

Chapter 1

Summary, Findings, and Policy Options

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Summary, Findings, and Policy Options

Introduction

Standards affect our lives in many ways. Food and drugs must comply with health standards; cars use standardized, interchangeable parts; workplaces have safety standards; clothing comes in standard sizes; jobs are evaluated according to performance standards; telephones have standard interfaces; and bed sheets are sized to fit standard mattresses. Even our lives have become standardized through our reliance on technology.

How standards are set is a matter of some concern because the economic and social stakes in standards are so large. The standards development process must be fair to prevent any single interest from dictating the outcome. Standards have major public policy implications, but the government has avoided taking a direct role in the process. Thus, in the United States, almost half of all standards are set by the private sector as part of a voluntary consensus process, in which all or most of the key players—including government-participate. The system reflects American political culture, and the general preference for market-based, pluralist solutions.

Many in the standards community contend that this private sector, voluntary consensus process has historically worked well.¹ However, a number of structural changes in the economy have recently occurred, which raise the question of whether the system can continue to be effective in the future. These include the development of a highly competitive global economy, which the United States no longer dominates; the emergence of regional trading blocks; the growing importance of multinational corporations and other translational nongovernmental institutions; and the rapid advance of technology.

Some people question whether the U.S. standards development process, which was designed to meet the problems of an industrial era, can continue to perform well in this radically new environment.² They are concerned, moreover, that other countries are better organized and better able to influence the international standards setting process, to the detriment of U.S. trade. In particular, they fear that the harmonization of European trade laws, scheduled for completion in 1992, will not only make it harder for U.S. companies to trade in Europe, but will also

¹ See proceedings, National Institute for Standards and Technology Public Hearings, "Improving U.S. Participation in International Standards Activities," Apr. 3, 1990. Satisfaction is not so great among user groups, environmental and consumer safety organizations, industries experiencing rapid technological change, as well as those heavily dependent on exports. For a discussion of standards development problems in the fast moving information and telecommunication industries, see National Research Council, *Crossroads of Information Technology Standards* (Washington DC: National Academy Press, 1990). See also, J.L. Berg and H. Schumy (eds.), *An Analysis of the Information Technology Standards Process* (Amsterdam Elsevier Science Publishers B.V., 1990); Jeff Mead, "The Standards Process Breaks Down," *Datamation*, Sept. 15, 1990, pp. 24-32; Dennis Gilhooly, "A Standard Line," *Communication Week*, Nov. 12, 1990, pp. 67-69; John W. Verity, "Complete Confusion: A Jumble of Competing, Conflicting Standards is Chilling the Market," June 10, 1991, pp. 72-79; and Irwin Dorros, "The Standard Slowdown," *Telephony*, Feb. 26, 1990., pp. 46-49.

For a discussion of problems in the area of safety standards, see Mary Ellen R. Fise *CPSC: Guiding or Hiding From Product Safety* (Washington DC: Consumer Federation of America, May 1987). Among the problems cited are: 1) voluntary standards entail excessive time delays, 2) voluntary standards are often inadequate, 3) voluntary standards do not conform sufficiently to the consensus process, 4) agency reliance on nonexistent voluntary standards, and 5) inadequate monitoring of implementation of voluntary standards.

² This is not an entirely new concern. It was raised, for example, as early as 1974 in a Congressional Research Service study prepared for Congress. As this study pointed out:

Participation in voluntary international standardization has been spotty and uneven, with effective participation for some industries, such as automatic data processing, while others have provided little support. . . . A second undesirable consequence is that the impact of international standards upon small firms, consumers, and U.S. foreign policy objectives may often receive insufficient attention.

Voluntary Industry Standards in the United States: An Overview of their Evaluation and Significance for the Congress, Report to the Subcommittee on Science, Research and Development CRS, July 1974, p. 4 (Hereafter referred to as CRS, 1974).

allow the Europeans to take the lead in setting international standards.³ Pointing to the active role that foreign governments play in the international standard setting process, some have called on the U.S. Government to assume greater responsibility in protecting U.S. interests.

This study addresses these concerns. Looking across industry sectors, it evaluates the U.S. standards setting process in the light of its changing economic and technological environment, and compares it to processes in other countries. In cases where specific problems can be identified, it suggests alternative strategies and options that the Federal Government might pursue.

Request for the Study

This study was requested by the House Committee on Science, Space, and Technology. Noting that standards are increasingly being used to ease or block trade throughout the world, the Committee requested OTA to:

1. **assess the** effectiveness of U.S. representation in the international forums that develop standards and evaluate the impact international standards setting is having on the U.S. ability to export;
2. review the roles played by the governments of other industrialized nations in their international standards setting activities and;
3. consider whether the U.S. Government should play a greater role in funding international standards development and standards assistance to developing countries.

The Scope of the Study and Method of Approach

While standards have much in common, they are not all the same. Standards serve a number of purposes, having evolved at different points in history in response to distinct social and economic problems. In the past, for example, standards were set only after a product had been developed. Today, in the face of rapid technological change, many standards are being set before a product is fully developed.⁴ Standardization processes and stakeholder interests also differ, depending on the nature of the standard and the structure of the market. Where a dominant producer or supplier exists, for example, standards may be set on a de facto basis, in the market place. But compromises and negotiations among key players may be required when economic leverage is more evenly distributed.⁵ Moreover, when there are safety or environmental hazards involved, government is more likely to become directly involved.⁶

Because standards and standards processes differ, it is difficult to generalize about them. What works well in one set of circumstances may fail in another. But comparisons over time, across industry sectors, and among countries can be useful to identify the important variables that lead to success or failure. The following analysis is based, therefore, on a comparison of the U.S. standards development process, as it has evolved over time, with those of Europe, as well as comparisons of how standards are set across industry sectors.

A series of interviews, conducted in both the United States and Europe, complement the research

³ See for a discussion, "Standards, Testing, and Certification," *The Effects of Greater Economic Integration Within The European Community on the United States: First Follow Up Report*, USITC Publication 2288 (Washington, DC: United States International Trade Commission, March 1990, ch. 6). As noted in the USITC report:

Some began to worry that the growing influence of environmentalists, consumers, and unions would lead the EC to "harmonize up" regulatory requirements, putting in jeopardy U.S. access to the entire EC market. It became apparent that, because of their lack of direct representation and uneven access to information, some U.S. suppliers had limited influence over the private standards bodies entrusted by EC authorities with drawing up voluntary standards. . . . The EC's systematic updating of technical regulations posed the prospect that standards developed as part of the 1992 program might become de facto or de jure world standards. Some claimed that the state-of-the-art standards being developed in areas like machine tools could give European competitors an upper hand, not only in the EC, but in third country markets.

Ibid., pp. 6-12, 6-13.

⁴ These standards are referred to as anticipatory standards. These standards are written before a product has been developed; they specify how products must perform, but allow producers to independently develop their products to meet these specifications. For a discussion see Carl Cargill, *Information Technology Standardization: Theory, Process, and Organizations* (Cambridge, MA: Digital Press, 1989).

⁵ Marvin Sirbu and Kent Hughs, *Standardization of Local Area Networks*, mimeo, Department of Engineering and Public Policy, Carnegie Mellon University, April 1986.

⁶ David A. Garvin, "Can Industry Self-Regulation Work?" *California Management Review*, vol. 25, No. 4, summer 1983.

for this study.⁷ They are intended to help fill the gap between the theoretical understanding of the standard setting process and how it works in practice. Most standard setting literature is theoretical. It attempts to identify the conditions under which “optimal” standards might emerge. This literature, which is aimed at the microlevel of the firm, views the producer, or vendor, as the primary actor in the standards development process. Few studies have examined how standards evolve through the voluntary consensus process in institutions such as the American Society for Testing Materials (ASTM) and the Institute of Electrical and Electronics Engineers (IEEE). And more often than not they have ignored key players such as user groups, or the standard setting institutions themselves.⁸

What Is Meant by Standards

The choice of definitions has major policy implications. How the term “standards” is used in this study, for example, determines the terms of the debate and the range of government options developed for dealing with problems in the standard setting process.⁹ The role for government may differ, for example, depending on whether one’s reference is product standards or safety and environmental standards.

Broad definitions used in every day speech are generally not helpful. They are too vague to guide analysis. Precision is sacrificed for the sake of comprehensiveness. This is clearly the case for standards definitions. They tend to be exceedingly broad, in order to cover the full range of standards found throughout society. Included among the definitions of standards in *Webster’s Dictionary* are;¹⁰

...something established by authority, custom, or general consent as a model or example,

...something set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.

Although these definitions provide an overall notion of what standards are, they do not help focus the analysis. For this reason, researchers formulate their definitions to conform to the specific questions to be asked and the problems to be solved. Economists, for example, generally seek to know how, and under what circumstances, standards are set in the marketplace. They tend to view standards as an agreed upon set of specifications that define a particular product or that allow products to interoperate. Anthropologists, on the other hand, focus on the question of how individuals relate to their cultures. Thus, they consider standards to be the accepted rules of behavior that facilitate social interactions. Government bureaucrats are likely to view standards as the means to address a societal concern or to achieve a social end. They often equate standards with regulations.

This study focuses on how U.S. standards and standards development processes might affect U.S. trade. Thus, it must consider all standards and standards processes that influence national economic performance. For this purpose, three different kinds of standards are considered. These include product standards, control standards, and process standards. There are also three different methods of achieving standards: 1) standards can be set through the market, on a de facto basis; 2) standards can be set by government, through the regulatory process; and 3) standards can be negotiated through a voluntary consensus process. These three kinds of standards and three kinds of standards processes can be matched to form a matrix of both the standards universe and the standards setting processes and problems analyzed in this study (see figure 1-1). Thus, all three kinds of standards can be established in any one of the three standards processes. The

⁷ A few of the people interviewed requested anonymity because they felt their positions and effectiveness in the standards community might be jeopardized were they to make their statements public. OTA decided it was important to include some of this interview material in the report, even though it cannot be directly cited. Because the U.S. standards process is a voluntary process, how well it works depends to a great extent on the attitudes and perceptions of the participants. The conflict within the standards community is a major problem for the U.S. standards system, and its magnitude only became apparent through the course of the interview process. All other interviewees and contributors are listed in app. B.

⁸ For a description of this literature see app. A.

⁹ As Ross E. Cheit notes in quoting Charles Lindblom and David Cohen

...we do not discover a problem “out there,” we make a choice about how we want to formulate a problem. That choice reflects certain values and in turn constrains the realm of possible solutions.

Ross E. Cheit, *Setting Safety Standards: Regulation in the Public and Private Sectors* (Berkeley, CA: University of California Press, 1990), p. 150.

¹⁰ Webster’s *New Collegiate Dictionary* (Springfield, MA: G&C Merriam Co., 1977). p. 1133.

Figure I-I—Standards Universe

Type of Standard by Goals

Standardization mechanism	Control	Product/quality	Process/interoperability
De Facto	Warner-amex Database-privacy standards	VCR standards	Language customs Bills of lading Computer interface standards
Regulatory	Auto safety regulations Fuel economy standards	NSA encryption standards Department of Agriculture Product classification standards	Open network architecture standards ETSI standards for European telecommunication standards
Voluntary consensus process	Standards for medical devices Pressure vessel standards Petroleum standards	Refrigerator standards	Map-top protocols for OSI/standards Standards evolving legislation Electronic data interexchange standards

The three kinds of standards and three kinds of standards processes can be paired to form a matrix that scopes the standards universe and the standards setting processes and problems to be analyzed in this study.

SOURCE: Office of Technology Assessment, 1992.

particular process by which standards are established is often the result of historical circumstances and/or political and cultural choice. (For a detailed discussion of these standards and the processes through which they evolve, see app. A).

Evaluating the U.S. Standards Development Process

The analytical basis for evaluating the U.S. standards setting process is poor. There is no objective set of criteria to gauge the standardization process, and little public thought or debate has been devoted to the question of what standards “ought to achieve. Much available information is hearsay and tainted by the narrow perspectives of those involved. Thus, stakeholders are inclined to judge how well the standards process works for each of

them, not on the basis of some agreed upon objective criteria. Even among academics, there is a tendency to judge the system from an overly narrow perspective. Whereas economists are likely to focus on the criteria of efficiency, those in political science and public administration generally stress the system’s effectiveness in meeting its goals.

Nor is there agreement about who should determine how well the standards development process works. Because standards organizations perform a number of public functions, government has generally monitored the process, intervening when it deemed necessary. For example, assertions of anti-trust infringements and unfairness led the Federal Trade Commission (FTC) in the 1970s to investigate the system and recommend that government assume

a greater role in regulating standard-developing bodies.¹¹ However, many in the private sector contend that it is the participants in the system, themselves, who should be the final arbiters.¹² This position assumes both that 1) the participants know and are willing to pursue their own best interests; and 2) that participants' interests always coincide with the *national* interest. Both assumptions, are certainly open to question, if not clearly refuted by history.¹³

Criteria for judging standards processes also change over time. As circumstances change, so too do the demands placed on the standards process. And different kinds of organizational arrangements may be more effective in meeting some demands than others. For example, during wartime, when speed was essential, government assumed control over standards setting. However, in the postwar period it relinquished the responsibility to the private sector.¹⁴

From the perspective of Congress, and for the specific purposes of this study, the most important criterion for judging the U.S. standards development process is its impact on the Nation's overall economic performance. The three major questions addressed, therefore, are:

1. whether and to what extent does the U.S. standards process support the growth and competitiveness of the U.S. economy in a rapidly changing global environment;
2. to what extent, and in what ways, are the current set of organizational arrangements a factor in determining the system's performance; and

3. under the current set of circumstances, what kinds of organizational changes, if any, might lead to enhanced performance.

To answer these questions, this report looks first at the evolution of the standards process in the United States (ch. 2); second, at standardization as it has taken place in Europe (ch. 3); and third at the structural changes taking place in the global standards setting environment and their implications for the United States (ch. 4). Appendix A provides an analytic framework for assessing standardization issues.

Key Findings

Concern about the U.S. standards setting process and recommendations for greater government involvement are based on the notion that the U.S. approach no longer works as well as it should. Before considering what government might do to improve the situation, one needs to identify specific failures and demonstrate why and how government involvement will lead to a better result. OTA identified a number of problems that give cause for concern.

A Growing National Stake in Standards Issues

The government, as the sole representative of the Nation, has a considerable interest in the effectiveness of the U.S. standards setting process. Standards help determine the efficiency and effectiveness of the economy, the cost, quality, and availability of products and services, and the state of the Nation's health, safety, and quality of life. The government's stake in standards setting will loom even larger in the future, given a number of developments.

¹¹ FTC, Bureau of Consumer Protection, Standards and Certification: Proposed Rules and Staff Report (Washington, DC: Government Printing Office, 1978).

¹² This position was stated repeatedly during interviews with stakeholders.

¹³ For e-pie, although participation in international standards bodies was in the long term interest of U.S. standards organizations, as well as of the Nation as a whole, U.S. standards developers failed to recognize the opportunity, and were late getting involved. Reportedly, ANSI was able to assume the position of national representative body within the ISO, not because of its stature in standard setting, but rather because ASTM—the most prominent standard development organization at the time—made a clear policy decision not to get involved in international standardization.

¹⁴ In 1917, product diversity was so great it threatened to hinder the War effort. As a result, the government set up a Commercial Economy Board of the Council of National Defense, whose task was to simplify the use of labor, capital, and equipment in all industries. Its membership was comprised of businessmen from key industries. In May, 1918, the Board was transferred to the War Industries Board. This Government Board eventually regulated the manufacture of over 30,000 articles of commerce. See CRS, 1974, p. 11. A similar shift occurred during the Second World War. Noting the importance attached to standards the ASA wrote:

Never before has the country been so standards conscious. Their president—his Director of Economic Stabilization—the Army—the Navy—WPB—OPA—industry—are all using standards as a means of carrying out the stake imposed upon them by war. Standards are being debated on the floor of Congress, which has setup a committee to study their use. As cited in *ibid*, p. 17.

As the United States adjusts to a changing global economy, more and more industries are not only dependent on trade but also affected by standards. It was estimated, for example, that for the year 1977, \$69 billion of U.S. exports were affected by standards activity. No comparable figure is available today. However, it is estimated that of \$83 billion in exports of manufactured goods, some \$48 billion is, or will be, subject to European Community (EC) product safety standards alone.¹⁵

Standards help determine the competitiveness of U.S. industries. Recognizing the relationship between standards and trade, the Europeans are using standards not only to create a common market, but also as a marketing device to sell their products in Eastern Europe and the developing world. If the U.S. standards process malfunctions, or fails to keep pace with standards developments in the rest of the world, American industry will suffer.

Failure to appreciate the implications of international standards can have serious consequences for U.S. industry. The U.S. machine tool industry provides a case in point. For years, the industry was able to thrive without regard to international standards. Industry practices became de facto standards because the U.S. market for machine tools was so large. In a global market, where there is intense foreign competition, this is no longer possible. Not being involved in the development of international standards or experienced in producing products to foreign specifications, the U.S. industry has become much less competitive.¹⁶ The Japanese, on the other hand, have gained considerable ground in the international market, in part by more effectively using standards to improve productivity and add value to their products.¹⁷ Concerned about the fate of the machine tool industry, President Bush recently

agreed to approve a 2-year voluntary restraint agreement on machine tools, which limits imports from Taiwan and Japan, to allow time for the industry to become revitalized.¹⁸

Standards will become more important due to growing reliance on technology. Just as specialization and assembly line production provided an impetus for standardization during the industrial era, so too networked production and computer-assisted work are increasing the demand for standards today. Machines require more precision than human beings, as they are less flexible in adapting to errors and omissions.¹⁹

Technology deployment can also give rise to unintended health and safety problems and threaten the Nation's environment. Standards can serve as mechanisms for limiting or ameliorating these impacts. Although safety standards were first set early in this century, creation of standards designed to control technological impacts has been growing steadily. At last count, Federal agencies, such as the Environmental Protection Agency, the Food and Drug Administration, and the Occupational, Safety, and Health Administration, had developed approximately 8,500 standards (see table 1-1 on laws affecting standards).²⁰

The growing pace of technological change will also drive the need for standards. The faster the advance of technologies, the greater the risk in R & D and product development. Standards setting can reduce uncertainty in a rapidly changing technology environment. Participants in the process learn first hand about new technologies. Moreover, by developing reference models and anticipatory standards, such as Open Systems Interconnection (OSI),²¹ manufacturers have a general target towards which

¹⁵ This figure was provided by the Department of Commerce.

¹⁶ As the Chief Executive Officer of Cincinnati Milacron described the situation to members of his industry:

Your competitors are global, ..Your suppliers, your standards, your designs, your issues, your policies, your strategies—they all must become global. Technology is not a provincial field any more. [Industry must implement] radical measures.

'Cincinnati Milacron Chairman Issues Stem Warning to U.S. Manufacturers,' *New Technology Week*, Nov. 18, 1991, p. 4.

¹⁷ Michael L. Dertourzos et al., *Made in America: Regaining the Productive Edge* (Cambridge, MA: MIT Press, 1989), pp. 241-42.

¹⁸ 'Bush Approves Limited Extension of Machine Tool VRAs With Japan, Taiwan,' *International Trade Reporter*, Jan. 1, 1992, p. 10.

¹⁹ Gerd Wallenstein, *Setting Global Telecommunication Standards: The Stakes, The Players & The Process* (Norwood, MA: Artech House, 1990), p. 18.

²⁰ Robert Toth, Toth Associates, (cd+), *Standards Activities of Organizations in the United States* (Washington, DC: NIST Special Publication 806, February 1991), p. 3.

²¹ OSI (Open Systems Interconnection) is an architecture for computer networks and a family of standards that permits data communication and data processing among diverse technologies. OSI-based standards anticipate the development of particular applications or products. They provide a reference model that defines and categorizes seven layers of functions that need to be performed in the protocols and services at each layer. OSI-based standards are international in scope and are being developed in international standard-setting bodies.

Table I-I—Legislation: Creating the Need for Government Standards

Safe Drinking Water Act of 1974 (Public Law 93-523)
Child Protection and Toy Safety Act of 1969 (P.L. 91-1 13)
Lead-Based Paint Poisoning Prevention Act of 1970 (P.L. 91 -695)
Consumer Product Safety Act of 1972 (P.L. 92-573)
Mobile Home Construction and Safety Standards, Title VI of the Housing and Community Development Act of 1974 (P.L. 93-383)
Traffic and Motor Vehicle Safety Amendments of 1970 (P.L. 91 -265)
Highway Safety Act of 1970, Title II, Sec. 202 of Federal-Aid Highway Act of 1970 (P.L. 91 -605)
National Environmental Policy Act of 1969 (P.L. 91-190)
Resource Recovery Act of 1970 (P.L. 91 -512)
Clean Air Amendments of 1970 (P.L. 91 -604)
Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500)
Federal Environmental Pesticide Control Act of 1972 P.L. 92-516)
Federal Energy Administration Act of 1974 (P.L. 93-275)
Solar Heating and Cooling Demonstration Act of 1974 (P.L. 93-409)
Medical Devices Amendments Act of 1975 (P.L. 94-295)
Occupational Safety and Health Act of 1970 (P.L. 91 -596)
Toxic Substances Control Act of 1976 (P.L. 94-469)

SOURCE: William T. Cavanaugh, "Needed: A National Standards Policy," *ASTM Standardization News*, vol. 5, No. 6, June 1977, p. 13.

they can direct technology development. Standards setting, therefore, is an important aspect of any national economic policy aimed at encouraging innovation and economic growth.

Some standards will likely be more important from a national perspective than others. In a global, information-based economy, networking technologies provide a basis for productivity and economic growth. These technologies will become the basis of an infrastructure for all economic activity. If net-

works fail to interconnect for lack of standards, the Nation could suffer considerable economic loss, and national security might also be jeopardized. Thus, while government may have a relatively small interest in the development of certain product standards, its stake in others, such as standards for interoperability, will be high.²²

Insufficient Support for Standards Setting

Standards are essential for all human activity, but most people take them for granted. Only when products fail to work, or mishaps occur, does the average person think about standards. Even in business, where money is at stake, standards are often given a low priority. *There is a clear need in the United States for greater attention to standards. In an information-based global economy, where standards are not only employed strategically as marketing tools but also serve to interconnect economic activities, inadequate support for the standards setting process will have detrimental effects.*

One reason for the lack of regard for standards is that they exhibit some of the characteristics of what economists call 'public goods.'²³ Public goods are those goods whose benefits are available to everyone and from which no one can be excluded, and no one can frilly appropriate the benefits. As a result, public goods are underproduced. Standards often fall into this category.²⁴

Other market failures may also weaken standards development processes. If the most efficient standard choices are to be made, all interested parties must have access to accurate and timely information.²⁵ However, information about standards, like standards themselves, is a public good, and is therefore

²² In the past, achieving adequate interoperability within the communication infrastructure was relatively easy. In telephony, AT&T provided both end-to-end service and system interconnection. However, in a recent study, OTA found that interoperability is likely to become more problematic in the future, from both technical and administrative standpoints. Not only will the need for interoperability become greater, achieving it is also likely to be harder. see U.S. Congress, Office of Technology Assessment, *Critical Connections: Communication for the Future*, OTA-CIT-407 (Washington DC: Government Printing Office, January 1990), chapter 11.

²³ Pure public goods will not be produced privately. There are only a few pure public goods, one example being national defense. Other goods, like education and standards, are impure public goods. These combine aspects of both public and private goods. Although they serve a private function, there are also public benefits associated with them. Impure public goods may be produced and distributed privately in the market or collectively through government. How they are produced is a societal choice of significant consequence. If decisions about impure public goods are made in the market, on the basis of personal preferences alone, then the public benefits associated with them may not be efficiently produced or equitably distributed. See Edwin Mansfield, *Macroeconomics Theory and Application* (New York, NY: W.W. Norton, 1970)

²⁴ C. Kindelberger, "Standards as Public, Collective, and Private Goods," *Kylos*, vol. 36, pp. 377-395; see also Sanford Berg, "Technical Standards as Public Goods: Demand Incentives for Cooperative Behavior," *Public Finance Quarterly*, vol. 17, January 1989, pp. 35-53.

²⁵ For a discussion of market failures due to lack of information, see Joseph Farrell and Garth Saloner, "Coordination Through Committees and Markets," *Rand Journal of Economics*, vol. 19, summer 1988, pp. 235-252; and Joseph Farrell and Garth Saloner, "Standardization Compatibility, and Innovation" *Rand Journal of Economics*, vol. 16, spring, 1985, pp. 70-83.

likely to be underproduced. Even when standards-related information can be packaged for sale like other commodities, thus yielding an adequate return, its price may limit distribution so that people have insufficient information to make sound decisions.

Some kinds of technologies are subject to greater market failures than others. For example, networked technologies—e. g., information and communication technologies—often have large installed bases, making it particularly costly for users to shift to a new, more technologically advanced standard. Thus, they may fail to adopt a superior standard, due to what economists call “excess inertia.”²⁶ At the same time, these technologies also exhibit “increasing returns to adoption,” a situation that occurs when the benefits to the user of a technology increase with the number of users. Under these circumstances, the wrong standard might be chosen due to “excess momentum.” Not wanting to be left off the network when a major user moves to a new standard, other users may rush too quickly to jump on the bandwagon.

These market failures help to justify the role of government. Sometimes, public interest and involvement in standards can only be sparked by some form of government action or major national event. The rise of the standards movement in the United States, for example, grew out of wartime production and a national campaign to reduce waste. With an effort made to reach everyone, standards became a household word.

The same thing is happening today in Europe, where standards are seen as a tool for unification. The European Commission (EC) estimates, for example, that by 1993 the Community will need at

least 1,000 European standards.²⁷ Viewing standardization as a priority task, the European Council adopted a new approach for developing European standards in May 1985.²⁸ As described by one member of the French standards community: “Standards are bound to lead to unification. Not since the French Revolution has there been such a significant movement.

How far, and under what circumstances, the U.S. Government should, itself, become involved in standards setting is problematic. It is hard to measure the societal benefits to be derived from standards, or the costs of low participation rates. The costs associated with government involvement must be taken into account in any calculation. If standards are produced prematurely, they can retard innovation. If they do not accurately reflect the market, they will send out false signals and favor some firms over others.

The situation is further complicated because standards problems differ by industry. In industries such as telecommunications, for example, the incentive to participate in standards setting will likely be high. If communication systems fail to work together, there can be no services to sell. Support for standards setting will also be greater in industries comprised of a few large companies. They are more likely to see a return on their investments, since there are fewer to share the benefits.²⁹ This has been the case, for example, in the automotive and petroleum industries. Industries subject to Government regulation are also likely to be actively involved in standards setting, if only for preemptive reasons.³⁰

There are, however, cases where greater government involvement can easily be justified. Some

²⁶ Joseph Farrell and Garth Saloner, ‘Horses, Penguins and Lemmings,’ H. Landis Gabel (ed.), *Product Standards and Competitive Strategy* (North Holland, Elsevier Science Publishers, 1987), p. 11. As the authors note:

“Excess inertia arises when not enough users are willing to go out on a limb by adopting the new technology. This is most likely when network externalities are strong and there is a great deal of uncertainty about whether a lead would be followed,” p. 11.

²⁷ Since 1986 approximately 30 standardization mandates related to European Economic Community (EEC) legislation (calling for about 800 European standards) have been given to the two main European standardization bodies Comité Européen de Normalisation (CEN) and Comité Européen de Normalisation Electrotechnique (CENELEC), which are to be completed by 1992. With more mandates being prepared, the total is likely to be over 1,000. Commission on the European Communities, *Commission Green Paper on the Development of European Standardization: Action for Faster Technological Integration in Europe*, Brussels, Oct. 8, 1990, COM(90) 456 final (hereafter referred to as *Green Paper on European Standardization*).

²⁸ See ch. 3. The number of Technical Committees and working groups has doubled between December 1987 and December 1989, and the number of draft European Standards in CEN rose from 220 in 1986 to 950 in 1989. *Green Paper on European Standardization*, op. cit., p. 9.

See for a discussion Lucy Kalloway, ‘Technical Standards Machinery Grinds Exceeding Slow,’ *Financial Times*, May 14, 1990, p. 4.

²⁹ Mancur Olsen, *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge, MA: Harvard University Press, 1971),

³⁰ For example, flammability standards in upholstered furniture industry were only developed by the industry trade association after a notice of proposed rulemaking appeared in the *Federal Register*. See Harvard Business School, *The Upholstered Furniture Flammability Issue* (Boston, MA: Intercollegiate Case Clearinghouse, 9-680-084, 1980). See also David Garvin, op. cit., footnote 7, and Ross E. Cheit, op. cit., footnote 10.

standards-such as health, safety, and environmental standards- will have consequences for the whole Nation apart from their market values. Moreover, since technological impacts transcend national boundaries, standards setting in these areas will likely require intergovernmental negotiations.

When the divisiveness in the standards community becomes intense, and its effectiveness is questioned, the government may also need to step in. Thus proposals to expand the Federal role have often come from the government acting in response to dissident claims. In 1979, for example, assertions of antitrust infringements and unfairness led the Federal Trade Commission (FTC) to investigate the system and recommend that government assume a greater role in accrediting standards setting bodies.³¹

Government involvement could similarly be called for to assure that U.S. producers and manufacturers have access to foreign markets. This is particularly important today, when standards are critical to the development of regional trading areas. For example, Secretary of Commerce Robert Mosbacher, concerned about U.S. access to the European market, recently initiated discussions with the Vice President of the European Commission, Martin Bange-mann to work out some of these issues.³² However, this action was not without controversy; a number of people in the standards community felt that the government had usurped the private sector's role.³³

Government support for standards setting can be most clearly justified in the international arena. Although much future standards work will take place in the international arena, it is not clear that the United States will be an effective presence there (see ch. 4). The United States has been slow to appreciate the growing importance of international standards. Some say, for example, that U.S. standards bodies lost a tremendous opportunity in the early post World War II years, when European standards institutions were still in a state of disarray.³⁴ Europeans, themselves, complain about the failure of the United States to make a real commitment to international standards. Some even suggest that U.S. involvement in the past was counterproductive. Americans, they say, were playing for much lower stakes than the Europeans, since standards implementation in the United States is voluntary, but compulsory in Europe. To the Europeans, therefore, U.S. participation has sometimes appeared perfunctory, if not at times obstructionist.³⁵

The United States may also have considerably less influence than in the past to determine the character of international standards institutions.³⁶ That the United States was able to play the dominant role in defining the post-war international economic order was due to factors, many of which no longer exist, such as American economic and military preeminence, the threat of a common enemy, as well

³¹ FTC, *op. cit.*, footnote 12.

³² See, "Commerce Department and EC Move Closer to Testing and Certification Agreement," *Business America*, July 15, 1991, pp. 7-9.

³³ Unpublished memo from ANSI to the Office of Management and Budget (OMB).

³⁴ Three was little incentive to consider international standards, so long as national economies were independent of one another. Writing in 1928, K. H. Condit explains the attitude of the time. He notes:

Very little has been accomplished in international standardization. . . for obvious reasons. The manufacturing arts are different at different stages in different countries, and what is acceptable in the advanced countries is not in the backward ones. Until international trade is conducted on a basis less strongly flavored with nationalism, and industrial education has made more progress than it has yet, there will apparently be little economic justification for extensive standardization.

K.H. Condit, "The Economic Aspects of Standardization" *Standards in Industry* (The American Academy of Political and Social Science, Notes from the Annals, 1928), p. 40.

³⁵ Reacting to these Comments during the OTA review process, some members in the American standards community say that these comments are self-serving, and thus not to be taken too seriously.

³⁶ Explaining U.S. hegemony in the past, Gilpin notes:

For the first time ever, all the capitalist economies were political allies. American initiatives in the area of trade led to successive rounds of tariff liberalization. The dollar served as the basis of the international monetary system, while American foreign aid, direct investment, and technology facilitated the rapid development of advanced and certain less developed economies. American hegemony provided the favorable environment within which supply and demand forces created an era of unprecedented growth and an increasingly open economy.

Robert Gilpin, *The Political Economy of International Relations* (Princeton NJ: Princeton University Press, 1987), p. 5.

as relatively steady economic growth.³⁷ To affect standards processes in an international environment in which economic and political resources are now both more balanced and dispersed, the United States will need to exert greater effort and resources, as well as negotiate and compromise, more than ever before (see ch. 4).

Rallying sufficient resources for such a task will also be difficult. The potential for market failures at the international level is very high, since many American companies, especially in the small business community, have yet to recognize the implications of international standards in a global economy. By the time they come to appreciate the potential consequences, the damage to the national economy may have already been done. Initial research suggests that a key factor determining outcomes in standards development bodies is the amount of resources and skills that participants bring to bear.³⁸ And whereas American participants must pay their own way, participants from other countries are generally supported, at least in part, by their national governments.³⁹

The cost of international standards development, and of participating actively in the process, is also a limiting factor. It has been estimated, for example, that the development of a major international telecommunications standard may require in the range of 1,000 person-years of experience, 20 person-years of actual effort, and \$3 million.⁴⁰ Distributing standards information across national boundaries, when it requires cultural and political as well as linguistic translation, can also be very costly.

If sufficient resources could be brought to bear in the international arena, the payoff would likely be great. U.S. companies, which are no longer dominant in the market, and hence no longer able to set de facto standards, will benefit from a standards setting arena where influence is not based solely on market power.⁴¹ Equally important, signatories of the General Agreement on Tariffs and Trade (GATT) Standards Code⁴² have pledged to adopt any international standards that already exist. Thus, if the United States supports the timely development of standards in international standards bodies, it may preclude the Europeans and others from using regional standards to restrict trade.

The Need for Cooperation Rather Than Conflict

The voluntary consensus process requires cooperation and trust to succeed. There is little bureaucratic structure to otherwise hold it together. Unresolved disputes and disagreements not only distract from the main purposes of setting standards; they also undermine the legitimacy of the system, both in the opinion of its members as well as in the eyes of the rest of the world. Such is the case in the U.S. standards world today.

The outpouring on behalf of the present standards development system hides some deep-seated divisions within the standards community itself. Although most members firmly believe in the voluntary consensus process, they differ about what “opemess” means. The American Society for Testing Materials (ASTM) insists that true consensus requires the participation of *all* interested parties,

³⁷ As described by Gilpin:

The United States emerged from the Second World War as the dominant or hegemonic economic and military power in the international system. This unchallenged American preeminence was partially due to the wartime destruction of other industrial economies. From this perspective, the commanding nature of American leadership in the early postwar period was “abnormal” and would one day decline with the recovery of other economies. This artificial situation, however, caused false and extraordinarily high economic expectations among the American people that continued into the 1990s and made adjustment to economic and political decline extremely difficult.

Ibid, p. 344.

³⁸ See Martin B.H. Weiss and Marvin Sirbu, “Technological Choice in Voluntary Standards Committees,” Op. cit., footnote 9, pp. 111-132.

³⁹ See ch. 4, for a detailed discussion.

⁴⁰ Dr. Odo J. Struger, “Impact of International and Foreign Standards on a Company’s Operations,” Presentation Aug. 20, 1991, p. 6.

⁴¹ Lehr, op. cit., footnote 9; and Farrell and Saloner, op. cit., footnote 9.

⁴² Article 2.2, Agreement on Technical Barriers to Trade. The Standards c& attempts to ensure that “technical regulations and standards are not prepared, adopted, or applied with a view to creating obstacles to international trade.” To accomplish this it lays out principles that guide the development and application of standards and the use of conformity assessments procedures. These principles include using international standards unless inappropriate for certain specific reasons and to not develop or apply standards in a way that poses an unnecessary obstacle to international trade. In the draft text, which is almost complete, countries pledge to use the least restrictive measure to accomplish a legitimate objective. In general these principles also apply to conformity assessment procedures (that is, the methods by which a body assures that a product conforms to a particular standard).

even if this requires subsidizing some groups. On the other hand, the American National Standards Institute (ANSI) as well as others, argue that due process requires only that the process be open so all have an opportunity to participate. They contend that willingness to pay is an essential measure of interest in the process.

Members of the standards community also disagree about which organizations produce the “best” standards. For instance, many professional societies claim that their standards are technologically superior, since their members participate not as representatives of any group or interest, but rather as individual engineers.⁴³ Some industry groups argue the opposite. Standards set by professional societies, they contend, do not reflect market forces, and they are often insensitive to industry competitive issues. “Unaccountable to industry, they often do more harm than good,” OTA was told.

Standards setting bodies also compete to sell standards, which is another important source of contention. Many of these organizations resemble publishers; they orchestrate standards setting in exchange for the right to sell standards and other value added, standards-related services. Sales from standards, for example, account for 80 percent of the income of ASTM, and 28 percent that of ANSI. Competition and turf battles among these and other standards setting bodies often revolve around these sales. These struggles are likely to become even more intense and convoluted in the future with the growth of a world market for standards and the emergence of new global competitors.

This economic competition is compounded by personality conflicts in the standards setting community, some dating back a number of years. There is little trust or respect among the leadership. People characterize one another in highly acrimonious terms.⁴⁴ As one industry representative, who is otherwise highly supportive of the U.S. standards system, described to OTA “This situation is sheer

madness. It has truly gotten out of hand and no longer serves our needs.”

The interests of some standards setting organizations are also beginning to diverge from those of manufacturers. In a highly competitive global economy, for example, it is important for manufacturers to have their standards adopted on an international basis. They may even want to ‘give’ their standards away in an effort to develop new markets. However, such a policy is not in the interest of those standards setting organizations, whose livelihoods generally depend on standard sales. In addition, manufacturers may want to speed up standards development and implementation, but standards setting organizations often hesitate to put their standards electronically online due to copyright concerns.

Conflicts in the standards community weaken the U.S. position internationally. Aware of these disputes in their most minute detail,⁴⁵ European standards makers use them to their advantage. Even so, Europeans would prefer that the United States presented a united front to the rest of the world. “The United States,” they say, “is a major economic power, and it must play its role in international standards setting accordingly.” Europeans emphasize how difficult it is to negotiate with one body speaking authoritatively for the United States, “when you are unclear about its actual power, and who it really represents.” They complain that one moment they are told that ANSI speaks for all the United States; but the next, ASTM is knocking at their doors.

Internecine warfare in the standards community also raises questions about the ability of the voluntary standards organizations to carry out the public trust delegated to them.⁴⁶ In a recent public display of these problems, ANSI—which is recognized internationally as the official member body to represent the American standards community in international standards organizations—charged before the Office of Management and Budget (OMB)

⁴³ For a descriptions of the American standards organizations and the rules that govern them, see ch. 2.

⁴⁴ Among the terms used during the OTA interviews to describe members of the community were “scum ball,” “liar,” and “sleaze,” to name a few. OTA interviews.

Some reviewers of the OTA draft believe that it is inappropriate to use such terminology in a government report. However, many of these same people, argue that OTA has exaggerated the turf battles and personality conflicts within the standards community. Because these words illustrate the intensity of feeling and negative tone of the competition among standards organizations, OTA chose to retain them in the final document.

⁴⁵ For example, the word for scum ball in French, OTA was told, is “l’eau du merde.”

⁴⁶ Although a voluntary, private sector activity, standards making in the United States is a public trust. The income that standards bodies derive from sales of standards documents and from member dues is tax deductible.

Table 1-2—Standardization Systems

U s .	Other industrialized nations
Distributed	Centralized
Pragmatic	Systematic
Reactionary	Anticipatory
Inch-pound	Metric
Entrepreneurial and individualistic	Tools of industrial policy
Maximize role of private sector	Standards development responsive to government direction and national policy
Tolerated; implementation questioned	Acceptance; immediate implementation
International standards often only guides	Direct adoption of international standards
Open and transparent	Often closed, negotiated standards development
Appeals mechanisms exist	Appeals procedures are exception
Self-certification and warranties	Type approval and third party testing

SOURCE: R. B. Toth, Toth Associates, course material from "Establishing and Managing a Company Standardization Program."

that certain parties in the Department of Commerce are underminingg ANSI's authority through their actions. However, three other major U.S. standards setting organizations quickly took exception to this charge, claiming that they fully support the Department of Commerce's actions.⁴⁷

The Need To Strike a More Appropriate Balance Between the Public and Private Sectors

Failure to bring American standards setting organizations together, and to work out their relationship with government, is a real and very serious problem in dealing with other nations. A solution requires afresh perspective that objectively considers both the problems of the system and the ways in which all participants can join to resolve them.

Standards serve both public and private functions; this raises a fundamental question about the appropriate roles of government and the private sector. Nations differ in the way they assign responsibility (see table 1-2). In Europe, many functions, which in the United States would typi-

cally be considered private sector tasks, are carried out by national governments. Standards setting is no exception.⁴⁸ From the European perspective, standards setting bodies perform a number of "public" functions. Accordingly, all European governments routinely support national standards setting to some degree and in one form or another. Moreover, whereas the private sector in the United States tends to view such support with suspicion—if not alarm—Europeans are comfortable accepting it. As one member of the French standards community told OTA "Americans are somewhat paranoid about government. If our government gives us financial support, it simply gets what it pays for. This certainly does not mean that the government has control."

The U.S. standards setting process reflects a strong political and cultural bias in favor of the marketplace, a preference that has its origins deep in American history.⁴⁹ Although government provided at the turn of the century the first impetus for national standards, it gradually relinquished much of this responsibility to private standards setting organizations,⁵⁰ which had already begun to emerge as

⁴⁷ See, for one discussion, "ANSI Complaints to OMB Underscore Tensions in Private Sector," *Laboratory Regulation News*, vol. 2, No. 12, June 25, 1991.

⁴⁸ See ch. 3 for a discussion,

⁴⁹ Gabriel Almond and Sydney Verba, *The Civic Culture: Political Attitudes and Democracy in Five Nations* (Boston, MA: Little, Brown and Company, 1965); See also, Robert Wuthnow (ed.), *Between States and Markets: The Voluntary Sector in Comparative Perspective* (Princeton, NJ: Princeton University Press, 1991).

⁵⁰ Rexmond C. Cochrane, *Measures for Progress: A History of the National Bureau of Standards* (Washington, DC: National Bureau Of Standards, 1966). As detailed in ch. 4, this transfer was not without its problems. The standardization movement, under Secretary of Commerce Herbert Hoover, was initially designed to help business. Times change, however, and consumer groups began to press the Bureau to certify product quality. This upset business, which in a period of prosperity was much less in need of the Bureau's services. Given budgetary pressures and competing demands, the Bureau gradually relinquished most of its product standardization efforts.

early as 1820.⁵¹ This private sector tradition remains strong today (see ch. 2). Instead of setting standards for the U.S. private sector,⁵² the government focuses its efforts on the fairness and effectiveness of standards setting processes. Uppermost in this regard have been concerns about antitrust infringements, due process and, more recently, international competitiveness. This preference for voluntary consensus standards was reaffirmed in the 1979 Trade Act, which formally recognizes the private sector's role in standards setting, and in OMB Circular A-119, which directs Federal agencies to use voluntary standards wherever possible. In both instances, however, the Federal Government retains the right to assume a greater leadership role when it considers it necessary.⁵³

This division of labor between the public and private sectors has strong support in the U.S. standards setting community. At hearings held in 1990 by the National Institute of Standards and Technology (NIST, formerly the national Bureau of Standards, or NBS) to determine whether the government should become more active in standards setting, especially in the international arena, the response of those testifying was an emphatic "No."⁵⁴

However, given the growing national stakes in standards, the problems in the standards community identified in this report, and the challenges presented by fast-moving technology and a highly competitive global economy, the governments will need to assume a greater role in the future. An appropriate division of labor between government and the private sector in standards setting must be based on mutual trust and a common recognition of the strengths and weaknesses of each. A positive relationship of this kind is clearly lacking today. Viewing proposals for change as either black or white, each side regards the other with suspicion. Thus, little that is new has been added to the

discussion. With government and the private sector increasingly at odds, the basis for trust has deteriorated, and the lines in the debate are becoming more sharply drawn.

Inadequate Federal Coordination on and Policymaking

Paralleling the lack of unity in the private sector standards community is a lack of coordination and policymaking at the Federal level. While this is not a new problem, its consequences will be more serious in the future. As the United States expands its role in a global economy, new trade-offs among standards goals must be negotiated. Free trade objectives are already coming into conflict with environmental and safety goals.⁵⁵ Under such circumstances, coordination and conflict resolution among Federal agencies is essential. Moreover, with the growing importance of standards, rapid technological advance, and the shift to a global economy, the Federal Government needs some ongoing organizational capability to identify problems, set goals, and evaluate system performance.

The 1977 Department of Commerce Report⁵⁶ on the U.S. standards setting process and the 1965 LeQue Report⁵⁷ both called for a unified, national standards policy. They proposed the establishment of some form of government body, where policies could be coordinated. However, this type solution was unpopular--especially in the business community--and nothing came of it.

The problem of coordination was eventually addressed on a limited scale with the establishment of an interagency committee. In accordance with OMB Circular A-119, the Department of Commerce (DOC) was directed to set up an interagency consultative mechanism to advise the Secretary and agency heads in implementing Federal standards

⁵¹ The first such organization, established in 1820 to establish uniform standards for drugs, was the United States Pharmacopial Convention. The first trade association to develop standards was the American Iron and Steel Institute, established in 1855. The American Society of Civil Engineers, formed in 1852, is the oldest scientific and technical society to develop standards. U.S. Department of Commerce (Robert Toth, Toth Associates, cd.) *Standards Organizations in the United States* NBS Special Publication 681, p. 4.

⁵² The U.S. Government traditionally set Pm-merit specifications for all its purchases, a practice that is declining in favor of voluntary standards.

⁵³ OMB Circular A-119; and 1979 Trade Act.

⁵⁴ See proceedings, National Institute for Standards and Technology Public Hearings, op. cit., footnote 1.

⁵⁵ See for one discussion, Keith Bradsher, "U.S. Ban on Mexico Tuna is Overruled," *The New York Times*, Aug. 21, 1991, pp. D1, and D3.

⁵⁶ *Voluntary Standards and Testing Laboratories Accreditation: Analysis of Problems, Issues, and Alternatives for Federal Action* (Washington DC: Department of Commerce, 1977).

⁵⁷ *Report on the Panel on Engineering and Commodity Standards of the Commerce Technology Advisory Board*. Francis L. La Que, Chairman, 1965. Parts A & B.

policy (as defined in the Circular); to coordinate agency views; and to develop, where possible, a single, unified position. DOC assigned this task to the Interagency Committee on Standards Policy (ICSP),⁵⁸ which operates under the direction of NIST.⁵⁹ Overall oversight rests with OMB, and the committee is required to report back to it on a triennial basis.⁶⁰

While active during its first year, this interagency committee has reportedly not met for the last year and a half.⁶¹ Meetings focused on implementing the Federal policy to encourage agency use of voluntary standards, as directed in its mandate. The committee also set standards for agency participation in voluntary standards bodies and laid out guidelines for public sector use of private certification bodies. Participants claim, however, that scant attention was devoted to evaluating existing policy or finding ways to improve it.⁶² Nor was there much effort to identify future standards issues or to view them strategically as part of the industrial infrastructure.⁶³ Some members claim that the group is not a useful mechanism for sharing information or coordinating interagency issues. One person noted with some irony that his chance of interacting with agency counterparts was better at private sector meetings of ANSI's Government Member Council.

Some of the problems faced by the Interagency Committee on Standards Policy stem from its organizational form. Interagency committees have a

poor record of policy coordination.⁶⁴ Among the problems associated with them are that they tend to bury problems rather than resolve them; make it difficult to get tasks accomplished because too many people with only a peripheral interest become involved; dilute interest in, and commitment to, addressing a problem; and lead to outcomes based more on the distribution of power within a committee than on policy considerations.⁶⁵ Such problems are clearly reflected in the Interagency Committee on Standards Policy.

The Office of Management and Budget (OMB) reviews the work of the ICSP on a triennial basis. Although OMB is the ultimate coordinating mechanism in the Federal Government, it can do little more than establish a policy directive.⁶⁶ There is little staff support in the area of standards. The Deputy Director of the Office of Federal Procurement Policy is in charge of overseeing Circular A-119. However, there is no one person at OMB who focuses explicitly on standards.⁶⁷

A second interagency task force was setup under the auspices of the Office of the U.S. Trade Representative (USTR). Although somewhat more active than the NIST committee, its focus is much more limited. Agency members meet when necessary to try to reconcile trade and other agency policies.⁶⁸ The committee is not meant to be a forward looking group, or to consider standards in strategic terms. Like the Office of the USTR, it tends

⁵⁸ The ICSP was established in 1985 to coordinate Federal Agency Standards Policy.

⁵⁹ The Committee's Charter goes further than OMB Circular A-119 in calling for interagency consideration of standards policy.

⁶⁰ OMB Circular A-119. See ch. 2 for a history of this circular.

⁶¹ It should be noted that some subcommittees met more frequently. The Commerce mandate establishing the committee requires that a III@ be held at least once a year.

⁶² Annual report t. Secretary of Commerce cited and tracked progress of agencies in using voluntary standards. But the analysis that was provided with the data is minimal.

⁶³ The ICSP Charter Policy, developed by commerce is much broader than the OMB Circular. However, overall support for the Committee was not sufficient to support this broader mandate. John Donalson of NIST suggests that the problem was circular. Because the OMB mandate was narrow, people at higher, policy levels didn't get involved. Without their involvement however, it was impossible to expand the Committee's mandate. John Donalson, NIST, personal communication.

⁶⁴ Characterizing this form of arrangement, Harold Seidman notes, for example:

Interagency committees are the crab grass in the garden of government institutions. Nobody wants them, but everybody has them. Committees seem to thrive on scorn and ridicule, and multiply so rapidly that attempts to weed them out appear futile." But, as

Seidman is quick to add: "The harshest critics have yet been unable to devise satisfactory substitutes.

Harold Seidman, *Politics, Position, and Power: The Dynamics of Federal Organization* (New York, NY: Oxford University Press, 3rd. ed., 1980), p. 207.

⁶⁵ Ibid.

⁶⁶ Ron C. Moe, "The Hud Scandal and the Case for an Office of Federal Management" *Public Administration Review*, July/Aug. 1991, vol. 511, No. 4, pp. 298-307.

⁶⁷ David Gold, OMB, personal communication.

⁶⁸ Susan Troje, USTR, personal communication.

to be reactive on standards issues, responding only when the need arises.

National coordination of communication standards issues is more effective. Because these standards are developed in the Consultative Committee for International Telephone and Telegraphy (CCITT), which is part of the International Telecommunications Union (ITU)—an international treaty organization—the State Department coordinates and presents the U.S. position. Even in this case, however, there are complaints, both in the United States and abroad, about the lack of a unified U.S. position.

The Federal organization of U.S. standards policymaking contrasts sharply with that of other countries. In all other major industrialized countries, governments view standards and the standardization process as part of the industry infrastructure, and they support it accordingly. While national differences exist, in all of these countries standards policies are set nationally and worked out with private sector organizations.⁶⁹

The Need for Greater Attention to How Other Governments Use Standards to Create Markets for their Nations' Industries

Having no comprehensive national standards policy of its own, the United States has tended to disregard or underestimate other governments' efforts to use standards as marketing devices to expand their trading opportunities. This short-sighted approach could undermine U.S. competitiveness. If not addressed quickly, the outcome could be irreversible. There are significant advantages to being the "first" to get a standard accepted. When one standard starts to take hold, more and more companies jump on the bandwagon to adopt it. And

once a standard is in place, trading relationships can become locked in.

Most other countries—developed and underdeveloped alike—view standards as part and parcel of their industrial infrastructures. Not surprisingly, therefore, foreign aid programs often focus on standards. This is a mutually advantageous arrangement. Industrialized countries are eager to help developing countries set up their standards programs. If they can influence the choice of standards in the developing world, trade will likely follow. Developing countries also welcome such assistance. Standards can help them create a national market. Equally important, they provide an excellent—as well as unobtrusive—source of technology transfer.

Most U.S. competitors are actively involved in programs of this sort. The Japanese Five-Year Plan for Industrial Standards, for example, calls attention to the role that such technical cooperation can play.⁷⁰ In pursuit of this strategy, the Ministry of International Trade & Industry has sent technical experts to five countries to assist them in the development of their standards programs.⁷¹ In the Philippines, for example, the Japanese International Cooperation Agency conducted a 13-person team, 500-person-day study of the Philippine national standardization system and provided a \$23.1 million grant to establish 3 regional labs.⁷² At the same time, the Japanese Government has paid for 28 people from developing countries to come to Japan for language and technical training.⁷³

The Europeans have similar programs.⁷⁴ With financial support totaling \$16 million from the EEC and Germany, an electronic component test laboratory has been set up in India. The laboratory receives technical support from the German Agency for

⁶⁹ See ch. 3.

⁷⁰ According to the plan:

Standardization and quality control, which are closely related to each other, are a technical infrastructure of industries. It is necessary to propel technical cooperation in this field to correspond to requests from developing countries. From this viewpoint, efforts should be directed to securing human resources in this field. It should be noted that implementation phases of technical cooperation should be designed to incorporate appropriate measures reflecting the developing stage of country cooperation.

As cited in Robert Toth, "Promoting U.S. Competitiveness by Promoting U.S. Standards," unpublished paper.

⁷¹ John R. Hayes, "Who Sets Standards?" *Forbes*, Apr. 17, 1989, pp. 111-112.

⁷² Robert Toth, Toth Associates, personal communication.

⁷³ Ibid.

⁷⁴ As in the case of Japan, this EEC has adopted a formal policy to this end. As described in the EEC Commission Communication, *Cooperation in Science and Technology with Third Countries* (June 1990):

Several developing countries have, by virtue of demographic and economic importance, achieved a position which gives them substantial international weight either in terms of international leadership or of potential markets. It consequently behooves the Community, in the area of cooperation to reinforce their position and interests by contributing to integrating them more fully into the various European policies in such areas as commercial relations or the definition of norms and standards."

Technical Cooperation. Specialist training is provided in Germany, the United Kingdom, the Netherlands, and Ireland. The European Commission has also conducted a study of the Association of South East Asian Nations (ASEAN) standardization base and provided a grant of \$6 million for an initial effort to implement its recommendations. Closer to home, the European Commission has provided Mexico \$1.5 million in consultation and training in standardization, testing, and quality system certification. Moreover, the European Committee for Standardization (CEN), the German Institute for Standards (DIN), and the Spanish Standards Institute (AENOR) have each offered to provide a resident expert in Mexico.⁷⁵

The United States has no equivalent programs. Most U.S. aid programs are dissociated from trade issues. In the fall of 1989, a law was passed directing the Department of Commerce to accept invitations from developing countries to provide assistance in developing standards programs. However, funding, which was to come from the private sector, has not been forthcoming. As of the spring of 1989, only \$85,000 had been raised. According to one source, German industry raised \$5 million for a similar effort in the course of 20 days.⁷⁶

Failure to compete in this arena will make it difficult for the United States to enjoy the benefits of a global economy and the future growth in world trade. The developing world will be a major world market, a fact that the United States cannot afford to ignore. Future trade opportunities are great. In the area of telecommunications alone, for example, estimates are that India will spend more than \$40 billion over the next 10 years. Already, the ASEAN bloc is the United State's fourth largest trading partner.⁷⁷

Persistent Due Process Issues

Due process issues are inherent in standardization. Safeguards must be built into the process, because manufacturers and users can use standards to set prices and constrain trade. In a pluralistic society such as the United States, competition and countervailing forces provide such safeguards. It is assumed that no one party can dominate the standards setting process because it is transparent and everyone can participate. *Due process, however, is not a constant. Agreement about what is a fair and open standardization process changes over time and in different circumstances. Today, the rapid advance of technology, the shift to a global economy, the rise of user groups, and the desire to substitute voluntary standards for regulation will likely put the issue of due process into much starker relief.*

The meaning of due process in standards setting has changed throughout American history. Earlier it was viewed narrowly. The first Federal efforts to promote product standards, for example, were taken on behalf of business. Secretary of Commerce, Herbert Hoover, sought to promote product standardization through the National Bureau of Standards, believing that standards would reduce waste and revive the post-war economy.⁷⁸ Although business interests were balanced, there was no effort to bring consumers into the standards process. In fact, consumers and their demands for variety were seen as the major source of business' problem.⁷⁹ This arrangement broke down, however, when consumers requested that the Bureau rate products according to quality standards. Quick to react, business decided that standards setting should be a strictly private sector affair.⁸⁰

The right of the private sector to determine the extent of due process was challenged in the 1970s with the rise of the consumer movement and

⁷⁵ Robert Toth, Toth Associates, personal communication.

⁷⁶ Hayes, op. cit., footnote 78.

⁷⁷ Robert Toth, Toth Associates, personal communication.

⁷⁸ Cochrane, op. cit., footnote 65.

⁷⁹ As described by Hudson in 1928:

The five years immediately following the World War were marked by a tendency on the part of industry to return to the old uneconomic conditions of over-diversity. Many products which had been simplified by the Conservation Division of the War Industries Board were again offered in a bewildering variety of sizes, types and shapes in an effort to break the "buyers' strike" of 1919 and 1920. In the scramble for sales volume during the industrial depression of 1921 this condition was so aggravated as to suggest a study of the situation with a view to possible remedies.

Ray M. Hudson, "Organized Effort in Simplification," *Standards in Industry*, *Annals* of the American Academy of Political Science, 1928, p. 1.

⁸⁰ Cochrane, op. cit., footnote 65.

growing concerns about antitrust. In 1974, the Federal Trade Commission (FTC) investigated the entire private standards setting process.⁸¹ After extensive hearings, at which over 200 people testified, it concluded that the entire standards system should be regulated, and a rule was proposed that would require standards setters to meet a substantive “fairness” criterion. These conclusions were very controversial, however.⁸² Under a new administration, the FTC reversed its course. Viewing due process less comprehensively, it decided to enforce standard infringements of antitrust law on a case-by-case basis.⁸³

The definition of due process will continue to be subject to debate. In a global economy, questions will arise about who should participate in standards setting, and in which organizations standards activities should be centered. More and more standards will be set at the international level, but the costs of international participation will be higher. Many small companies and public interest groups will be left out. Moreover, if standards decisions are made increasingly at the international level, these groups will be left out of the domestic policymaking processes as well (see ch. 4).⁸⁴

Standards decisions will also be made by regional standards setting bodies. While large translational corporations can gain access to these processes by setting up subsidiaries abroad, most small companies cannot. Governments, themselves, may need to be the standards bearers for due process, seeking access for their nation’s industries to international standards processes. Together these governments

will have to agree on an international norm for fairness in standard setting.

The speed of technological advance together with the increased complexity of many standards issues may also upset existing notions of due process. Assuring all interested parties a voice in standards processes slows them down. When the system cannot keep pace with technological change, producers and large users seek alternative solutions, which are often less open. In the area of telecommunications and computer technologies, for example, standards setting can take between 4 and 8 years.⁸⁵ This lengthy process could undermine the market for some products.⁸⁶ To get a quicker response on standards, some producers are setting up standards consortia. Although they have been successful in speeding up the process, their membership is limited⁸⁷ (see ch. 2).

Due process issues are also likely to arise if more and more regulatory decisions are based on voluntary consensus process standards. Requirements for due process may vary, depending on economic context and the type of standard in question. Where market share is distributed among competing producers, and users are either large or well organized, the social consequences of limited participation in standards activities may be positive. The social outcome is likely to be negative, however, when users are unorganized and/or there is a dominant firm. This latter situation is most typical in areas such as health, safety, and the environment, which the government has typically regulated. In relying on voluntary standards, therefore, Federal agencies may need to focus greater attention on due process.

⁸¹ The use of standards for anticompetitive purposes is not new. For examples of cases where the courts struck down standards for antitrust reasons, see *Milk and Ice Cream Can Institute v. F. T. C.*, 152 F.2d 478 (7th Cir. 1946); *United States v. Institute of Carpet Manufacturers*, CCH Trade Reg. Service (9th ed.), par. 52,517 (S.D.N.Y.); *Bon Crown and Cork Co. v. F. T.C.*, 176 F.2d 974 (4th Cir. 1949); *Radian Burners v. Peoples Gas Co.*; and more recently, *American Society of Mechanical Engineers v. Hydrolevel Corp.* 456 U.S. 5556 (1982).

⁸² FTC, op. cit., footnote 12.

⁸³ “Memorandum to the Federal Trade Commission from Amanda B. Pedersen,” Aug. 29, 1985.

⁸⁴ This is a central concern of many health, safety, and environment groups. Mark Ritchie, Institute for Agriculture and Trade Policy, personal communication.

⁸⁵ The growing complexity of standards issues puts additional burdens on standard setting institutions. This is reflected in the extended period of time required for standards to be formally ratified, and the rapid multiplication of standard setting committees and subcommittees. As one journalist observing international standards meetings has described:

The content [of the materials] is technical, voluminous, and difficult. . . . the minutes look like telephone books. . . . Readings come to several hundred pages of technical matter each month.

See, Timothy Haight, “Standards-setting and the Limits of Journalism,” *CommunicationWeek*, Mar. 14, 1988, p. 14.

⁸⁶ Providers of frame relay services for example, had only a small time period in which to establish a market for their product. One of its most important selling features was that the product was available to meet an existing market need. Had frame relay providers waited too long, their product might have been superseded by cell relay services such as switched multimegabit data service (SMDS), which were still in the development phase.

⁸⁷ Garvin, op. cit., footnote 7.

As revised, OMB Circular A-119 virtually eliminated all due process requirements.⁸⁸

Criteria for Evaluating Policy Strategies and Options

Many standards setting problems cited in this report are persistent problems that have been identified before. The inability to deal with these problems reflects the high stakes and significant ideological differences involved. There are no perfect solutions. Stakeholders strongly disagree about what constitutes a perfect state of affairs. Thus, any politically viable solution is likely to require compromises. To lay the groundwork for such a compromise, OTA has identified a number of criteria that a standards policy must meet if it is to adequately address the Nation's standards needs.

Cultural Consistency

Standards setting institutions strongly reflect economic and cultural conditions and constraints. In the United States, organizations have often sprung from the bottom up, formed spontaneously at the grass roots in response to perceived needs.⁸⁹ These types of organizations reflect the American preference for market solutions and a strong cultural and political predisposition towards voluntary organizations. Standards policies are likely to be more politically viable to the extent that they build on this tradition. Private sector solutions are also likely to be favored, given the present deregulatory political environment.

Flexibility in Dealing With Different Industry Sectors

Standards setting varies across industry sectors, so standards problems and their solutions will also differ. Rapidly advancing technologies require an especially timely standards process. Regulatory standards merit special attention to due process. Anticipatory standards need to be implemented and certified. And standards critical for trade, or for the

national infrastructure, may call for some form of government promotion or involvement. Government can address this whole array of needs with greater precision and less disruption if standards processes allow for a flexible response. To develop an appropriate range of flexible responses, policymakers will need to know more about how product types, market structure, and organizational contexts affect the outcome of standards setting processes.

Capability for Evaluation and Foresight

The factors and conditions that drive standards setting processes are in a state of great flux. Nations are being integrated into a global economy; technologies are rapidly advancing and, in many cases, converging; powerful private sector translational organizations are emerging; and governments are redefining their roles in advanced industrial societies. If standards setting bodies are to perform effectively in such a rapidly changing environment, they must have an ongoing capability to evaluate their performances and to assess and plan for their futures.

Provide for the Most Efficient and Cost Effective Use of Resources

Standards setting will likely be costly in a global economy based on rapidly advancing technologies. Bringing together sufficient economic resources to support standard setting processes is very difficult due to the public goods nature of standards. If standards setting bodies are to have adequate support, new ways must be found to share costs and reduce unnecessary technical and organizational redundancies. Achieving this objective will require the system to have a broad base of legitimacy.

An Incentive Structure Designed to Promote Cooperation

One major obstacle to altering the standards setting process has been the widespread belief that change could only take place at the expense of one party or another. As a result, stakeholders have

⁸⁸ Memo to Agency Heads from David Stockman regarding revised OMB Circular A-119.

⁸⁹ This aspect of the American character was noted early in American history by de Tocqueville. As he described in *Democracy in America*: *Nothing . . . is more deserving of our attention than the intellectual and moral associations of America. Americans of all ages, all conditions, and all dispositions constantly form associations. They have not only commercial and manufacturing companies, in which all take part, but associations of a thousand other kinds, religious, moral, serious, futile, general or restricted, enormous or diminutive. . . . Wherever at the head of some new undertaking you see the government in France, or a man of rank in England, in the United States you will be sure to find an association.*

Alexis de Tocqueville, *Democracy in America*, vol. 1 & 2 (New York, NY: Harper and Roe, 1966), pp. 110 and 106.

fiercely resisted any tampering with the status quo. If standards setting processes are to be improved, solutions must be developed that will distribute benefits on a broader basis.

Equivalency With International Norms and Procedures

Standards setting in the United States has usually been focused on domestic markets and conditions. Given the size of the U.S. market, there was little need for many industries to become involved in other national or international standards processes. This is no longer the case. In a world economy comprised of regional trading blocs, Americans cannot afford to remain aloof. To benefit fully from the growth in trade, the United States must become a leader in international standards. To play such a role, it must have equivalent-but not necessarily the same-standards setting procedures and institutional mechanisms.

Support of Due Process and Antitrust Prescriptions

Winning a standards battle-whether in a domestic or international market-is often a matter of speed. Thus, when the stakes are high, there may be a temptation to sacrifice due process for speed. Care must be taken to avoid this trade-off. Little is to be gained in the long run. Not only will the legitimacy of the system be questioned; if standards fail to represent a true consensus, they will not survive.

Policy Strategies and Options for Addressing Standards Setting Issues

Government can pursue a variety of strategies for addressing the standards development issues identified in this report. Three are discussed herewith a set of alternative policy options. Together, these strategies address the issues outlined in this report and suggest a variety of ways the Federal Government might deal with them. They are evaluated in terms of the seven criteria listed above. Each option will meet some criteria, and satisfy some stakeholders, better

than others. These strategies and options are depicted in figure 1-2.

Strategy 1: Provide more substantial Government support for standards development processes to address market failures resulting from public goods aspects of standards.

Many People--especially in industry-believe that standards development is a private-sector activity, best carried out in voluntary processes that closely replicate the marketplace. According to this perspective, the government is cast in the role of "user." As a user, the government should support the standards process in proportion to the benefits it derives. It need play no larger role; for it is assumed that voluntary processes, like market mechanisms, lead to the most socially optimal outcomes.

The marketplace for standards, however, is an imperfect one. As in the case of other semipublic goods, the standards market and policy arena occasionally fail. As a minimalist strategy, the Federal Government might provide support for the standards process, where such failures are likely to occur. Three areas merit attention:

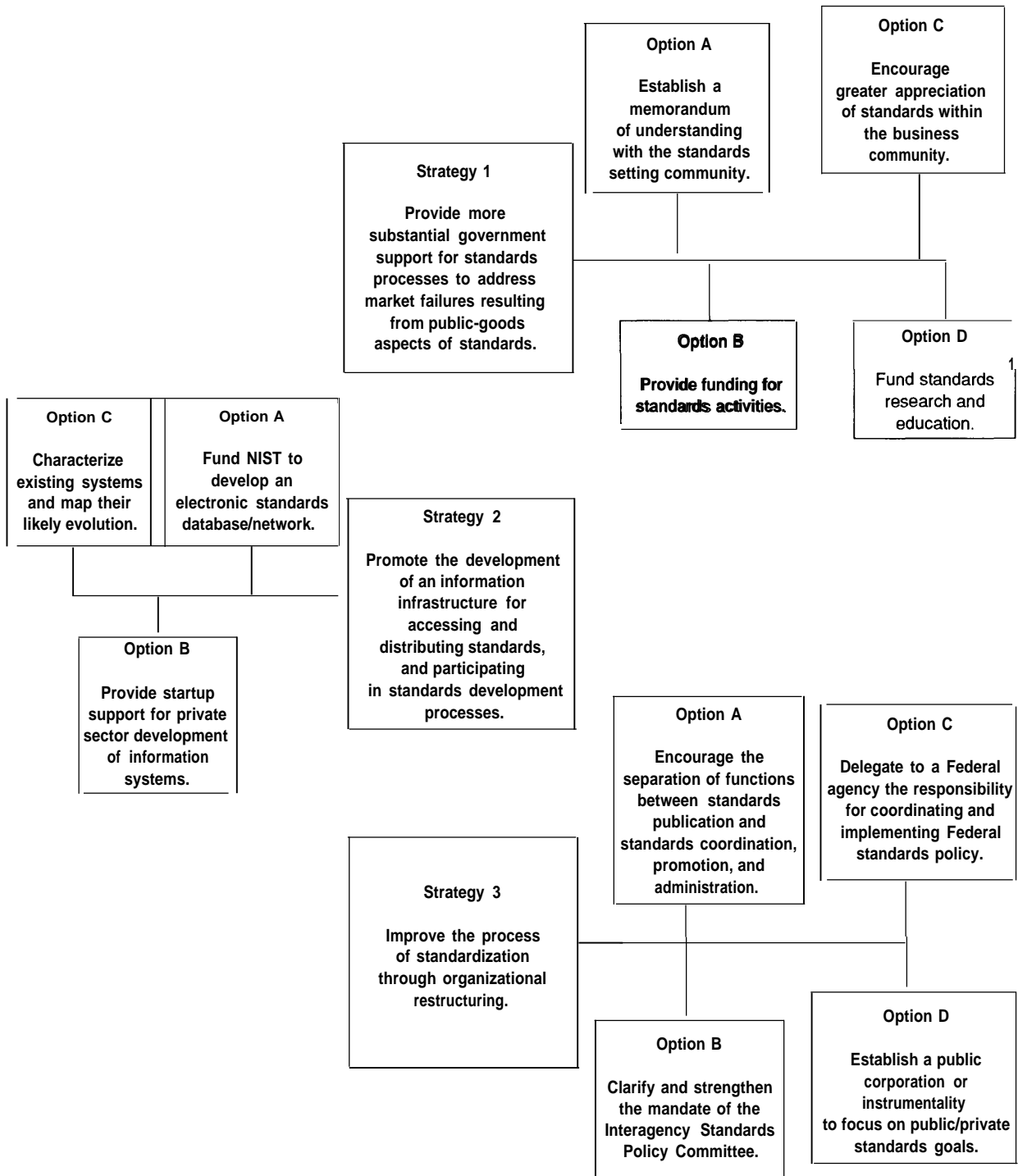
- the lack of government support for standard development, both politically as well as economically;
- the lack of business appreciation for standards; and
- the lack of an information infrastructure to support standards development processes.

Option A: Establish a Memorandum of Understanding With the Standards Setting Community

Most governments support their national standards development processes and provide for official national representation in international standards development organizations.⁹⁰ At a minimum, they formally acknowledge the public role performed by private national standards bodies and lay out mutual obligations among the players. Thus the British Standards Institution (BSI) is chartered by the

⁹⁰ See ch. 3.

Figure 1-2-Strategies and Options To Address Standards Issues



government of England,⁹¹ while the Deutsches Institut für Normung (DIN) has a memorandum of understanding with the government of Germany.⁹² In similar fashion, the government of Sweden has a contractual relationship between the public and private sectors. A special case is Japan where 205 private sector trade associations and professional societies work with the responsible government ministries to develop sectoral standards. These are in addition to the national standards developed by the private sector and these government ministries under the aegis of the Ministry of International Trade and Industry (MITI) and the Japanese Industrial Standards Committee.⁹³

Such arrangements help to legitimize standards organizations both at home and abroad. They also encourage participation in standards development activities, since businesses using nationally approved standards greatly reduce their liability.⁹⁴ Joint agreements between the public and private sector are especially useful in international standards negotiations, since they leave no doubts about where authority lies.

The U.S. Government has no similar arrangement with ANSI or other national standards bodies. This situation reflects the history of the American stand-

ards movement. In no other country were there so many grass roots standards organizations emerging to compete with one another as in the United States.⁹⁵ This history mirrors American political tradition and the predilection for separating the public and private sectors.

Today, ANSI is the self-designated national coordinating body for U.S. standards development organizations, and the self-designated national member body within the International Organization for Standardization (ISO). However, ANSI's status is not fully accepted by major players in the U.S. standards community, and a number of organizations continue to act independently in their international dealings with other national standards organizations. Nor have these organizations been willing to defer to ANSI leadership in domestic standards activities.⁹⁶ In fact, in some cases, they have preferred that government, itself, take the lead.⁹⁷

In July, 1991, ANSI proposed that the Government establish a memorandum of understanding with ANSI. Although there have been preliminary discussions, no action has been taken. Creating such a memorandum could facilitate U.S. international standards development activities. It could, more-

⁹¹ The British Standards Institution was first chartered in 1929; an additional Memorandum of Understanding was adopted in 1989 which recognizes the important role that standards play in international competitiveness. The Department of Trade and Industry laid out the rationale for reinforcing the Government's relationship to BSI in its white paper, *Standards, Quality and International Competitiveness*, which was presented to Parliament in July 1982. The report states:

The experience of other countries shows that strong standards systems capable of securing the industrial and trade benefits do not emerge spontaneously; they involve not only a legal structure but aspects of organization and attitude which evolve over a long period. Nor is it just a question of reproducing here the legal and institutional arrangements that have shown themselves successful in other countries. What is needed is to give strength and coherence to the existing national standards system. This requires the full support of manufacturers and purchasers in the private and public sectors and all those in central and local government who are responsible for drawing up technical regulations and specifications.

⁹² See CONTRACT between the Federal Republic of Germany, represented by the Federal Minister of Economics, and DIN German Institute for Standards (Deutsches Institut für Normung e. V.) represented by its President.

⁹³ R.B. Toth Associates, *Transparency and Accessibility of the Japanese Standardization System*, November 1991.

⁹⁴ In Germany, for example, the burden of proof shifts to the user, when DIN standards are met. Dr. Helmut Reihlen, Dr. Christian Kaiser, DIN, personal communication.

⁹⁵ The Europeans are perplexed as to why such an arrangement does not exist. From their point of view, it would be mutually beneficial. The United States would have more influence internationally, if it spoke with one voice, and the Europeans would have a clearer picture of where the power to negotiate and make decisions lies. European interviews.

⁹⁶ A recent memo from the ASTM staff to the Board of ASTM, which outlines ASTM's reasons for not cooperating more with ANSI's international efforts, illustrates the problem. As described in the memo:

The importance to ASTM, and to ASTM's long range future, of the strategy which this committee endorsed was clear. If the ANSI prescription prevailed-if the U.S. adopted a strategy of committing its standardization efforts to ISO and agreeing to accept and use ISO standards-ASTM, would, overtime, decline from the largest voluntary consensus standards developer in the world to a "bit player" in a system dominated by ISO and ANSI. ASTM would become solely a feeder of U.S. consensus standards and positions into ANSI for blessing as U.S. "national" standards and into ISO for blessing as "international standards." And, ASTM might not even to be able to play that limited role. If Europe and the U.S. agreed to adopt and require the use of ISO standards in their respective markets, sales of ASTM standards, nationally and internationally, might be so eroded that ASTM could not longer support itself.

ASTM memo to Members of the Board, regarding "ASTM's Public Position," dated December 12, 1991.

⁹⁷ Interestingly enough, German business supports the role of the Federal Government, because they don't want to deal with all the different laender (states). Dr. Helmut Reihlen, DIN, personal communication.

over, improve government cooperation with the private sector.

Even if government were disposed to such an option, it would likely not be politically viable, at least at this time. Competing standards organizations would not support a memorandum of understanding that would officially designate ANSI as “the” national standards organization. A compromise might be negotiable, however.⁹⁸ For example, organizations might accept ANSI as the recognized national standards body, so long as it were not a competitor, selling standards or if their markets for standards could somehow be preserved. Thus, if there is to be a more formal relationship between the government and the private-sector standards community, it will likely have to evolve as part of a comprehensive overall resolution of the conflict among standards organizations.

Option B: Provide Funding for Standards Activities

Most governments provide financial support for standards setting activities. In 1990, for example, the United Kingdom provided BSI £4,963,000 in grants; £455,000 for special activities; and £470,000 for technical assistance to exporters.⁹⁹ Some of this funding was used to support the attendance of British delegates to international standards meetings. In similar fashion, the German Government provides 15 percent of DIN’s expenses. These public funds are used primarily for programs that promote industry, increase competitiveness, and provide protection against the risks of technology, as well as for DIN’s membership subscriptions in international and European standards organizations.¹⁰⁰

Whether or not private standards bodies receive Federal funds can make a significant difference in terms of their resources and the kinds of programs they can support. (Mention has already been made of the aggressive export programs that many foreign governments now support.) Some foreign governments also finance their nationals’ participation in international standards proceedings. In addition,

many governments support the development and use of electronic media to provide access to standards information. The German Government, for example, has provided a subsidy over a 7-year period of 25 million deutsche marks for the development of an electronic database and standards delivery system. European standards organizations have also developed special programs to assist businesses in accessing and using standards for exporting goods and services. The French standards institute, AFNOR, for example, has set up a U.S. subsidiary (NOREX) to help French businessman negotiate their ways through the U.S. standards maze.¹⁰¹

Apart from the membership dues paid by Federal agencies to standards bodies, the U.S. Government provides almost no funds for private-sector standards development. Even the recently established NIST program, aimed at promoting trade through standardization in developing countries, depends heavily on business contributions. Depending entirely on membership dues and the sale of standards, ANSI has insufficient financial and human resources to carry out programs at the same level and intensity as the Europeans. For example, as compared to DIN’s 900 employees, BSI’s 1,000 employees, and AFNOR’s 550 employees, ANSI employs only 110 people. Not surprising, under these circumstances, ANSI currently has no significant education or information programs.¹⁰²

One reason for this lack of Federal support is that members of the private sector have been extremely reluctant to accept *any* support from government for fear of strings attached.¹⁰³ They are concerned, moreover, that such support, once given, might be withdrawn at any time, given a budget crisis or change in political climate.¹⁰⁴ Moreover, many in the U.S. standards community would be uncomfortable being cast in a semipublic role. Most Europeans have little problem in this regard.

As the costs of standards activities increase, however, members of the community may become

⁹⁸ See footnote 103.

⁹⁹ BSI Annual Report and Accounts 1989-1990, nd.

¹⁰⁰ DIN, *One World, free trade, free standards*, p. 4, nd.

¹⁰¹ Europeans have a long tradition of supporting export activities that goes back to the first standardization efforts. (See ch. 5.)

¹⁰² ANSI does publish a newsletter, and has begun developing electronic retrieval systems. ANSI has also begun to move in the area of education, but its resources are, by necessity, spread very thin.

¹⁰³ NIST hearings, op. cit., footnote 1.

¹⁰⁴ Ibid.

more receptive to Federal support. Ideally, from their point of view, Federal contributions should carry no obligations. Preferably, they would take the form of tax credits or simple grants. Funding of this sort, however, might have a low pay-off from the government's point of view, since it could not be targeted to achieve Federal policy goals.

Option C: Encourage Greater Appreciation of Standards Within the Business Community

The Federal Government could also support the standards development processes indirectly, by educating business and the public about the important role of standards. Increased awareness could lead to increased support for, and participation in, national and international standards activities. Moreover, using standards effectively within industry can also improve productivity, and hence American competitiveness.

This option accords well with a free market approach. It is user-driven, and aims merely to fill an information gap. By generating an awareness of standards, it seeks to stimulate a demand for them. Thus, it is unlikely to distort the marketplace.

Currently, the Federal Government does very little to promote standards. Whereas in its early years the National Bureau of Standards organized business groups to convene for discussions of standards issues,¹⁰⁵ NIST has only limited outreach and/or educational programs except for the publications of standards directories and reports. Business concerns about standards are generally channeled to the Federal Government through the Interagency Fed-

eral Advisory Committee (IFAC),¹⁰⁶ but there is no information flowing in the opposite direction. Although government agencies, such as the Office of the International Trade Administration (ITA), or the United States Trade Representative (USTR)¹⁰⁷, respond to business queries and concerns about standards, they make little effort to educate businesses as to the value and use of standards in trade.¹⁰⁸ Even within the Small Business Administration (SBA) there is no standards education or awareness program. The most elaborate promotional event in which the government is involved is National Standards Week.¹⁰⁹

This situation is greatly different from that in other countries. In Great Britain, for example, the British Standards Institution is viewed as an organization that not only sets standards, but also services industry.

The business community would likely welcome a government initiative of this sort. Some might prefer, however, that it come from the private sector. Private standards organizations, for example, could view this option as an usurpation of their roles. On the other hand, because standards organizations are in competition with one another, some might prefer that government perform this kind of function to provide a neutral forum.¹¹⁰

Option D: Fund Standards Research and Education

National competence in dealing with standards issues could be greatly enhanced through Federal support of academic programs and research relating to standards. Few schools of engineering or business

¹⁰⁵ Cochrane, *op. cit.*, footnote 65. Moreover, during this phase of American standard setting, it was the chief executives of American business and top leaders in science and education who were involved. In 1939, the members of the American Standards Association Advisory Committee included: Lammont du Pont, President, E.I. du Pont de Nemours & Co., Walter S. Gifford, President, American Telephone & Telegraph, J.H. McGraw, Jr., President, McGraw-Hill Publishing Co., A.W. Robertson, chairman of board, Westinghouse Electric & Manufacturing Co., Alfred P. Sloan, Jr., chairman of the board, General Motors Company, E.R. Stettinius, Jr., chairman of board, U.S. Steel Corp., and Walter C. Teagle, chairman of board, Standard Oil Company of New Jersey, to name a few. See for a discussion, Edmund A. Prentis, "Leading Executives for ASA Advisory Committee," Report, Annual Meeting ASA, June 1939; See also, Edmund A. Prentis, "Democratic Methods Widen ASA Influence, Bring Agreement Between Diverse Groups," Report Annual Meeting ASA, January 1940.

¹⁰⁶ The Industry Functional Advisory Committee on Standards for Trade and Policy Matters was established on Mar. 21, 1979, and extended on Mar. 11, 1982, Mar. 6, 1984, Mar. 7, 1986, and Mar. 8, 1988, by the Secretary of Commerce and the United States Trade Representative pursuant to the authority delegated under Executive Order 11846 of Mar. 27, 1975. The Committee consists of approximately 40 members, with approximately 20 members from the Industry Sector Advisory Committees and approximately 20 from such private-sector areas as to provide expertise on the subject of standards.

¹⁰⁷ The USTR coordinates trade policy between the President, Congress, and the private sector. It manages the private sector advisory system, consults regularly with Congress, and chairs the interagency committees which develop trade policy with the Executive Branch. 1991 *Trade Policy Agenda and 1990 Annual Report of the President of the United States on the Trade Agreements Program*. p. 103.

¹⁰⁸ Don Mackay, National Association of Engineers, and Bob Toth, Toth Associates, personal communications.

¹⁰⁹ Although S.J. Res. 291 would have designated the week Oct. 14, 1990 as "National Standards Week," it failed to pass. Don Mackay, National Association of Engineers, personal communication.

¹¹⁰ This point came up a number of times during interviews with stakeholders.

schools provide course materials or sponsor research projects focusing on standards. Even in those cases where research is being conducted, there is little cross fertilization of ideas from one circle of scholars to another. Most research takes a relatively narrow economic perspective, and fails to take into account a number of factors affecting standards outcomes:

- the role of standards organizations themselves, and their relationships to one another and the industry community;
- the full range of motivations for corporate participation in standardization¹¹¹; and
- the impact of a global economy and the globalization of the standards process.

Moreover, most ongoing research focuses on existing problems; there is almost no current work being done to anticipate future standardization problems or standards needs.

Federally sponsored research about standards processes is sporadic, at best.¹¹² The National Science Foundation has funded some economic research on standards, specifically in the area of networking technologies. But it is not typical of the projects NSF is likely to fund. Much of the general policy oriented research at NSF has been cut back, so funding would have to be provided at the program level.¹¹³ As one NSF program director pointed out: "From a philosophical perspective, standards are the last thing that we would look at. That's applied research; we are interested in science."

Research on standards could also be generated through the National Research Council (NRC), which undertakes 80 percent of its research at the behest of Congress. The NRC has already undertaken an investigation of information technology standards.¹¹⁴ Because NRC research is organized on a committee basis, it could help to bring a multidisciplinary

approach to the study of standards processes. However, such projects are generally one-time efforts, so they are unlikely to stimulate ongoing research.

Strategy 2: Promote the Development of an Information Infrastructure for Accessing and Distributing Standards, and Participating in Standards Development Processes.

Information and communication technologies can play a critical role in the standards development and implementation processes. Online systems connecting standards developers and users across the globe can help standards organizations keep pace with technological change and improve the efficiency and effectiveness of all standards activities. Standards developers and users can be apprised of standards activities and access standards on a real-time basis. Shared, distributed information systems allow standards developers to reduce costs through interactive online participation at a greatly reduced cost. Access to such systems can facilitate the implementation of standards in business and industry.

Much of the technology needed to create such systems is already--or will soon be--available.¹¹⁵ Existing services such as CompuServe and Internet, for example, can be used to develop standards through electronic mail exchanges. Off-the-shelf technology is also available to create online distributed libraries, which could be designed to house standards-related information.¹¹⁶ In addition, databases can be automated to notify parties of standards-related subjects and activities of interest to them.¹¹⁷ In the near future, personal computers will be equipped to perform this function on a personalized basis. With the deployment of high-capacity networks and the development of standard interchange

¹¹¹ Most economic literature look at the strategic use of standards to achieve competitive advantages in the marketplace. More attention needs to be given to the use of standards to improve the production process, and the role that standards play in technology transfer.

¹¹² Dan Neulin, Larry Rosenberg, National Science Foundation personal Conversations.

¹¹³ Dan Neulin, NSF, also interviews with program directors, National Science Foundation, personal communication.

¹¹⁴ See Crossroads of Information Technology Standards, op. cit., footnote 1.

¹¹⁵ There are four basic categories of electronic systems: 1) indexes of standards; 2) delivery of full-text; 3) announcement of new standardization projects and the provision of drafts for review; and 4) conferencing to develop and revise standards. Some of these systems are already underway; others will require additional work. R. B Toth (R.B.Toth Associates) Lee McKnight (MIT) Anthony Rutkowski (ITU) and Carl Malamud (Carl Malamud Consultant), personal communications.

¹¹⁶ Marvin Sirbu, reformation Networking Institute, Carnegie Mellon University, personal communication.

¹¹⁷ Selective dissemination of information (SDI) has been available on Dialogue for more than 5 years and these features have been available on standards databases File 92 and File 113 for quite some time.

formats for multimedia electronic mail,¹¹⁸ more and more kinds of standards activities can be carried out interactively online.¹¹⁹

A number of standards groups are already taking advantage of such technologies. Many are beginning to setup standards databases. Some provide bibliographic data about standards; others the full text. In 1981, for example, ANSI created a database of standards as well as a Project Identification Notification System (PINS), which compiles data about new and upcoming ANSI standards projects and activities.¹²⁰ ANSI has also undertaken a project to deliver standards using CD-ROM. Eager for the system to be fully functioning, the Member Council of ANSI's Board has recently set up a committee to hasten its development.¹²¹ The Library of Congress is also considering whether to include a bibliographic database on standards as part of its Science and Technology Information Initiative.¹²²

Similar initiatives are taking place at the international level. Within the European Community, the Commission has helped to finance a joint database of German, French, and U.K. standards. These standards are cross referenced and available in each language.¹²³ In accordance with Resolution 18, passed in 1988 at the Melbourne meeting of the CCITT, a group has been set up to promote electronic document handling within the worldwide telecommunications standards community.¹²⁴

Information and communication technologies can also be used to sell standards information and

full-text standards in electronic form. Online sales of expanded bibliographic citations are provided through Information Handling Services and Dialogue. Although these services have existed since 1980, they have not been as popular as one might expect; only 2,000 subscribers worldwide regularly use these two standards information services. One major barrier to their use is the need for trained intermediaries to perform searches. Cost is also an inhibiting factor; users are discouraged from spending much time online because the meter is constantly ticking.¹²⁵

CD-ROM is the most cost-effective media for distributing MI-text standards. CD-ROM databases are also more popular than online systems.¹²⁶ They are easier to use and do not require information search specialists. However, CD-ROM full-text standards are expensive, so their market is relatively narrow. The major customers are large companies that can afford the price. Moreover, not all kinds of standards are available in this form. Generally it is the more voluminous, complex sets of standards that are published electronically, since they tend to yield the greatest profits.¹²⁷

In the United States, two major companies publish standards in CD-ROM—Information Handling Services (IHS), which accounts for close to 85 percent of all sales, and the National Standards Association (NSA) which covers the rest.¹²⁸ These companies do not create standards. They are essentially resellers who sign licensing agreements to sell standards from standards-development bodies.¹²⁹ Both have in-

¹¹⁸ See, for a discussion Nathaniel S. Borenstein, "Multimedia Electronic Mail: Will the Dream Become a Reality," *Communication of the ACM*, April 1991, vol. 34, No. 4, pp. 117-119.

¹¹⁹ Bob Smith, Nynex, personal communication.

¹²⁰ This system is not online. Interested parties contact ANSI for this information which is then made available to them. Stacy Listner, ANSI staff, personal communication. It should be noted that a number of stakeholders claimed that the process works too slowly.

¹²¹ Paul Mercer, Boeing, personal communication.

¹²² Presser Gifford, Director of Scholarly Programs, The Library of Congress, personal communication.

¹²³ Dr. Helmut Reihlen, DIN, personal communication.

¹²⁴ Bob Smith, Nynex, personal communications. Ironically, one of the problems that inhibits electronic data exchange is that the CCITT and the ISO format their documents differently. Thus, there is a need to standardize this aspect of the standardization process.

¹²⁵ Bob Toth, R.B. Toth Associates, personal communication.

¹²⁶ Although these databases have been available for only the past year or two, they already have more subscribers than online systems. Bob Toth, Toth Associates, personal communication.

¹²⁷ Ibid.

¹²⁸ Online systems are not effective for selling full-text standards. Two major problems are the graphic content, which requires the use of high cost imaging technology, and the lack of standards.

¹²⁹ Deferring to commercial distributors, a number of standards developing organizations have worked with NSA and IHS to develop effective systems and new products. These distributors perform an important service for them. Not only do they receive substantial royalty checks; they often benefit from greater sales. Distributors open new markets where the standards developer is not well known, or does not have easy access to the developer. Robert Toth, Toth Associates, personal communication.

vested considerable amounts of money testing the market, making false starts, developing and applying appropriate technology, and educating users. A substantial return on this investment will clearly take some time.¹³⁰

Standards processes and related activities can also be conducted electronically. For example, some standards-making organizations use technology interactively to develop standards online. The most well-known case is the Internet Engineering Task Force (IETF), which has responsibility for the TCP/IP protocol and a number of other internationally accepted networking standards. General Motors is also creating a system to develop standards online, as is the Defense Department with its CALS system. Communication systems are even being used to implement standards. Some companies are beginning to view the implementation and use of standards from a competitive perspective. They use their communication networks to speed up standards implementation and improve the quality of their products. The Boeing Corp., for example, has recently made a major investment in its communication system to this end.

Despite the success of many of these individual initiatives, online standards activities are still the exception rather than the rule. Moreover, most technology efforts are occurring independently of one another. Barriers to extending and coordinating these electronic standards related activities are financial and institutional, not technological. Authoring systems and networking can be expensive. The costs of a conferencing system include, for example: 1) the cost of software for *each* committee member, 2) the cost of online charges, and 3) the cost of storing the working document and ports to users.¹³¹ Among the institutional problems are concerns about copyright protection, lack of expertise and resistance to the use of technology, and competition among standards publishers.¹³²

One step the Federal Government might take to promote the use of technology, therefore, would be

to explore these problems in greater depth and identify creative ways to address them. Some possible options are laid out below.

Option A: Fund NIST to Develop an Electronic Standards Database/Network

Most developed countries provide financial support for national standards databases and retrieval systems. As noted above, the European Commission also provides such support for a community-wide database. The U.S. Federal Government has no program equivalent in size or scope. At present, NIST does not have a standards database.¹³³ Although MST used to maintain a computer database of U.S. voluntary engineering standards, called KWIC Index, it stopped maintaining the system for lack of resources.

One option for government, therefore, might be to provide funding for a national electronic standards database/network. Funding would probably need to be targeted as a line item for this project. If funds were provided discretionally from the general MST budget, support for the undertaking would be subject to administrative whim or expediency. Its future would likely depend more on the political ups and downs and internal affairs of NIST than on the national value of the project.

Most people in the standards community agree, in principle, on the value of an information infrastructure for carrying out standards-related activities. Small users would likely favor this option if it would give them greater, more affordable access to standards and standards-related materials. However, many might oppose a greater Federal role in its development, especially if government might compete with private-sector activities. Competition among standards organizations is much more intense in a global economy, so organizations are looking for new kinds of value-added services to provide. In these circumstances, standards bodies are suspicious of possible

¹³⁰ In addition, other private S&T organizations such as NIBS (construction and building standards) and CADIS (3-D graphics presentation of standard parts) have pushed the technology and developed the market. One estimate is that between \$40 to \$60 million has been spent by these four organizations, three or four now-defunct start-ups, and the SAE, ASTM, and IEEE on electronic delivery of standards. Robert Toth, Toth Associates, personal communication.

¹³¹ Standards organizations often view the costs for software, networking, etc. as costs that they can't pass onto committee members. Robert Toth, Toth Associates, personal communication.

¹³² See for one discussion, Tony Rutkowski, "Networking the Telecom Standards Bodies," unpublished paper, Version 3.0. Aug. 1, 1991.

¹³³ Walter Leight, JoAnne Overman, NIST, personal communication.

government encroachments in their areas.¹³⁴ Many in industry, moreover, are unfamiliar with NIST, and might be reluctant to see a database housed there. If this option is to be pursued effectively, therefore, care must be taken to work cooperatively with the private sector and to sort out the complementary roles.

If technology is used interactively to actually carry out standards processes, participation could be greatly expanded. However, at the same time, the balance of power within standards bodies would most likely be changed.¹³⁵ Thus, those exercising leadership under present circumstances may strongly oppose the substitution of technology for face-to-face relations, which is their stock in trade.¹³⁶

Option B: Provide Start-up Support for Private-Sector Development of Information Systems

Information and communication systems are often underfunded, especially in their early stages. As previously noted, information exhibits many characteristics of a public good; because it tends to be "leaky," its value is difficult to appropriate.¹³⁷ As a result, information systems often fail to attract adequate investment. Communication systems may also be slow to develop until they reach a critical mass. A communication network will up until a certain point-increase in value as more and more users are interconnected. Given this potential for underdevelopment, government might provide some start-up funding for private-sector projects.

One successful example of such an effort is the OnLine Computer Library Center (OCLC), an electronic bibliographic database developed jointly by university libraries with grants from the Council on Library Resources, the State of Ohio, the Department of Education, and private foundations.¹³⁸ These libraries contributed bibliographic information to a central database, which when compiled and put online was made accessible to them. Today, OCLC is a self-sufficient, nonprofit venture, competing with other similar operations.¹³⁹ To promote the system, the Federal Government did not have to make a major financial commitment, only provide enough support to launch the system and support the development of new innovative programs.¹⁴⁰

One advantage of this approach is joint funding. Joint funding not only encourages resource sharing; it can also help promote cooperation among highly competitive, or otherwise disparate, parties.¹⁴¹ In addition, by funding a project jointly, the government is not forced to second-guess the marketplace and pick winners and losers. This option is also appealing because government support can be limited to a certain time period or set of conditions.

An alternative way of supporting private-sector information-based standards activities is to subsidize use. Such an approach allows for competition, and lets the market allocate resources.¹⁴² Moreover, users deemed to have special needs, or whose involvement is considered necessary to the standards process, can be targeted to receive funds. If this approach is pursued, however, efforts will be needed

¹³⁴ This position is not surprising since, as Priscilla Regan has pointed out, organizations will likely be threatened by policies seeking to interfere with their information practices, since they are dependent for their existence and autonomy on information. See, Priscilla Regan, "Two Political Approaches to Information Policy," ch. 3, *Public Use of Private Information: A Comparison of Personal Information Policies in the United States and Britain*, (New York, NY: Cornell University, unpublished dissertation, 1981).

¹³⁵ Communication systems greatly affect power relationships within organizations. As Lucien Pye has pointed out:

Communications is the web of human society. The structure of a communication system with its more or less well-defined channels is in a sense the skeleton of the social body which envelops it. The content of communications is of course the very substance of human intercourse. The flow of communications determines the direction and the pace of dynamic social development. Hence it is possible to analyze all social processes in terms of the structure, content, and flow of communications.

Lucien Pye, *Communication and Political Development* (Princeton, NJ: Princeton University Press, 1963), p. 4.

¹³⁶ As William Lehr has shown, the technical outcome of standardizations processes will differ depending upon the organizational structure of standards bodies. See Lehr, op. cit., footnote 9.

¹³⁷ See for a discussion of some of the economic characteristics of information, Charles Jonsher, "Information Economics and Policy I (North Holland: Elsevier Science Publishers, 1983), pp. 13-35.

¹³⁸ This acronym originally stood for Ohio College Library Center, and was later changed to the Online Computer Library Catalogue System. For a description and history of OCLC, see Kathleen L. Maciuszko, *OCLC: A Decade of Development*, 1984. See also, Anne Marie Allison and Ann Allan, *OCLC: A National Library Network* (Short Hills, NJ: Enslow Publishers, 1979); Also, Richard Van Orden, OCLC, personal communication.

¹³⁹ David L. Wilson, "Researchers Get Direct Access to Huge Data Base," *The Chronicle of Higher Education*, Oct. 9, 1991, pp. A24-A29.

¹⁴⁰ Kathleen L. Maciuszko, op. cit., footnote 146.

¹⁴¹ It is important to note, however, that as OCLC became more profitable, issues of copyright and resource sharing emerged.

¹⁴² Martin Sirbu, Carnegie Mellon University, personal communication.

to assure that standards activities are interconnected and widely accessible on an open, and transparent, basis. Otherwise, the emergence of competitive, independent technology-based systems could serve to inhibit access to information and due process. Inefficiencies might also result from the perpetuation of overlapping projects and duplication. Technical architectures for linking decentralized database systems are being developed, which might help alleviate such problems.¹⁴³

Option C: Characterize Existing Systems and Map Their Likely Evolution

One difficulty in developing Federal strategies to promote electronically based standards information activities is the lack of information about existing systems and the directions they are likely to take in the future. With few exceptions, these standards systems are being developed independently of one another. It is only recently, for example, that the three major international standards bodies—the ISO, the ITU, and the IEC—have begun discussing how their information systems might be linked. Thus, innovations are unlikely to be shared, and systems will evolve without reference to the latest technical and institutional developments. There are today, for example, many exciting things happening within the Internet community that are useful in the context of standards. There has been little cross fertilization of ideas, however.¹⁴⁴

If the government is to develop effective programs to promote online standards activities, it will need to have a better idea of the key players, their plans and competing interests, and the potential resources that they can bring to bear. To initiate such an undertaking the Government might sponsor a

major conference or convention, perhaps under the auspices of the Library of Congress, NIST, or the National Academy of Sciences. With a clearer picture of what is already going on, and what is at stake for all players, it will be easier to develop policies calling for complementary, rather than conflicting, roles. If successful, such a conference might lead to more enduring relationships. For example, such a group might be reconvened—or even maintained online—to discuss and debate issues, such as copyright, that have typically stood in the way of the development of online standards systems. Research might also be undertaken to fill in knowledge gaps and raise the level of debate.

Strategy 3: Improve the Process of Standardization Through Organizational Restructuring.

New organizational arrangements are often necessary to address a perceived problem or set of problems, or when old tasks and functions cannot be accomplished by established individual or collective means.¹⁴⁵ This is because organizations often become fossilized and resistant to change; instead of finding new solutions, energies are spent trying to preserve existing practices.¹⁴⁶ Over time, however, failure to adapt can threaten an organization's survival.¹⁴⁷

Basic changes in the standards environment have already led to a number of organizational changes throughout the standards community. In the United States, ad hoc industry consortia have emerged, bypassing traditional standards organizations. In the United Kingdom, BSI has spawned an offshoot group—DISC—that, operating by somewhat different rules, sets standards for rapidly advancing

¹⁴³ Marvin Sirbu, Carnegie Mellon University, personal communication.

¹⁴⁴ Rutkowski, op. cit., footnote 140.

¹⁴⁵ Harold Seidman, *Politics, Position, and Power: The Dynamics of Federal Organization* (London, England: Oxford University Press, 3rd ed., 1980), p. 15; See also, Harvey C. Mansfield, "Reorganizing the Federal Executive Branch: The Limits of Institutionalization," *Law and Contemporary Problems*, vol. 35, summer 1970, p. 462.

¹⁴⁶ As Katz and Kahn have pointed out:

They [the decisionmakers] do not consider all possibilities of problem solution because it is of the very nature of organizations to set limits beyond which rational alternatives cannot go. The organization represents the walls of the maze and, by and large, organizational decisions have to do with solving maze problems, not reconstructing maze walls.

Daniel Katz and Robert Kahn, *The Social Psychology of Organizations* (New York, NY: John Wiley & Sons, 2nd ed., 1978) p. 283.

See also, Mancur Olsen, *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities* (New Haven, CT: Yale University Press, 1982).

¹⁴⁷ As Andrew Schotter notes:

Economic and social systems evolve the way species do. To ensure their survival and growth, they must solve a whole set of problems that arise as the system evolved. Each problem creates the need for some adaptive feature, that is, a social institution. . . . Those societies that create the proper set of social institutions survive and flourish; those that do not, falter and die.

Andrew Schotter, *The Economic Theory of Social Institutions* (Cambridge, London: Cambridge University Press, 1981), pp. 1-2.

information technologies.¹⁴⁸ In the European Community as a whole, new standards organizations—such as ETSI—are being created, and new standardization procedures adopted.¹⁴⁹ Changes are also being made at the international level. The ITU, for example, is completely revising its organizational structure to take account of converging technologies and a changing regulatory environment.¹⁵⁰ Technology convergence has also led to international, interorganizational restructuring; to work on common standards and avoid project overlaps, the International Standards Organization (ISO) and the International Electrotechnical Commission (IEC) established a joint committee, JTC1. More recently, the ISO, IEC, and CCITT met in Tokyo to work out a common approach for developing image header standards.¹⁵¹

It is in this context that the U.S. Government will need to consider whether reorganizing national standards procedures are in order. Any reorganization will likely be difficult to execute. Organizational arrangements are not neutral; they define power relationships determining who shall control what, and for what ends.¹⁵² Because organizations are inherently political, their restructuring serves to redefine commitment, influence program direction, and reorder priorities.¹⁵³ Many who have an investment in the status quo will resist. Organizational change might be facilitated, however, to the extent that the government and the private sector can, together, develop anew understanding of the role of standards in American life.

Option A: Encourage the Separation of Functions Between Standards Publication and Standards Coordination, Promotion, and Administration

Most standards organizations function to some extent as publishers; they seek to maximize standards sales since their survival depends on them.

Competition among standards bodies is fierce and likely to become even more so in the future. Increasingly, standards resemble international commodities. In a global marketplace there will not only be more standards bodies competing with one another for sales, industry restructuring will also likely follow, with business alliances cutting across national lines.

In such an environment, the interests of national governments, manufacturers and users, and standards bodies alike might increasingly diverge. National governments and manufacturers, for example, may view standards implementation as a way of improving productivity and national competitiveness.¹⁵⁴ To this end, they may want to encourage the dissemination of standards information in ways contrary to the needs and interests of standards organizations. Otherwise, competition among standards organizations may become so intense that it precludes the development of national standards goals and policies.

One way of reducing this mounting tension is to separate the functions of standards publication and distribution from those of standards coordination, promotion, and administration. Perhaps the least disruptive approach would be to have ANSI—as the existing national body representative to the ISO—renounce standards sales in exchange for both greater responsibilities and formal government recognition of its coordinating role (i.e., a memorandum of understanding). Federal financial support might also be required if members were unwilling or unable to fill the income gap. Members might agree to increase their support if such a restructuring meant that standards bodies would better serve their needs. Government might also provide incentives for such support through the tax code.

¹⁴⁸ BSI, personal communication; The term DISC stands for “Delivering Information to Customers through International Standards.” Legally part of BSI, DISC has substantial autonomy with respect to program and resource development. See, for a discussion, J.L. Bogod, “Information Technology Standardization,” Berg, op. cit., footnote 1, pp. 70-73.

¹⁴⁹ Frede Axe, Deputy Director, ETSI; personal interview, see, for discussions, M.E. Brenton, “The Role of ETSI in IT Standardization,” Berg, op. cit., footnote 1, pp. 49-51; John Williamson, “Raising the European Standard,” *Telephony*, June 3, 1991.

¹⁵⁰ International Telecommunication Union, High Level Committee, Final Report DOC.No. 145. April 29, 1991 (Geneva, Switzerland).

¹⁵¹ Bob Smith, Nynex, personal communication.

¹⁵² field Seidman, *Politics, Position, and Power: The Dynamics of Federal Organization* (London, England: Oxford University Press, 3rd ed., 1980) p. 15.

¹⁵³ Ibid. See also, Harvey C. Mansfield, “Reorganizing the Federal Executive Branch: The Limits of Institutionalization,” *Law and Contemporary Problems*, vol. 35, summer, 1970, p. 462.

¹⁵⁴ This, for example, was one of the original basis for the Federal Government becoming involved in standards, Cochrane, op. cit., footnote 65.

Some standards organizations would welcome such a change. A number who have acted independently in the past have made it clear that they would be much more inclined to coordinate their policies at the national level if they could do so within an organization that is not competing with them for standards sales.¹⁵⁵ Some industry groups who are becoming impatient with the standards community squabbles and want to be more assertive in the use of standards might also support this option. They might be hesitant, however, to the extent that government funding is involved.

ANSI is not likely to favor this option; on the contrary, it has argued persistently in favor of the status quo. However, there may be some room for maneuvering and incentive to compromise. If enough of its members become dissatisfied by the present set of arrangements, ANSI will be pressed to reconfirm and/or broaden its role. Under the circumstances, it may be willing to trade off standards sales in exchange for a greater coordinating role and Federal support.

Option B: Clarify and Strengthen the Mandate of the Interagency Committee on Standards Policy

Many of the problems experienced by the Interagency Committee on Standards Policy are due not just to the Committee's organizational form; they stem also from overly ambitious expectations about what the committee might reasonably accomplish.¹⁵⁶

Although called on to coordinate, such committees are often expected to develop a policy consensus—a task much more easily said than done.¹⁵⁷ For, if the chairman of an interagency committee actually had power to force a consensus, he or she would enjoy more authority than the President himself.¹⁵⁸ On the contrary, the chairmen of interagency committees often have very little authority. When these committees are established, it is generally understood and agreed upon in advance that the power relationships among the members will remain the same.¹⁵⁹ Given this tendency to delegate responsibility without equivalent authority, interagency committees are likely to be most successful when they are assigned realistic tasks.¹⁶⁰ In addition, these tasks should be related to some overall shared goal—one that is agreed on at the outset and which, over time, can sustain an organizational commitment.¹⁶¹

One option for the Federal Government, therefore, is to clarify the mandate of the Interagency Committee on Standards Policy, relating it to an overall national standards policy. This option presumes, of course, the existence of a commitment to develop such a policy. To sustain an organizational commitment, a national standards policy will need to be worked out in an organizational context that is broader than the focus now provided by the Office of Management and Budget. Acknowledging the relationships between standards and national economic performance, it might be developed, for example, in the Economic Policy Council¹⁶² or the Office of Science Technology Policy (OSTP).

¹⁵⁵ Mr. Brooks, ASTM, personal communication. At a subsequent meeting Mr. Brooks said that this was not ASTM's main opposition. More important to ASTM, he said, was his opposition to the use of the canvass method of standards of adoption. Responding to this comment, ANSI director Manny Paralta points out that ASTM takes advantage of the canvass method when the need arises.

¹⁵⁶ Seidman, op. cit., footnote 160.

¹⁵⁷ As Seidman has noted:

The quest for coordination is in many respects the twentieth century equivalent of the medieval search for the philosopher's stone. If only we can find the right formula for coordination, we can reconcile, harmonize compelling and wholly divergent interests, overcome irrationalities in our government structure, and make hard policy choices to which no one will dissent.

Op. cit., footnote 160, p. 205.

¹⁵⁸ Seidman, op. cit., footnote 160, p. 216.

¹⁵⁹ Ibid., pp. 213-216.

¹⁶⁰ It is interesting to note, in this regard, that even though the problems of interagency committees are well known, such committees continue to be established. President Carter, for example, planned to reduce the number of these committees as part of his reorganization efforts. Instead, however, during one 12-month period, he established seven such committees by executive order. Alan Schick, "The Coordinating Option," Peter Szanton, *Federal Reorganization: What Have We Learned?* (Chatham, NJ: Chatham House Publishers, Inc., 1981), pp. 95-96.

¹⁶¹ As Alan Schick has noted, "Interagency committees cannot succeed as organizational orphans. When nobody has a vested interest in the group's work and nobody is responsible for following through on its decisions, a committee will languish even if its formal status remains intact." Alan Schick, op. cit., footnote 168, p. 97.

¹⁶² President Reagan set up the Economic Policy Council in 1985 as a means of working out interagency economic policy issues. A Cabinet-level body, it is comprised of the Secretaries of the Treasury, Commerce, State, Energy, Agriculture, and Labor; the Director of the Office of Management and Budget; the U.S. Trade Representative; and the Chairman of the Council of Economic Advisers. The Vice President and the Chief of State are ex-officio members, and the heads of nonmember departments may be invited to attend when issues germane to their activities are under discussion.

From the point of view of agency stakeholders, any proposed new interagency coordination could generate strong opposition. As Harold Seidman has noted, efforts at coordination are not designed to make friends. For “coordination is rarely neutral,” and always “advances some interests at the expense of others.”¹⁶³ Thus, any proposal to *enhance coordination* is likely to be judged less on its merits than on how it might redistribute power among existing players. OTA interviews with members of the Interagency Standards Policy Committee suggest that lack of participation was not due to concerns about turf, but rather for lack of a clear and meaningful mandate. However, were the committee to have a significant mandate, it is likely that power disputes would arise.

Option C: Delegate to a Federal Agency the Responsibility for Coordinating and Implementing Federal Standards Policy

Existing Federal standards policy is limited to support for private-sector development of standards. The Federal role, according to this position, is to encourage all Federal agencies to voluntarily use consensus standards. Unlike in other countries, the Federal Government has given little consideration to the notion that standards serve as an industrial infrastructure, or as international marketing tools for American companies.

The findings in this report contradict this point of view. They emphasize that the U.S. Government—as representative of the Nation—has a growing stake in standards and the effectiveness of the standards setting process. They describe, moreover, a number of market and political failures in the system, and outline reasons why, in the future, private sector and national goals may no longer coincide.

If the Federal Government favored the development of national standards goals, it might delegate the responsibility for implementing them to an agency within the Federal Government. The most likely candidate is NIST, given its history and experience in this area. Based on the analysis in this report, some of the functions that NIST might perform would include:

- Build an organizational capacity at the Federal level to address standards questions. To this end, for example, NIST might sponsor research

on standards and standards development processes especially as it relates to standards usage by industry and the impact on the national economy as well as to the question of how the outcomes of standards processes may vary in different economic and organizational contexts.

- Support standard development activities through the promotion or development of an information infrastructure. Sponsor efforts to identify and reduce obstacles (i.e., copyright issues) to the development and use of such an infrastructure.
- Educate producers, users, and other interested parties with respect to the role of standards and the importance of participation in standards processes both domestic and international.
- Foster and/or sponsor programs to encourage the use of international standards by potential trading partners.
- Monitor the private sector process to assure that its performance is consistent with public sector goals. Serve as an ombudsman, providing a mechanism for feedback about the effectiveness of the standards process.
- Identify, on behalf of the government, areas where future standards activity will likely be required (i.e., environmental concerns, critical technologies, etc.).
- Foster a debate about, and coordinate interagency interests in, national standards policy.
- Represent, along with private sector standards developers, the United States in international standards negotiations.

Were NIST to be assigned such tasks, it would need to have much **greater resources in this area than** it has today. Not since its heyday in the postwar years has NIST had such a mandate, so its financial and human resources to perform such functions are no match for the complex tasks involved. NIST would also need greater political support. One can only speculate whether Congress, given budget concerns, would be willing to fund such a program. And in recent years the Executive Branch, through OMB, has sought to curtail the role of NIST rather than enhance it. Nor would the private sector be likely to support such a role for NIST, judging from the recent NIST hearing on the Standards Council of the United States of America (SCUSA) proposal.

¹⁶³ Seidman, Op. cit., footnote 160, p. 205.

Although perhaps not politically viable, this option has considerable merit from a public administration point of view.¹⁶⁴ According to many public administration experts, once an authentic national need meriting Federal attention has been clearly identified should be addressed within the public sector. Privatization of public sector tasks, it is argued, diminishes government resources to deal with complex policy issues, and undermines the principal of political accountability.¹⁶⁵

*Option D: Establish a Government Corporation or Instrumentality to Focus on Public/Private Standards Goals*¹⁶⁶

Perhaps a more politically viable option would be to create a joint venture between government and the private sector, where national standards policy might be worked out and the tasks identified above pursued. As in Option C, the actual development of standards would continue to be performed by the private sector. This kind of an arrangement might be especially appealing in today's political climate, given efforts to limit the role of government.¹⁶⁷ It might be especially appropriate in the case of standards, which serve both public and private functions.

While foreign to the free-market advocacy style of the American political economy, organizational arrangements that promote collaboration among government industry and user interests are not only common in other parts of the world but also extremely successful. In Japan, for example, such collaboration is an integral feature of industrial policy. Generally, the Minister of International Trade and Industry (MITI) issues "administrative guidance" to alert large corporations of its plans. Industry, which often employs ex-MITI officials to facilitate its liaison with MITI, usually complies with this guidance. MITI also coordinates with industry through advisory committees and public and private-sector forums.¹⁶⁸

In the United States, such collaboration has been much more limited. Here, the most typical kind of cooperative arrangement between government and the private sector has been the government corporation or instrumentality.¹⁶⁹ Precedents for such organizations date back to 1781 with the establishment of the First Bank of the United States. Their major supporters were those suspicious of politics and politicians. They wanted government to be "run in a more business-like manner."¹⁷⁰

The public corporation's popularity ebbed and flowed throughout American history, becoming

¹⁶⁴ As identified by Ira Sharkansky, there are four intellectual roots that, in this country, provide a public administration rationale. They are: "1) the desire to maintain political accountability in public administration; 2) the desire to maintain the traditional equilibrium among the three constitutional branches of government by preserving the separation of powers and checks and balances; 3) the desire to insure that professional and technical skills are brought to bear on relevant matters of policy formulation and implementation; and 4) the desire to maximize the efficient use of resources by means of a hierarchical form of organization." See Ira Sharkansky, "Administrative Organization and Control Units: Structures and Their Intellectual Roots," *Public Administration: Policy-Making in Government Agencies* (Chicago, IL: Rand McNally College Publishing Co., 3rd ed).

¹⁶⁵ See for discussions, Ron C. Moe, "Government Corporations and the Erosion of Accountability: The Case of the Proposed Energy Security Corp.," *Public Administration Review*, November/December 1979; Ronald C. Moe and Thomas H. Stanton, "Government-Sponsored Enterprises as Federal Instrumentalities: Reconciling Private Management with public Accountability," *Public Administration Review*, vol. 49, July/August 1989, pp. 321-329; Harold Seidman, "The Quasi World of Federal Government," *The Brookings Review*, summer 1988, pp. 213-27; and Ronald C. Moe, "Liabilities of the Quasi Government" *Government Executive*, November 1988, pp. 47-50.

¹⁶⁶ There is no precise, or legal definition of a Government corporation. Most broadly stated, "Government corporations are organized to achieve a public purpose authorized by law." Harold Seidman, "The Theory of the Autonomous Government Corporation: A Critical Appraisal," *Public Administration Review*, vol. 12, spring, 1952, p. 93. They are, however, operationally and financially independent of Government. A good portion of all public corporations are not-for-profit. These include, for example, the Corporation for Public Broadcasting, the National Park Foundation the Securities Investor Protection Corporation, and the United States Railway Association. Most of their funding comes from Government. Instrumentalities are government sponsored enterprises, such as the National Academy of Sciences. They perform no commercial functions and are designed to minimize Presidential involvement. Ron Moe, CRS, personal communications.

¹⁶⁷ According to Moe, "While American society might want the Federal Government to "do something" about a particular problem area, there is also an aversion on the part of a substantial portion of the public towards creating a new department or agency since this is seen as just more 'bureaucracy.' The acceptable solution in several instances has been to create quasi-governmental units that emphasize their privateness and their profit seeing character.

Ronald C. Moe, Library of Congress, Congressional Research Service, "Administering Public Functions at the Margin of Government: The Case of Federal Corporations," HD 2755, Dec. 1, 1983, p. 22.

¹⁶⁸ Jill Hartley, "The Japanese Approach to the Development of New Residential Communication Services," Marjorie Ferguson (ed.) *New Communication Technologies and the Public Interest* (London, England: Sage, 1986), p. 168; See also, Ira Sharkansky, *Wither the State? Politics and Public Enterprise in Three Countries* (Chatham, NJ: Chatham House, 1979).

¹⁶⁹ For a discussion, see Ronald C. Moe, op. cit., footnote 167.

¹⁷⁰ *Ibid.*, p. 9.

more popular during periods of crisis and emergency.¹⁷¹ Thus, a number of government corporations were established to deal with the problems arising from the Depression and during the First and Second World Wars. These included the Reconstruction Finance Corporation, the Commodity Credit Corporation, and the Tennessee Valley Authority.¹⁷² More recently, however, the rapid growth and increased autonomy of government corporations began to raise concerns among government administrators¹⁷³ and political scientists, who fear that they are no longer accountable to either Congress or the President.¹⁷⁴

Because of their long and varied **history**, public corporations differ considerably in **terms** of their goals and organizational structures. Like COMSAT, they may be profit-making corporations sponsored by government and calling for a major government role. Or, as in the case of the Corporation for Public Broadcasting, they may be nonprofit

ventures in which government's role is limited to appointing the board of directors.

A public corporation created to develop and oversee national standards policy could take a variety of forms, given this organizational leeway.¹⁷⁶ Its board of directors, for example, could be comprised of individuals representing government, standards development organizations, industry, and the general public. Its role could be advisory, or supervisory. Its structure and functions could even be negotiated among the key interested parties. Such an arrangement would allow for flexibility, provide for the efficient use of resources, promote cooperation, and be capable of evaluation and foresight. Established on behalf of the public interest, but operating somewhat apart from government, it could help the United States to better promote its interests in the international arena, while still keeping with American tradition (see box 1-A).

¹⁷¹ Ibid., pp. 6-7.

¹⁷² Ibid.

¹⁷³ The Brownlow Commission, while recognizing the value of this form of organizational arrangement, recommended that they be incorporated within existing Federal agencies. Concerned that government corporations were getting out of hand, Congress, in 1945, passed The Government Corp. Control Act, which established budgeting and auditing standards. The act provided, moreover, that no corporation be created or acquired by any agency or corp. of the Federal Government without the specific authorization of Congress.

¹⁷⁴ See, for example, Harold Seidman, "Government-Sponsored Enterprises in the United States," Bruce Smith (ed.) *The Public Use of the Private Sector* (London, England: Macmillan Co., 1975).

¹⁷⁵ As Moe points out, "By 1981, efforts to neatly categorize the new breed of corporations were doomed to frustration. Neither the President nor Congress had used a set of criteria when creating 'corporations,' rather each new 'corporation' tended to be viewed sui generis." Op. cit., footnote 167, p. 26.

¹⁷⁶ For one example see H.R. 6496, introduced in May 19, 1948. This bill was designed to incorporate the American Standards Association. Its purpose was to operate exclusively as a nonprofit educational and scientific organization, and, in connection therewith, to assemble and diffuse knowledge concerning the standardization of measurements, materials, products, methods, operations, and nomenclature; to study, approve, and promote the use of suitable and desirable standards; to provide systematic means by which organizations concerned with standardization work may cooperate in creating and developing such standards so that they may represent a consensus of those concerned with their scope and provisions; to furnish facilities for promoting the use of such standards; to serve as a clearinghouse for information on standardization work in the United States and foreign countries; and to cooperate with the Government of the United States, and with other organizations in standardization matters, including cooperation in international standardization matters."

Box I-A—The United States and Saudi Arabia Standards Program

Created in 1989 by NIST and the American and Saudi Roundtable (an **association** of U.S. companies with business **interests in Saudi Arabia**), the Program has had a substantial impact on the development of Saudi national standards.

Many Saudi product standards, incompatible with U.S. products, promulgated prior to 1989 with assistance from Japan, the United Kingdom, Germany, and other countries, have diminished U.S. export opportunity by \$100 to 500 million annually.¹

Since the inception of the NIST Roundtable Program, no standard incompatible with U.S. products has been promulgated, and effort is underway to achieve revision of the earlier, damaging standards.

Under the program, a U.S. standards advisor, stationed in Riyadh, works directly with the Saudi standards agency (SASO), providing advice and counsel on standards development. The advisor obtains standards in the draft stage and sends them to NIST, which disseminates the drafts to U.S. companies, industry associations, and standards organizations for comments. NIST collects and harmonizes the comments and sends them to the U.S. standards advisor who presents and advocates them to the Saudi agency. Unlike any U.S. industry and thereby provides the Saudis the broadest possible expertise and establishes maximum credibility for U.S. comments.

The Program demonstrates that industry and government can work effectively together to bring U.S. standards capability to bear on foreign standards development.

Formed by a Memorandum of Understanding between NIST and the American/Saudi Roundtable, the Program costs about \$5000,000 per year (\$250,000 from the private sector maintains and supports the Standards Advisor in Saudi Arabia, \$250,000 from the NIST budget maintains the standards dissemination and review system). Private sector funds have been contributed by fewer than 50 U.S. companies, however, out of the several hundreds which benefit from the program.

¹ Study by U.S. Embassy, Riyadh, Saudi Arabia, 1991.

SOURCE: American and Saudi Roundtable.