDARDS FACE THE 80s

by

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This was the keynote speech given at the 32nd annual SES conference. The speech noted that the top issue for the U.S. in the 80s will be our competitiveness in world markets. Unlike other countries, the U.S. is playing in two superbowls at once -- the defense of the free world and economic competition. To compete and win, we will need excellence in design and manufacturing and "world class" quality will require "world class standards." The speech further discussed changes required to our present standards' organizations and processes to bring this about.

INTRODUCTION

Thank you for the opportunity to share some thoughts of mine concerning the competitive challenge to the United States for the future and some indications of the vital role of standards in meeting this challenge.

CHALLENGE

The Standards Engineering Society and other U.S. standards organizations do have new challenges for the 1980s and beyond. This relates to the environment in which the United States now finds itself.

This environment might be characterized as playing in two Superbowls at the same time. One is the Defense Superbowl with the Russians and the other is the Commercial Superbowl with Japan. Unlike Russia, who does not have to worry about the Consumer Superbowl, or Japan, who does not have to worry about the Defense Superbowl -- we have to concentrate on both. The challenge for the United States is to be competitors in both of these. Failure in one bowl will lead to failure in the other. This is a matter of great concern for the American people, and meeting the challenge is important to the future of our country.

CONCERNS OF THE PEOPLE

A cue to this concern can be found in the popular music of today. This year on the Academy of Country Music Awards, the song that received the award for the top hit of the year was a song that was sung by Merle Haggard. It goes something like this:

> "I wish a buck was still silver, back when the country was strong, back before Elvis and the Vietnam War came along, back before the Beatles and yesterday when a man could still work, would still work. Are we heading downhill like a snowball headed for hell with no kind of hope for the Flag and the Liberty Bell?

Wish a Ford and Chevy would last ten years like they should. Is the best of the free life behind us now, are the good times really over for good?"

Another country singing group, the Oakridge Boys, have a hit record called, "American Made." But the words talk about foreign made. They say, "Everything I buy these days has a foreign name, from the kind of car I drive, to my video game, my Nikon camera, and a Sony television."

This concern regarding the effects of foreign competition extends beyond country music. There is a song by Billy Joel called, "Allentown." It talks about the problems in our "smokestack industries" and the lament of youth for jobs. It begins, "Here I am in Allentown, and all the factories are closing down. Over in Bethlehem, they are spending time standing in line, filling out forms." Further along in the song, it talks about the frustration of youth. "Here I am waiting in Allentown for the Pennsylvania I never found. Our teachers promised us that if we studied hard and behaved, we'd get ahead. But here I am with a diploma on the wall and I am still waiting."

INTERNATIONAL COMPETITION:

These songs are examples of problems concerning the American public today. The 1980s are going to be a time of tremendous transition. Every country in the world today wants to be an exporter and be a leader in international competition. In the past, we could rely on our own large home marketplace to buy most of our goods. The rest we could sell overseas. But, today, even third-world countries have access to modern manufacturing and technology and they want to be exporters, too. Approximately 70 percent of United States made products now have a foreign competitor. The United States will not be able to compete unless our products have more to offer. We can compete if we have superior excellence in products and technology and world-class quality. Many define quality as conformance to standards. We will need world-class standards to produce world-class quality.

A popular book on the market today is entitled, "Megatrends." The author predicts that by the year 2000, the United States will transform from manufacturing and become a service economy because of the loss of our ability to compete in manufacturing. Quite frankly, if this were to happen, the Defense Department would be in serious trouble. We need a strong industrial base to produce products for our national defense. We cannot let manufacturing go down the drain in this country. I am confident that the country is not going to let that happen. Instead, we are going to use the new technology to be competitive.

THE YEAR 2000

This drive to be competitive will fuel the drive to increase the use of computers which will result in a tremendous exponential growth in their use during the 1980s and 90s. Robotics will modernize factories so they can be efficient. We will also see significant changes in other technologies such as the use of new materials. A representative sample of changes, the experts say we will find by the year 2000, is as follows:

- Computer applications will make possible the unmanned factory. This will create a significant change in societies' employment mix. The individuals remaining in manufacturing will be primarily top managers, engineers, and skilled maintenance personnel.

- The staff engineer will design and instruct the manufacture of products from his graphic workstation including analysis, scheduling, robot handling instructions, process planning, NC machining, inspection, simulation, etc....and therefore becomes line management. The line manager now monitors the manufacturing environment for unexpected problems and becomes functionally staff.

- Management will recognize the importance of data. Common integrated data bases will be developed for all data including engineering, finance, manufacturing, and marketing. The security and design of this data base will be a very high priority issue.

- The telephone, calculator, CRT, typewriter, and TV will be combined into one piece of equipment...A management workstation. It will be less expensive than the other devices but far more powerful. Key employees will also have these workstations in their homes and attendance at the office will be optional.

- The time between event and reaction will be reduced to perhaps nanoseconds. Use of on-line systems, personal workstations, direct numerical control, programmable controllers, data collection devices, fiber optics and intuitive software will reduce the time between problem and corrective action to approaching zero most of the time.

- It will be as easy and as cheap to make one as one hundred. Numerical control will eliminate the need for set-ups, tooling, etc. Generative process planning will know the easiest, least costly, fastest manufacturing steps. Modeling software will exist to allow the complete simulation of the manufacturing process. Scrap and rework will become a rare event.

- Real time inprocess control and inspection utilizing laser or vision systems, image enhancement and signal/sensor processing will automate and improve inspection systems. Part traceability will be easy as equipment is automatically adjusted and scrap parts become the rare exception.

- Improved relationships between vendor and buyer will be established. Lessons learned from the Japanese as well as better scheduling and communication tools will create close integrated working relationships. Orders and part design (CAD) will be transmitted from buyer to vendor.

- Effective use of flexible systems will also require companies to master group technology: techniques for identifying parts that can be made by similar processes, and developing processes that can manufacture similar parts. These systems list all the parts made by a company, encoded by their shapes, materials, and production techniques. Such systems allow quick identification of parts families that could be produced by a flexible system. By allowing a designer to quickly find a similar part that can be modified rather than design a new part from scratch, these systems prevent a duplication of effort.

WORLD CLASS STANDARDS

The new technology will require an expanding baseline of dynamic standards--particularly software standards, standards for interconnections of computer-aided manufacturing systems, design standards for use in CAD/CAM, and many others. Standards groups need to meet this challenge. Technology will move so fast during the 1980s, and 1990s, that we can no longer take several years to publish standards. If

we expect standards covering high technology to be effective, they will have to be developed quickly. I am thinking in terms of months, instead of years. Standards that take years to develop will be covering obsolete technology. The United States cannot be a global competitor with obsolete technology. But we can compete with high technology and quality.

COMPUTER NETWORKS

How can we produce these standards quickly? One way may be to begin using Computer-Networking. Instead of being paced by the scheduling of formal face-to-face meetings, we can use the power of electronic means to improve the productivity of coordination by providing for a process where a continuous dialogue can take place. Last week, I participated in the White House Conference on Productivity. In preparing for that conference, we had 175 people that conferred daily through computers and developed reports for use at the White House Conference. At times, I personally communicated with several people in different cities between 8:00 and 10:30 pm. We could never have accomplished this degree of communications through formal meetings.

Computer-Networking technology is available and affordable. It could be used today in improving the standards coordination process. This process might begin with an initial face-to-face organizational meeting. This meeting would allow participants to meet each other and provide an opportunity to define parameters for the standard under consideration. Thereafter, the conversation could continue by computer-conference. The staff of standards organizations could serve as moderators to focus the guidance received from the volunteering experts, compile the information, send it around the country by computer, encourage people to interact, and get the standards approved. One formal meeting at the final stage may be needed if there are some real problems that remain unresolved.

DYNAMIC STANDARDS

Once approved, these standards have to be dynamic so that they can be changed quickly. A problem we have today is the tendency to strive for perfection in standards before their release because it may be a long time before the standard is revised. If we can revise standards quickly, we can afford to wait for the next revision to introduce the latest change.

STANDARDS "ON-LINE"

Another impact of the computer on standards is the expanding use of computer data banks in lieu of the "hard copy." I can foresee standards organizations having a computer bank of all standards. If you want to review the latest version of these standards, you use your computer terminal. Possibly, you would pay a fee to be hooked into the data bank, instead of buying hard copies. You could also determine the status of any revisions or progress in developing new standards.

EFFICIENT USE OF ENGINEERS

Some lament the fact that Japan graduates more engineers than we do even though they have a much smaller population. I suggest that the problem is not the number of engineers a country has, but rather it is the efficiency of their use. There are many ways we can improve the efficiency of American engineers. For example, we can give them computers (CAD/CAM) with standards programmed in their data base.

This data base can include standard parts, standard materials, standard processes, and test methods. Every engineer in a high technology company today should have a computer terminal on his desk. There should be at least one interactive graphics terminal for every four engineers.

DOD USE OF NONGOVERNMENT STANDARDS

The DoD has supported nongovernment standards and operated under the philosophy of the OMB Circular for years. Our first standards were adopted for DoD use in the mid-1960s. We now have approximately 3200 standards, that are in the DoD Index of Specifications and Standards (DoDISS) today, approved for DoD use. It is important for efficient procurement in the DoD that we buy commercial supplies using commercial standards. It is costly for the DoD to develop military specifications for commercial products. Fortunately, we have a number of nongovernment standards organizations that do that job very efficiently.

FRAGMENTED NATIONAL STANDARDS ORGANIZATIONS

I mentioned earlier that one of the greatest challenges facing our country in the 80s will be to remain competitive in the international markets. Good standards which are free of technical barriers to trade, I believe, will play a vital role in increasing our industrial productivity and in maintaining our international competitiveness. If we examine some of the most productive and competitive nations today, like Japan and Germany, we quickly notice that they both have one common feature when it comes to standards development. They both have strong national standards organizations supported by both their governments and the private sector.

In our country, however, we're still faced with the division at the National level. The challege, to the standards community, both the developers and users, is obvious. We need to look beyond parochial interests and work out our differences so that we can provide unified support for U. S. standards of excellence.

OPTIMISTIC FUTURE

In conclusion, I refer once again to Merle Haggard. The final verse of his song gives us hope. He sings, "Stop rolling downhill like a snowball headed for hell. Let's all stand up for the Flag, let's ring the Liberty Bell. Let's build a Ford and a Chevy that will last ten years like it should. The best of the free life is yet to come, the good times ain't over for good."

PUTTING THE U.S. STANDARDS SYSTEM INTO PERSPECTIVE

by

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Abstract: This paper presents an overview of the U.S. standards system based on a survey of more than 1000 private sector organizations, as well as Federal and state agencies. Data is presented on the number of standards available; organizations that create them, and the portion that are designated American National Standards. Current status is compared to past decades. While the majority of the data is for private sector standards, information is also presented on military and other government standards. The U.S. standards system is compared with other nations. The author includes twelve observations and trends and recommends that the standardization community reemphasize the basic reasons for standardization and the benefits that can be derived.

Keywords: United States; Standards System; Overview; Government; Federal; Private; Industry; Voluntary; American National Standards

Background

When the Dayton Section started planning this 1983 conference, they had the benefit of responses to surveys made at previous conferences. From recurring requests, it was apparent the topic standards engineers wanted addressed more than any other was an overview of the U.S. standardization system. I find it significant that the people most directly involved feel their information gap is in the very system within which they operate. This, I believe, is not the fault of any organization or agency, and certainly does not reflect adversely on the standards engineers, but is an indication of the breadth, complexity and decentralization of U.S. standardization activities. My consulting work has taken me to many foreign countries or their embassies in Washington. Invariably, I am asked: how is U.S. standards activity organized? who is responsible for developing standards? why is there not one source for authoritative information on the application of standards? why is there more than one standard for many commodities? where can copies of standards be obtained in timely fashion? Foreign engineers who are used to dealing with a national standards institute, such as AFNOR, DIN, BSI, or national bureaus that provide nearly all these services, can be very critical of the U.S. system. It is my perception that many developing nations are dissuaded from applying U.S. standards because of real or anticipated problems in choosing, obtaining and applying them.

When asked to prepare this paper, I reviewed the literature, including the Proceedings of the last ten SES Conferences, magazine articles, the FTC Study and other likely sources. No one had tried to present an the overall picture. No one that I talked to wanted to take on the chore, but they all agreed it was vitally needed. So I advised the Conference Committee that I would try to put together an overview. It might not be 100 percent complete, but it would be considerably more than we have right now. Besides, it would be an overview that could be critiqued and updated by those with better information. Healthy interchange of this sort is certainly the essence of a professional society. So with hopes that this paper can be a baseline upon which others can add and improve, I have assembled a variety of facts and opinions on the U.S. standards system, with special attention to the private sector.

Some Basic Data

Current facts and figures on private sector organizations have been developed from two primary sources. The first is a contract my company has with the National Bureau of Standards to revise and update NBS Publication 417, the Directory of United States Standardization Activities. This was first published in 1941 and was last revised in 1975. It was this work by Sophie Chumas, together with the late Bill Slattery, that provided the measure that "more than 400 organizations have developed more than 20,000 standards". For the 1983 update we have contacted more than 1,000 private sector organizations; all the states and territories; and numerous Federal agencies that develop or apply standards. Late responses are still coming in. Any significant changes to the data presented here because of these late responses will be reported in the pages of Standards Engineering Magazine. Online standards databases, particularly the complete and up-to-date IHS TechNet system have been my other source of information.

Data about standards development is continually changing. Organizations disappear and new ones are founded. Standards programs are dropped and new ones are established. Sometimes we stumble across an organization which has had a very active standardization program for many years but which is known and used only within its special field. It appears that for the past 20 to 30 years, at any point in time, there have been approximately 400 private sector organizations developing standards. Figure 1 shows that these organizations together with Federal agencies have created more than 80,000 standards, specifications, codes, recommended practices, and similar documents that we classify by the generic term "standard". Compare this to 20 years ago when there were 39,500 government standards and less than 14,000 private sector standards. See Figure 2. The growth has been in the private sector, and it is increasing at an average rate of 3.5 percent per year. In other developed countries the growth rate is approximately five percent per year. The number of ISO standards has increased in the last 10 years at a rate of nearly 12 percent per year.

The U.S. standardization community that has created more than 80,000 standards is depicted in Figure 3. This chart shows the various categories of standards developers in proportion to their output. The private sector has prepared 40% of the total. A further breakdown of this sector is shown in Figure 4. In the private sector about 420 organizations are responsible for actually developing standards while 200 more work with the private sector and government in the development process. Many other organizations, of course, review standards when their interests are affected but they are not in the mainstream of

Figure 1

CURRENT U.S. STANDARDS

GOVERNMENT			
	DEFENSE	38 000	
	FEDERAL	6 000	
	OTHER	5 000	
(60%)			49 000
PRIVATE SECTOR			
	SCIENTIFIC & PROFESSIONAL	12 600	
	TRADE ASSOCIATION	11 200	
	STANDARDS WRITING	8 200	
(40%)			32 000
	TOTAL	81 000	

Figure 2

U.S. STANDARDS GROWTH 1964 - 1983

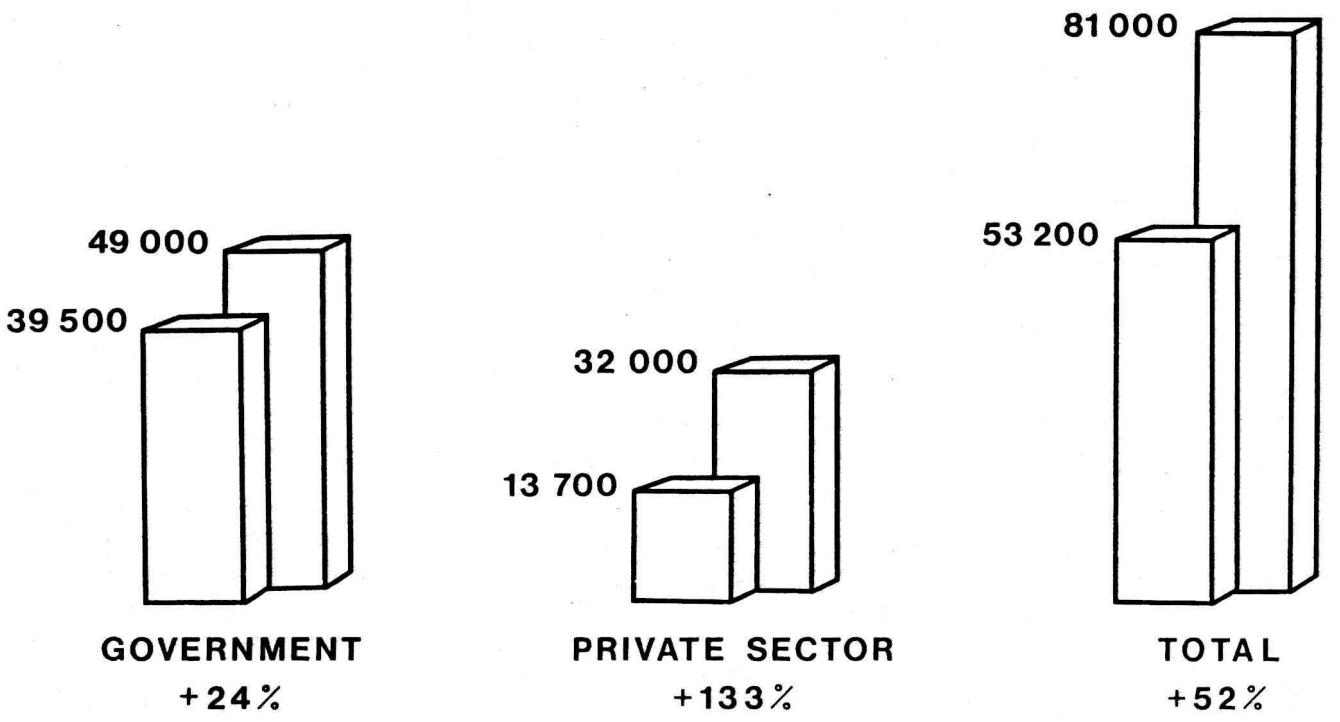


Figure 3

U.S. STANDARDS DEVELOPERS

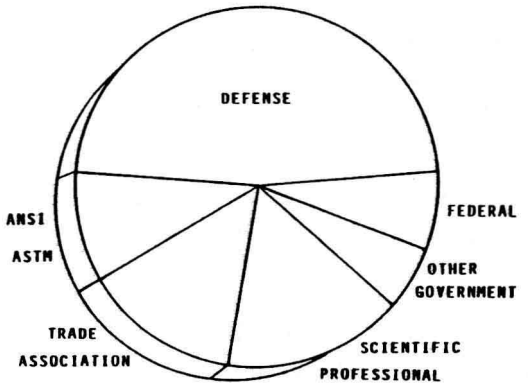


Figure 4

CLASSIFICATION OF STANDARDS DEVELOPERS

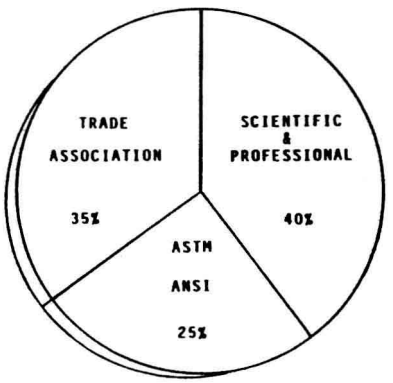
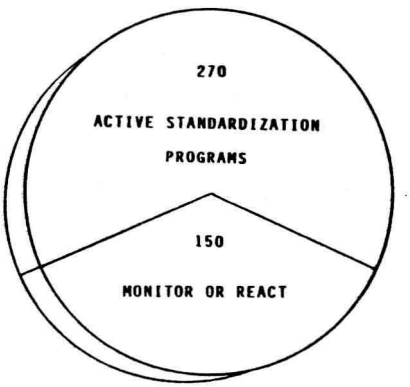


Figure 5

ESTIMATED LEVEL OF ACTIVITY OF STANDARDS DEVELOPERS



standardization. As shown in Figure 5, about 65 percent of the 420 standards developers have on-going standardization programs. The remainder have prepared a few standards in the past, occasionally up-date them, but are not actively engaged in standardization work.

The 20 major private sector standards developers are listed in Tables I and II. The standards of these organizations constitute 78 percent of the database of U.S. standards. Only nine of these process standards through ANSI. Before making comparisons or drawing conclusions from the numbers on these tables, take into account the type of documents produced. The 24 volume Boiler Code, The Rules for Building and Classing Steel Vessels, or the Uniform Building Code are not comparable to 95 percent of the standards in this database.

In considering these major standard developers one fact becomes readily apparent: While the standards literature and day-in, day-out attention focuses on the widely used standards of such organizations as ASTM, IEEE and ASME, some sectors have spawned large, comprehensive collections of standards to meet their particular needs. While standards engineers may be aware of, or even use aerospace or pulp and paper standards, do we know how USP standards are developed and used, or those for cosmetics and fragrances, or blood banks? There is much to be learned about alternative procedures for preparing standards and especially the way some of these organizations work in cooperation with government agencies.

Table III compares the current number of standards available from some of the major organizations and the degree of change during a 14 year period.

Other changes include the demise of Joint Industrial Council (JIC) standards which were widely used on industrial equipment. Most of the material in the JIC standards has been incorporated into National Fluid Power Association and National Fire Protection Association standards. Fifteen other standards developing organizations have ceased operations; some have been absorbed into other organizations. More than thirty organizations no longer develop standards themselves but now work within the committees of other organizations primarily ASTM and ASME. More than 40 additional organizations have been identified as standards developers or have started to develop standards. Some, like the Toy Manufacturers Association and the Outdoor Power Equipment Institute, have reacted to government initiatives. The American Society of Civil Engineers is again publishing standards after a lapse of 88 years. The breakup of AT & T and other factors has resulted in the formation of a new organization -- the Exchange Carriers Standards Association -- that represents all public telephone networks and replaces, in part, the Telephone Group.

Table I

DEVELOPERS OF INDUSTRIAL STANDARDS

AMERICAN SOCIETY FOR TESTING & MATERIALS	7 000
SOCIETY OF AUTOMOTIVE ENGINEERS	4 200
AEROSPACE INDUSTRIES ASSOCIATION	2 800
ASSOCIATION OF AMERICAN RAILWAYS	1 350
AMERICAN NATIONAL STANDARDS INSTITUTE	1 200
FACTORY MUTUAL	600
AMERICAN SOCIETY OF MECHANICAL ENGINEERS	550
ELECTRONIC INDUSTRIES ASSOCIATION	480
INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS	500
UNDERWRITERS LABORATORIES	465
AMERICAN RAILWAY ENGINEERS ASSOCIATION	400
AMERICAN PETROLEUM INSTITUTE	350
TECHNICAL ASSOC. OF THE PULP & PAPER INDUSTRY	270
NATIONAL FIRE PROTECTION ASSOCIATION	260

Table II

DEVELOPERS OF GENERAL STANDARDS

U.S. PHARMACOPEIA	2 900
COSMETIC, TOILETRY & FRAGRANCE ASSOCIATION	630
AMERICAN ASSOCIATION OF CEREAL CHEMISTS	350
AMERICAN OIL CHEMISTS ASSOCIATION	330
AMERICAN ASSOCIATION OF BLOOD BANKS	280
AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS	185
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION	170

Table III

STANDARDS DEVELOPMENT

	1969	1983	% NET CHANGE
ASTM	4 170	7 000	+68
SAE	2 300	4 200	+82
ANSI	1 410	1 200	-15
AAR	1 160	1 350	+16
AIA	1 050	2 800	+167
FM	330	600	+82
AASHO	330	185	-44
AOCS	290	330	+14
TAPPI	270	270	-0-
UL	250	465	+86
ASME	240	550	+129
EIA	240	480	+100
NEMA	230	200	-13
IEEE	220	500	+127
NFPA	200	260	+30