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GLOBAL ASSESSMENT OF STANDARDS BARRIERS TO TRADE IN THE INFORMATION TECHNOLOGY INDUSTRY

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Executive Summary

The importance of facilitating increased trade and investment in the information technology (IT) industry was reflected in the Uruguay Round tariff reductions on many IT products and, more recently, in the speed at which negotiations for the Information Technology Agreement (ITA) were concluded. As tariffs on IT products have been reduced and face elimination in global markets, nontariff barriers have emerged as the most important obstacles to trade for IT producers. Among these, standards-related barriers to trade have been identified as among the most important and costly for producers of computer hardware, software, and telecommunications equipment. The principal findings of this assessment of standards barriers to trade in the information technology industry are presented below.

- Standards often serve important economic and social goals by facilitating production, reducing transaction costs, and protecting health, safety, and the environment. However, standards and the means by which government regulators assess the conformance of products, processes, or quality management systems to government-mandated standards (formally known as technical regulations) also may be used to protect domestic IT industries.

- In the United States, government plays a much smaller role in standards-setting activities than it does in Europe and Japan. U.S. standards are more often established by private firms participating in voluntary standards bodies. In contrast, in Europe and Japan the government has been much more involved in the standards process. IT industry observers assert that both Japan and the European Union have had more active and concerted government strategies than the United States in promoting their respective standards and standard systems in world markets. Many U.S. industry observers assert that the decentralized, industry-led U.S. standards system has resulted in a more innovative and competitive U.S. industry. However, some foreign government and industry officials state that the decentralized U.S. approach to standards results in a fragmented U.S. market that is difficult for outside firms to penetrate.

- Despite the differences among standards strategies and systems, a number of countries' principal technical regulations related to IT standards are based on the same international standards and used for the same general purposes: to provide for workers' safety and to minimize the effects of electromagnetic interference generated from IT and electrical products on countries' telecommunications networks and radio spectrums. The main differences among countries are related primarily to the means required to prove conformity to such technical regulations.

- U.S. IT producers have encountered standards-related barriers in international markets such as unnecessary quality systems assurance, onerous testing and certification requirements, and differing marking and labeling requirements. However, for most computer hardware, software, and telecommunications equipment manufacturers, the standards-related barriers of most significance are the need to undergo multiple conformity assessment procedures to meet duplicative government technical regulations. This is despite the fact that the United States and a number of its trading partners use the same international standards as the basis of their IT technical regulations.

- Thus far, there has been little quantitative analysis of the effects of these barriers to trade on IT producers. Although this study does not itself provide empirical estimates of the costs of standards-related barriers, it does present some estimates made by private and other public sector sources that suggest the magnitude of the costs incurred by such measures.

- The Information Technology Industry Council has estimated that duplication in mandatory U.S. and European Union testing and certification for computers, telecommunications equipment, and other information technology products costs U.S. companies and consumers more than $1.3 billion annually. Meanwhile, a comprehensive examination by the Organization for Economic Cooperation and Development (OECD) of various OECD countries' telecommunications terminal type approval requirements shows that meeting the varying requirements accounts for slightly over 2 percent of the price of exported products. These represent just the direct costs of such measures. Total global welfare costs of such measures could be many times higher but more empirical work needs to be done to measure such costs. More recent studies completed by the National Research Council, the Brookings Institution, and the OECD also suggest that the costs of standards-related barriers to trade on the IT industry are significant.

- Sometimes the costs to IT companies of having to assure compliance to requirements through conformity assessment in multiple markets may be reduced by the establishment of agreements known as mutual recognition agreements (MRAs). A number of policy experts assert that such agreements between governments to recognize national conformity assessment mechanisms have a potential to facilitate trade. MRAs appear to work best in overcoming differences in testing and certification requirements for specific industries that have traditionally experienced a high level of government regulation, such as the telecommunications equipment industry.

- However, although MRAs may be appropriate in some cases, they may not always be the most cost-effective means for reducing standards-related barriers to trade on traditionally less-regulated IT products. For instance, while seeking international compatibility in conformity assessment, the possibility of an MRA may require countries with less regulated systems than other negotiating countries to introduce more regulation than may be necessary. This is of particular concern to the U.S. industry since less regulation tends to be the rule in the United States, especially in high-technology segments of the industry such as the computer and software sectors.

- U.S. industry and trade officials point out that in addition to considering MRAs as possible tools for overcoming multiple testing and conformity assessment requirements in international markets, alternative, and potentially less-trade-restrictive, means for accomplishing the objectives of technical regulations should be considered. For example, unilateral recognition of other countries' conformity assessment results and supplier's declaration of conformity are alternative approaches to reducing burdens on IT exporters caused by duplicative conformity assessment requirements. However, the challenge to IT industry representatives and trade officials is convincing government regulators that such alternatives will not compromise regulators' obligations for ascertaining the safety of IT workers and consumers and the efficient operation of public telecommunications networks.

CHAPTER 1
INTRODUCTION

Purpose and Scope of Study

The purpose of this study is to assess certain standards-related barriers to trade (also known as technical barriers to trade)[1] of particular interest to the global information technology (IT) industry.[2] These include duplicative conformity assessment[3] requirements; onerous quality registration, testing, certification, and marking and labeling requirements; and strategic standards policies of some major IT-producing countries. The study will focus on the computer hardware, software, and telecommunications equipment sectors of the IT industry.

As tariffs are reduced as a result of the Uruguay Round Agreements and other trade liberalization initiatives, nontariff measures are emerging as the most important barriers to trade for U.S. companies.[4] Among these measures, standards-related barriers, including standards, testing, certification, labeling, and conformity assessment requirements, are among the impediments that have surfaced as major concerns to U.S. industry representatives and government trade negotiators.

The interest in standards-related barriers is reflected in the efforts put forward during the Uruguay Round of multilateral trade negotiations to conclude a new Agreement on Technical Barriers to Trade (TBT). Standards-related measures also have received special attention in the North American Free Trade Agreement (NAFTA), the Asia-Pacific Economic Cooperation (APEC) forum, the United States-European Transatlantic Economic Partnership (TEP), discussions on expanding the Information Technology Agreement (ITA), and the Organization for Economic Cooperation and Development (OECD)'s work on regulatory reform.

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[1] The formal term used for "standards-related barrier to trade" in the World Trade Organization (WTO) is "technical barrier to trade" (see appendix A for a glossary of important terms used in this report). Some of the most important of these standards-related measures include certification, testing, labeling, and conformity assessment requirements. Such trade barriers are dealt with under the WTO's Agreement on Technical Barriers to Trade (TBT).

[2] An important distinction to be made in any discussion of standards-related barriers to trade is between voluntary and government-mandated standards (or technical regulations). The TBT defines a voluntary standard as a "[d]ocument approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which *compliance is not mandatory*." This is in contrast with the TBT definition of a technical regulation (which is really a mandatory standard), as a "[d]ocument which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which *compliance is mandatory*." The TBT states that both voluntary standards and technical regulations "may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."

[3] Conformity assessment is defined as any activity concerned with determining whether a product or process conforms to particular standards or technical regulations. Activities associated with conformity assessment may include testing, certification, accreditation, and quality assurance system registration.

[4] Alan V. Deardorff and Robert M. Stern, *Measurement of Non-Tariff Barriers*, Economics Department Working Papers No. 179 (Paris: Organization for Economic Cooperation and Development (OECD), 1997), p. 3.

Standards-related barriers to trade have become an increasing concern for the IT industry. The United States is currently among the global leaders in the industry, but faces strong competition from Japanese, European, and emerging Asian electronics producers. Due to the perceived importance of IT in the global economy, the United States and its major IT trading partners recently concluded an ITA to address both tariff and nontariff barriers on a broad range of IT equipment and components. These nontariff barriers include discriminatory standards-related practices, a priority concern of the IT industry.

This staff research study does not address all standards-related barriers affecting the global IT industry. Instead, it focuses on several areas of current and practical interest to both industry and government trade officials who are currently in the process of trying to resolve some of these standards-related issues. It provides illustrative examples of how standards-related barriers affect IT firms in the computer hardware, software, and telecommunications equipment sectors, three of the largest segments of the IT industry. The report does not attempt to draw conclusions about which countries, barriers, or products are most affected.

One example of current interest to both industry and government trade officials is the necessity for global IT firms to meet duplicative conformity assessment requirements to sell their products in a number of overseas markets. For instance, suppliers of telecommunications and computer equipment often must prove that their products comply with minimum standards adopted by government agencies as technical regulations for electrical safety and electromagnetic compatibility (EMC)[5] before such products may be sold in most countries. The problem often is not the technical requirements themselves, which IT industry officials acknowledge are reasonable demands. It is the need to prove product compliance to similar technical regulations, or slight variations[6] in such regulations, repeatedly, across countries, that results in substantial costs for IT producers.[7]

Other issues of current importance to the IT industry and government policy makers that will be evaluated in this staff study are the proliferation of quality registration, testing, and certification requirements; inconsistent and discriminatory marking and labeling requirements; and the strategic standards policies of some major IT producing countries. In addition, the study evaluates some recent attempts by trading partners to address some of these standards-related barriers through the

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[5] Electromagnetic compatibility (EMC) is defined as the ability of equipment to function satisfactorily in its electromagnetic environment without introducing intolerable disturbances to anything in that environment. Compliance with EMC standards ensures that any IT equipment does not harm broadcast, computer, and telecommunications networks, or other equipment in the same environment. A related concept, electromagnetic interference (EMI) refers to the degradation of the performance of a device, transmission channel, or system caused by an electromagnetic disturbance. Thus compliance with EMC standards addresses the problem of EMI.

[6] Such variations are sometimes referred to as national deviations in standards or technical regulations. Underwriters Laboratories Inc. representative, interview by USITC staff, July 17, 1998.

[7] U.S. industry and standards organization representatives, interviews by USITC staff, Sept. 23-24, 1997; U.S. Government trade and regulatory officials, telephone interviews by USITC staff, Oct. 27, 1998; WTO Committee on Technical Barriers to Trade, *Report of the First Triennial Review of the Operation and Implementation of the Agreement on Technical Barriers to Trade*, Geneva, Nov. 18, 1997; OECD, "Product Standards, Conformity Assessment and Regulatory Reform," Annex to *The OECD Report on Regulatory Reform* (Paris: OECD, 1997), pp. 4 and 44; Brian D. Unter, Director, Corporate External Standards, Hewlett-Packard Company, speaking for the Information Technology Industry Council, "Maximizing Customer Benefits--a Global Model for Regulatory Reform," presented to U.S.-China Standards, Testing and Certification Workshop, Washington, DC, Feb. 17-18, 1998; and John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," Experts Briefing at the World Trade Organization, Geneva, Switzerland, Apr. 18, 1997, pp. 1-12.

establishment of mutual recognition agreements (MRAs), and to consider some alternatives to MRAs presently being discussed among industry, trade, and regulatory officials.

Thus far, there has been little quantitative analysis of the effects of these barriers to trade on IT producers.[8] Although this study does not provide empirical estimates of the costs of standards-related barriers, it does present estimates made by other private and public sector sources that suggest the magnitude of the costs incurred by such measures.[9] More importantly, this study outlines some broad standards-related issues of current interest to the IT industry and trade policy makers. By explaining how such issues affect the IT industry in some very specific ways, it may provide the needed groundwork for future quantitative work.

Data Sources

Information on IT standards-related measures was collected through an extensive literature search[10] and through personal and telephone interviews in the United States, Europe, Asia, and Latin America.[11] Production, trade, and other market data for the study were collected from official government and private sector sources in the United States and abroad. Finally, information and views concerning the effects of standards-related measures on the computer hardware, software, and telecommunications equipment sectors were obtained in interviews conducted by Commission staff with representatives of U.S.- and foreign-based companies, government and trade association officials, investment analysts, and consultants.

Organization

This chapter has provided a general background on the purpose, scope, data sources, and organization of this study. Chapter 2 provides a snapshot of the IT industry and market, its

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[8] In fact, there is a dearth of quantitative work on standards-related barriers to trade in general. Jacques Pelkmans, a senior researcher at the Centre for European Policy Studies, Brussels and Maastricht University, indicates that empirical research on standards-related measures is "scant" and there are "no data sets as they exist, for example, [for] tariffs and trade flows." Dr. Pelkman further states that "only with extensive field work (which is time-consuming and, for this topic, very costly) would it be possible to overcome this gap." Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets* (Washington, D.C.: The Brookings Institution, 1995), p. 154. A more recent OECD paper finds that "If regulatory and/or certification mechanisms are designed in a way that puts imports at a disadvantage relative to domestic goods, it [standards-related barriers to trade] is one of the hardest NTBs imaginable to quantify." Alan V. Deardorff and Robert M. Stern, *Measurement of Non-Tariff Barriers*, p. 52.

[9] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century* (Washington DC: National Academy of Sciences, 1995), pp. 104-112; John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," pp. 1-12; Juergen Mueller, *Research on the "Cost of Non-Europe" - Basic Findings - Volume 10 - The Benefits of Completing the Internal Market for Telecommunication Equipment in the Community* (Luxembourg: Commission of the European Communities, 1988); Group MAC, *Research on the "Cost of Non-Europe" - Basic Findings - Volume 6: Technical Barriers in the EC; An Illustration by Six Industries* (Luxembourg: Commission of the European Communities, 1988); and OECD, *Telecommunications Type Approval: Policies and Procedures for Market Access* (Paris: OECD, 1992), p. 66.

[10] See appendix B for a bibliography of publications consulted by USITC staff in connection with this study.

[11] See appendix C for a list of the individuals, companies, standards organizations, trade associations, government agencies, and other organizations interviewed by USITC staff in connection with this study.

importance in the global economy, and the emergence of nontariff barriers, including standards-related measures, as major barriers affecting the industry. Chapter 3 discusses the role of standards and conformity assessment in the IT industry, provides an overview of the standards process in the United States, the European Union (EU), Japan, and other important global markets, and describes important international trade agreements and obligations pertaining to standards-related barriers to trade. Chapter 4 examines the effects of certain standards-related barriers to trade on the computer hardware, software, and telecommunications equipment sectors. Finally, chapter 5 concludes with a summary of the findings of this report and evaluates proposals for reducing IT standards-related barriers.

CHAPTER 2
THE INFORMATION TECHNOLOGY INDUSTRY

This chapter provides a snapshot of the IT industry and market, its importance in the global economy, and the emergence of nontariff barriers, including standards-related measures, as major barriers affecting the industry. Such barriers can adversely affect IT manufacturers' competitiveness by raising production costs and increasing time to market even as these manufacturers face constantly declining prices and shortened product life cycles. Major IT-producing countries, including the United States, have entered into negotiations to attempt to address these barriers to trade.

Industry Perspectives

The United States is one of the world leaders in the manufacture of IT products. U.S. production of information technology products and components amounted to $297 billion, or 27 percent of the world total valued at $1.1 trillion in 1997.[12] However, as figure 2-1 shows, the U.S. IT industry faces competition from Japanese, European, and emerging Asian electronic producers for leadership in this important high-technology industry. U.S., EU, and Japanese producers generally compete in high-value-added areas, such as software, microprocessors, and product design. Meanwhile, emerging Asian countries concentrate on more labor-intensive production of commodity electronic components or final assembly of IT equipment.

The IT industry is increasingly characterized by relentless competition, constantly declining profit margins, and rapid obsolescence. As a result, cost management and speed to market are critical to success. The need to move quickly and at low cost in a competitive global setting make IT producers exceptionally vulnerable to factors that delay market entry. Tariff and nontariff barriers, including standards-related measures, increase IT suppliers' relative costs in important foreign markets and play an important part in determining their international competitiveness.

The IT industry is also characterized by its globalization, with production of commodity electronic components and peripherals and final product assembly largely done abroad, particularly in the rapidly emerging Asian economies where wage costs are lower.[13] IT producers cut costs and enhance competitive positions by securing high quality products and components internationally at the lowest possible prices, setting up foreign production and sales facilities, and entering into international strategic alliances. Because of the number of countries involved and borders crossed in various stages of the IT production and marketing process, standards-related barriers to trade can be particularly costly for IT firms in this globalized industry.

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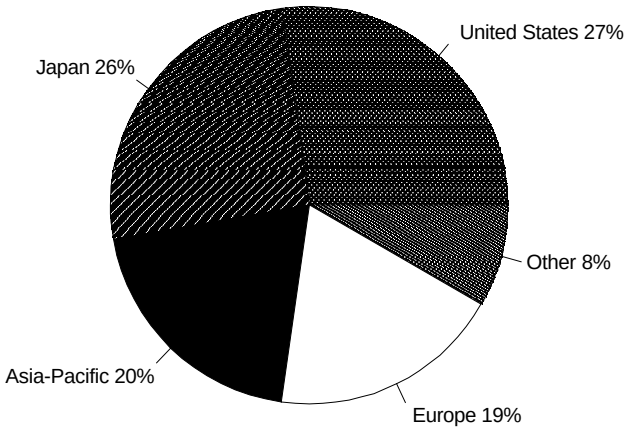
[12] USITC staff estimates based on *Yearbook of World Electronics Data 1996* (Oxford: Elsevier Advanced Technology, 1996), Vol. 3, table 2.3.4., p. 13; *Yearbook of World Electronics Data 1998* (United Kingdom: Reed Electronics Research, 1998), pp. 7-15; and official statistics of the U.S. Department of Commerce.

[13] A typical PC designed and manufactured in the United States may contain a disk drive from Singapore, a display monitor and motherboard from Taiwan, and a keyboard manufactured in Malaysia.

Figure 2-1
Shares of world electronics production, 1997



Source: Reed Electronics Research, *Yearbook of World Electronics Data*, 1998, and USITC staff estimate.

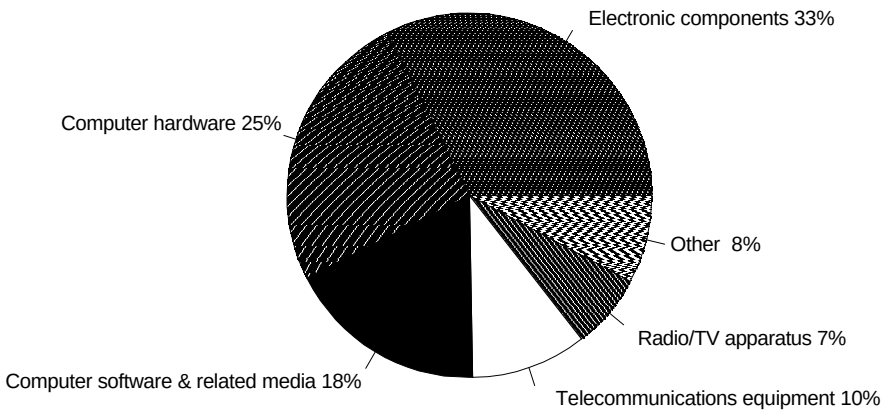
This study focuses on standards-related barriers to trade in the computer hardware, computer software, and telecommunications equipment sectors, three of the largest segments of the IT industry (figure 2-2). U.S. production in these sectors together accounted for $157 billion, or over one-half of total U.S. IT shipments in 1997. These sectors also accounted for 40 percent of total IT employment in that year.[14]

An important trait of these three sectors is growing technological interdependence and convergence.[15] Improved microprocessor processing capabilities lead to more powerful computers. More powerful computers are able to run more sophisticated software programs. And advanced telecommunications equipment increasingly depends on the latest developments in microprocessor, computer, and software technology to improve its transmission, switching, and networking capabilities. The growing convergence and interdependence of these sectors is particularly evident in the essential role of each in the establishment of the Internet.

[14] Compiled by USITC staff from official data of the U.S. Department of Commerce; *Yearbook of World Electronics Data 1996*, Vol. 3, table 2.3.4., p. 13; *Yearbook of World Electronics Data 1998*, pp. 7-15; and data contained in USITC, *Shifts in U.S. Merchandise Trade in 1997*, Inv. No. 332-345, Appendix B, Profile of U.S. Industry and Market, by Industry/Commodity Groups, 1993-97, July 1998.

[15] For further discussion on the role convergence plays in the removal of trade barriers in the IT industry, see John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," in *Unfinished Business: Telecommunications after the Uruguay Round*, Gary C. Hufbauer and Erika Wada, ed. (Washington, DC: The Institute for International Economics, 1997), pp. 63-85.

Figure 2-2
Information technology goods: U.S. production, by product line, 1997



Total: $297 billion

Source: Compiled from official statistics of the U.S. Department of Commerce.

The vastly different regulatory environments of the computer and telecommunications equipment sectors also are converging, especially in conformity assessment and other standards-related areas. For example, telecommunications traditionally has been a much more regulated area than computers and software.[16] In most markets, telecommunications equipment to be connected to the public telephone network is required to go through a type approval process, which includes conformity assessment with required standards and technical regulations before it can be sold and installed. Suppliers of such equipment also often face electrical safety tests to verify the level of risk for workers and consumers of electrical equipment, and electromagnetic compatibility tests to ensure that equipment does not harm networks or other equipment in the same environment.

In contrast, computers and software traditionally have not faced such strict regulation. However, with the convergence of technologies, including the increased attachment of computers and peripherals to networks, they have increasingly become subject to some of the same types of technical regulation and conformity assessment requirements historically faced by telecommunications equipment producers.[17] This convergence has led to increased standards-related barriers in certain sectors of the industry, such as the computer sector, at the same time that

[16] Paul David and W. Edward Steinmueller, "Standards, Trade, and Competition in the Emerging Global Information Infrastructure Environment," in *Telecommunications Policy*, Vol. 20, No. 10, 1996, p. 1; John Wilson, "Regulatory Reform, Trade and Telecommunications Goods and Services," paper presented at OECD Workshop on Trade Policies and Trade Relations: Regulatory Reform and International Market Openness, Paris, 1997, pp. 1-18; and U.S. telecommunications equipment industry and trade association representatives, telephone interviews by USITC staff, Sept. 26 and Nov. 12, 1997; and June 24, 1998.

[17] U.S. IT industry representatives, U.S. and foreign government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

standards-related barriers in other sectors, such as the telecommunications equipment sector, are being relaxed in relative terms with liberalization of telecommunications markets worldwide.[18]

Addressing Tariff and Nontariff Barriers: The Information Technology Agreement

To address barriers to trade in the IT industry, an Information Technology Agreement (ITA) was signed by 28 countries or customs territories, including the United States, during the World Trade Organization (WTO) Ministerial meeting in Singapore in December 1996. As of October 1998, the ITA covered 44 countries representing approximately 93 percent of world trade in information technology products. The agreement requires participants to eliminate tariffs on a non-discriminatory basis on a specific list of IT products by January 1, 2000.[19] These products include computer hardware, computer software, telecommunications equipment, semiconductors, and other electronic components and equipment (table 2-1). Countries involved in negotiations to accede to the WTO, including China and Russia, are expected to join the ITA upon their accession to that organization.

The ITA has increased market access opportunities; however, according to industry observers, some areas still need improvement, especially standards-related issues.[20] Some IT industry representatives assert that the benefits of duty elimination as a result of the ITA could be reduced by nontariff barriers.[21] For instance, U.S. telecommunications equipment producers have pointed out that while the ITA was designed to deal with tariff barriers, "many of the barriers to exports are not tariffs but nontariff barriers."[22] For instance, some of the largest potential export markets, such as Japan, have zero tariffs on IT products but market penetration by foreign producers remains low. Among the nontariff measures cited by IT industry representatives are (1) discriminatory certification, testing, conformity assessment, and other standards-related measures,[23] (2) unfair marking and labeling requirements,[24] and (3) proliferation of quality system registration requirements.[25]

[18] Ibid; Paul David and W. Edward Steinmueller, "Standards, Trade, and Competition in the Emerging Global Information Infrastructure Environment," p. 1; and John Wilson, "Regulatory Reform, Trade and Telecommunications Goods and Services," pp. 1-18.

[19] This product list is attached to the Ministerial Declaration.

[20] John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 63-85.

[21] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26,. 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[22] "Spirited Talks Help Uncork Global High-Tech Trade," *Journal of Commerce*, Dec. 13, 1996, p. 14; Seth Schiesel, "Still a Long Road for Freer Global Technology Trade," *New York Times*, Dec. 21, 1996, pp. 37-39; and U.S. industry representatives, telephone interviews by USITC staff, Feb. 10-12, 1997.

[23] Division Vice President and Director of Public Policy, Corning, Inc., "The Other Side of the ITA," Testimony Before the House Ways and Means Committee, Subcommittee on Trade, 1997, and U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[24] U.S. industry representatives, interview by USITC staff, Washington, May 5, 1997; and U.S. industry representative, facsimile transmission to USITC staff, May 5, 1997.

[25] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 25, 1997, and Nov. 17-19, 1997.

Table 2-1
Product landscape: Major products covered by the Information Technology Agreement

Computer Hardware	Computer Software	Telecommunications Equipment
PC's Workstations Minicomputers Mainframes Supercomputers CPUs Keyboards Displays Printers Smart cards Printed circuit board assemblies	Diskettes Floppy disks Magnetic tapes CD-ROM's Application software Multimedia software	Switching equipment Multiplexers Facsimile machines Telephone sets Telephone answering devices Voice messaging equipment Cellular phones Cellular transmission systems Satellite network equipment Bridges Routers
Semiconductors and Electronic Components	**Semiconductor Manufacturing and Test Equipment**	**Other Electronic Products**
Microprocessors Microcontrollers Memory devices Discrete devices Diodes Laser devices Optoelectronic devices Passive components Linear circuits Capacitors Resistors	Wafer stepper aligners Wafer handlers Ion implanters Thermal processors Grinding machines Polishing machines Epitaxial deposition machines Laser cutters Certain microscopes Clean room equipment	Analytical instruments Certain office machines Digital photocopiers Indicator panels Automatic teller machines Electronic translators

Source: World Trade Organization, *Ministerial Declaration of Trade in Information Products*, Singapore, Dec. 13, 1996.

To address industry concerns about remaining standards-related and other nontariff factors affecting global market access for IT products, specific provision was made in the ITA to assure that nontariff measures would not undermine the commitments achieved in that agreement. An annex to the ITA states that participants shall meet periodically to consult on nontariff barriers to trade in IT products as well as to review the product coverage. On September 30, 1997, follow-on discussions among ITA participants, referred to as "ITA II," were launched that included, among other things, consideration of nontariff barriers to IT products. Among the nontariff measures of priority interest to the IT industry were standards, testing, and certification measures. ITA II participants convened at WTO headquarters in Geneva in July and October 1998 and planned to reconvene on November 20, 1998 to resolve some remaining tariff and classification issues and embark on some "serious work on non-tariff measures, in particular with respect to standards."[26]

[26] U.S. Department of State Telegram, message reference No. 130714, "ITA Negotiations to Continue," prepared by USTR, July 18, 1998.

CHAPTER 3
THE ROLE OF STANDARDS IN THE IT INDUSTRY

Standards serve important economic and social goals by facilitating production, reducing transaction costs, and protecting health, safety, and the environment.[27] For the IT industry, they also increasingly serve as benchmarks for technological capacity or network compatibility.[28] However, standards, as well as conformity assessment procedures such as testing and certification to ensure compliance with government-mandated standards, may be used to protect domestic industries. The Information Technology Industry Council (ITI), the largest U.S. industry trade association representing computer and other information technology companies, has identified standards-related barriers as the most significant obstacles to trade in the industry.[29] This chapter defines standards, conformity assessment, and testing; outlines the standards processes in the United States, the EU, Japan, and other important global markets, particularly as they relate to IT sectors; describes important international trade agreements and obligations with respect to standards-related barriers to trade; and discusses some recent agreements related to IT standards-related measures concluded by the United States with some of its most important trading partners.

Standards

Standards specify special features and characteristics of products, processes, services, interfaces, and materials.[30] Product standards can establish qualities or requirements to ensure that a product will function safely and effectively.[31] Testing standards define the procedures to be used to assess the performance or other characteristics of a product.[32] Process standards specify requirements to be met by a process, such as manufacturing. Standards may be in written form or simply be commonly used.

Numerous standards may be incorporated in a particular information technology product or manufacturing process to accomplish various desired or required functions. For example, standards specifying data transfer protocols for computers provide manufacturers with information to assist developers in a computer's design. In the rapidly converging IT industry, product interface standards can provide compatibility between previously disparate IT sectors, such as standards

[27] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 9.

[28] OECD, "Product Standards, Conformity Assessment, and Regulatory Reform," in *OECD Report on Regulatory Reform* (Paris: OECD, 1997), p. 1.

[29] John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 63-85.

[30] Maureen Breitenberg, *Index of Products Regulated by Each State* (Gaithersburg, MD: National Bureau of Standards, 1987), pp. 1-20.

[31] Maureen A. Breitenberg, National Institute of Standards and Technology, *The ABC's of the U.S. Conformity Assessment System* (NISTIR 6014), Apr. 1997, p. 1.

[32] Ibid.

defining the point of connection or interface between a telephone and a computer terminal.[33] Some standards enable IT producers to take into account health and safety or other guidelines set by government regulatory agencies, such as electrical safety and environmental concerns.[34]

Standards can be voluntary or mandatory. Although many manufacturers adhere to voluntary standards, they are not obligated to do so, and these standards are not enforceable. Voluntary standards can be developed as de facto standards or by consensus. De facto standards are product or process specifications that acquire authority and influence by virtue of success in the competitive marketplace. Microsoft's Windows operating system and Intel's microprocessors have become de facto standards in the global PC market.

Voluntary consensus standards often are established via coordinated processes in formal standards-development organizations. These organizations contain broad industry representation, such as producers, consumers, private and public sector procurement officials, government regulatory officials, and other interested parties. They can be national or international organizations. Generally, voluntary consensus standards-development organizations adhere to transparent and democratic rules governing voting rights to ascertain that all interests are taken into consideration when adopting standards. ITI follows such procedures to develop voluntary compatibility standards for computer device interfaces in the United States.[35]

Voluntary standards may also be developed by a narrower consortium of companies or organizations with related interests to serve the group's need.[36] These consortia may not take into account the opinions of those outside it. Further, for competitive reasons, the group may or may not share these standards with those outside the consortium.[37] Some companies form such consortia to avoid the traditional and consensus-based standards-development organizations to expedite the standards-setting process. This incentive is especially true in the IT industry, where many industry representatives believe that the formal standards-setting process is too slow to keep up with the rapid pace of technological change in their industry.[38] For example, microprocessor, software, and PC firms may establish consortia to speed the development of needed standards outside of a more

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[33] Ibid.; and Telecommunications Industry Association representatives, interview by USITC staff, July 1997.

[34] John S. Wilson, *Standards and APEC: An Action Agenda* (Washington, DC: Institute for International Economics, October 1995), p. 14.

[35] ITI sponsors the National Committee on Information Technology Standardization (NCITS). NCITS' mission is to produce market-driven, voluntary consensus standards in the areas of multimedia, interconnection among computing devices and information systems, storage media, database, security, and programming languages.

[36] U.S. standards organization representatives, interviews by USITC staff, Sept. 23-24, 1997.

[37] Carl Cargill, VP Standards, Netscape, interview by USITC staff, Washington, DC, May 7, 1997.

[38] Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade," Rayburn House Office Building, Washington, DC, Apr. 28, 1998. In addition, the IT industry is experimenting with a "fast track" process in which a consortium-developed standard is sent directly to the relevant international standards-development body to be voted on without modification to become a draft international standard, bypassing preparatory stages and committees. This international standards-development body, JTC 1, is described in the section on international standards organizations. For details of the fast track process, see ISO/IEC, "Preparation and Adoption of International Standards- Fast-Track Processing," in *Procedures for the technical work of ISO/IEC JTC 1 on Information Technology, Third Edition, 1995.*

cumbersome formal standards process.[39] Nokia, Ericsson, IBM, Intel, Toshiba, and other firms recently formed a consortium to develop technologies and standards for interoperability among wireless telecommunications products. The group believes this approach will allow it to create standards more quickly than could be done through an international standards-setting body.[40]

Companies usually participate in standards-setting activities to influence the development of standards or keep abreast of technological developments in their industries. However, due to considerable costs in participating in national and international standards activities, the incentive to participate varies among industries. Firms must be able to see tangible benefits resulting from participation. In IT sectors such as computer hardware, software, and telecommunications equipment, the incentive to participate is high. If information technology and communication systems fail to work properly together, there will be no products or services to sell.[41]

In contrast to voluntary standards, mandatory standards are product, service, system or process specifications set by regulatory government bodies. Manufacturers or other parties are obligated to follow governments' mandatory standards contained in technical regulations to sell products in a given market. In many countries, mandatory standards are developed by a government agency itself; however, most often a regulatory agency will reference a voluntary industry standard in a regulation.[42] For example, the Federal Communications Commission (FCC)'s technical regulation for PC-related electromagnetic compatibility (EMC) references a voluntary international EMC standard.[43] Mandatory standards are generally published as part of a code, rule, or regulation and are enforced through government agencies.[44] Such standards may be set for safety, health, environmental, or other reasons, and usually specify guidelines for design, performance criteria, or other characteristics of a product, service, system, or manufacturing process.[45]

The distinction between voluntary standards and mandatory standards is made within the WTO in discussions of technical barriers to trade. Accordingly, the following WTO Agreement on Technical Barriers to Trade (TBT)-consistent definitions will be used henceforth in this report to differentiate between voluntary and government-mandated standards:[46]

> **Standard:** Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory.

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[39] Carl Cargill, VP Standards, Netscape, interview by USITC staff, Washington, DC, May 7, 1997, and U.S. standards organization representatives, interviews by USITC staff, Sept. 23-24, 1997.

[40] Other members include Motorola, Lucent, and Qualcomm, and the consortium is called Bluetooth. "Newswatch: Standards Development," *Compliance Engineering*, July/Aug. 1998, p. 191.

[41] U.S. Congress Office of Technology Assessment (OTA), *Global Standards: Building Blocks for the Future* (Washington, DC: U.S. Government Printing Office (GPO), Mar. 1992), p. 104.

[42] Breitenberg, *ABC's of the U.S. Conformity Assessment System*.

[43] See appendix A for a glossary of important terms used in this report.

[44] Breitenberg, *ABC's of the U.S. Conformity Assessment System*.

[45] Ibid.

[46] WTO Agreement on Technical Barriers to Trade, *Annex I: Terms and Their Definitions for the Purpose of this Agreement.* See appendix C for a glossary of important terms used in this report.

Technical regulation: Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory.

Mandatory standards contained in technical regulations are often the subject of trade conflicts as producers assert that meeting varying governments' technical regulations raises their costs and hinders their competitiveness in foreign markets. Government technical regulations cited as particularly cumbersome by U.S. IT representatives are marking and labeling requirements. Examples of such regulations and their effects on U.S. producers are discussed in chapter 4.

Conformity Assessment

Conformity assessment encompasses the complete range of activities by which products, services, systems, and processes are evaluated against specific standards or technical regulations.[47] Conformity assessment can involve one or a combination of the following procedures: a supplier's (manufacturer's)[48] declaration of conformity to requirements through its own testing and quality systems; testing or inspection of products and components, services, or processes by independent laboratories; formal certification of conformity; and an independent audit and approval of quality manufacturing systems, leading to registration with a quality systems registrar (table 3-1).

The simplest form of conformity assessment, supplier's declaration, is a streamlined tool by which a manufacturer or supplier provides its own written assurance of conformity to a standard or technical regulation.[49] The declaration identifies the party responsible, such as manufacturer or importer, for assuring and declaring conformity. In the United States, reliance on a supplier's declaration of conformity is more prevalent for use in proving conformance to voluntary standards than technical regulations.[50] For instance, telecommunications equipment and computer manufacturers use supplier's declaration to assure telecommunications interoperability.[51] However, a number of U.S. regulatory agencies also allow supplier's declaration of conformity to government technical regulations.[52] The FCC permits recognition of supplier's declaration of electromagnetic compatibility for PC's and PC peripherals, provided supporting test results are obtained from an accredited laboratory.[53]

[47] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 17-21 and Breitenberg, *ABC's of the U.S. Conformity Assessment System*.

[48] Also referred to as manufacturer's declaration, supplier's declaration is a more inclusive term and includes importers or manufacturers' representatives in foreign markets.

[49] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 68.

[50] U.S. regulatory officials, interviews by USITC staff, Dec. 1997 and Feb. 1998.

[51] Ibid.

[52] Ibid.

[53] Ibid.

Table 3-1
Conformity assessment system framework

	Manufacturer's Declaration of Conformity	Inspection Product Testing	Product Certification	Quality System Registration
Activity	Manufacturer's own testing and quality assurance.	Testing of products, components, materials, etc.	Certification of products against a standard or set of standards.	Audit and registration of manufacturer's quality assurance system (e.g., against ISO 9000 standards).
Assessor	Manufacturer.	Independent Laboratory.	Product Certifier.	Quality System Registrar.

Source: Reprinted with permission from *Standards, Conformity Assessment and Trade Into the 21st Century;* Copyright 1995 by the National Academy of Sciences. Courtesy of the National Academy Press, Washington, D.C.

Although many manufacturers prefer supplier's declaration, much conformity assessment testing[54] is performed for manufacturers by independent laboratories.[55] Such third-party testing has grown in recent years and may be viewed as desirable when meeting concerns about safety, health, or the environment.[56] Manufacturers rely on independent testing as a check against their own testing and to support declarations of conformity to purchaser specifications or government technical regulations.[57] In fact, government-mandated technical regulations often require manufacturers to show compliance through results of independent testing. For example, IT products used in the workplace, such as PC's, are required to be tested, certified, or listed by an independent laboratory (certifier) accredited by the Occupational Health and Safety Administration (OSHA) to meet OSHA's technical regulations for electrical safety.[58]

Certification is a form of conformity assessment. In certification, a third party provides written assurance that products or processes conform to specified standards or technical requirements. Certification generally requires the performance of product tests, but is distinguished from testing by three features.[59] First, certification always measures a product or process against one or more specific standards, whether mandatory or voluntary. Testing does not necessarily measure against a specified standard. Second, certification is always performed by a third party, independent of either the supplier or purchaser. Finally, certification results in a formal statement or mark of conformity, or certificate, that can be used by the producer to show compliance with regulations.

[54] The International Organization for Standardization (ISO) defines a test as a "technical operation that consists of the determination of one or more characteristics of a given product, process, or service according to a specific procedure." ISO, *Compendium of Conformity Assessment Documents*, 152. Tests related to IT products include those for physical properties, such as strength and durability; electrical characteristics, including interference with other electrical devices (known as electromagnetic interference (EMI)); acoustical properties; electrical safety requirements; and other features.

[55] These independent laboratories provide testing services consisting of a broad spectrum of technical activities and serve clients including private sector entities and Federal, State, and local governments.

[56] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 68-70.

[57] Ibid., pp. 71-72.

[58] Ibid.

[59] Ibid., p. 73.

Quality system registration is the assessment and periodic audit of a manufacturer's quality assurance system, usually performed by an independent party known as a quality system registrar.[60] The proliferation in quality system registration is one of the most recent trends in conformity assessment.[61] Registration to ISO 9000 standards, a series of quality system standards first published by the International Organization for Standardization in 1987, and revised and reissued in 1994, exemplifies this trend. The European Commission's adoption of these standards in 1989 as part of the EU's standards conformity system increased the registration of companies to ISO 9000 around the world, including in the United States. Registration to such quality systems is fast becoming a cost of doing business in international markets, and ISO 9000 standards are increasingly being adopted or considered for adoption as requirements by numerous private sector and public sector entities in Asia and Latin America.[62]

Conformity assessment procedures are as important to manufacturers as the underlying standards and technical regulations with which conformity is to be assessed.[63] Ideally, the market access benefits firms gain by proving compliance to standards and technical regulations exceed the costs. Compliance with a particular technical regulation does little good if relevant regulatory authorities cannot be convinced of it at a reasonable cost.[64] In fact, measures taken by companies to prove conformity to standards and technical regulations are often more expensive, or may be of greater importance in gaining market access, than is conformance to the standards themselves.

However, sometimes the costs of required testing, inspection, audit, and other conformity assessment procedures far exceed benefits to the manufacturer, the regulator, or the consumer. This is particularly the case when manufacturers must undergo multiple conformity assessments to the same or similar requirements across countries.[65] In addition, as one legal expert explained, because conformity assessment procedures often involve "bureaucratic discretion and industry influence," opportunities for consciously established technical barriers to trade often arise in connection with such procedures.[66] Further, even in cases where standards-related measures consist of regulatory requirements that appear to be nondiscriminatory, they may, in fact, confer an advantage on domestic products over imported products. For instance, standards-related requirements, such as duplicative conformity assessment procedures, can impede trade by placing importers at a significant cost disadvantage as compared to domestic producers, as will be seen in chapter 4.

IT industry representatives state that assessing conformity to government technical regulations through testing and certification exceeds the regulations themselves as the most significant standards-related trade barriers affecting their industry. Because the IT industry faces rapidly changing technologies, shortening product life cycles, and intense price competition, time and expenses to meet conformity assessment requirements can be extremely detrimental to producers' competitiveness. Thus, many IT manufacturers prefer supplier's declaration over relatively costly

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[60] Greg Hutchins, *ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and Successful Certification* (Essex Junction, Vermont: Oliver Wight Publications, Inc., 1993), pp. 3-20.

[61] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 77-80.

[62] Latin American government officials, interviews by USITC staff, Washington, DC, Feb. 4-5, 1998, and Guest Researcher, National Institute of Metrology, Standardization and Industrial Quality and National Confederation of Industry, Rio de Janeiro, Brazil, telephone and e-mail communications with USITC staff, Jan.-Mar., 1998.

[63] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, pp. 22-25.

[64] Ibid.

[65] John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," pp. 1-12.

[66] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, pp. 22-25.

third-party testing to ensure regulators of compliance to required standards.[67] IT manufacturers' challenge is to convince governments that the use of supplier's declaration is sufficient to meet the objectives of relevant technical regulations.

International Standards Organizations

Three of the major global standards-setting bodies relevant for the IT industry are the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunications Union (ITU) (see text box below). The ISO and IEC are closely related; they develop international standards in nearly all industry sectors and their membership consists of the national standards-development organizations, whether public or private, of member countries. Standards setting in both groups is decentralized and performed by various technical committees that draw on volunteer technical experts from member countries. Standards are drafted through consensus, and each member country's vote is weighted equally.[68] The ISO and IEC jointly develop international standards for almost all information technology industries, including software and systems integration, via the ISO/IEC Joint Technical Committee 1 (JTC 1).[69] One exception is international telecommunications equipment standards, which are set by the International Telecommunications Union (ITU), an intergovernmental rather than a voluntary body.[70]

Standards Policies and Strategies in the United States, Europe, and Japan

There are important differences in the U.S., European, and Japanese standards systems.[71] In general, government plays a larger role in both the European Union and Japan in many standards-related activities, including voluntary standards development, technical regulatory development, and promotion of national and regional standards and standards systems abroad. In contrast, in the United States, the standards-development system is primarily driven by the private sector, in a decentralized, heterogeneous, bottom-up process. While U.S. Government agencies possess certain responsibilities related to standards, such as in their own use of

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[67] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[68] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 46.

[69] Overlap of the ISO and IEC standards activities in information technology led to the development of this joint committee. Carl F. Cargill, *Information Technology Standardization: Theory, Process, and Organizations* (Bedford, MA: Digital Press, 1989), p. 133.

[70] The ITU is a treaty organization comprised of government representatives from 160 countries. National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 46.

[71] Trade Promotion Coordinating Committee (TPCC), "A Strategic Standards Policy," ch. in *National Export Strategy: Cornerstones for Growth*, Fifth Annual Report to Congress (Washington, DC: TPCC, 1997), pp. 38-50; Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade;" John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," in McIntyre, John R., ed., *Japan's Technical Standards: Implications for Global Trade and Competitiveness* (Westport, CT: Quorum Books, 1997), p. 86; U.S. IT industry representatives and standards officials, interviews by USITC staff, Sept. 25, 1997, and Feb. 17-18, 1998; and Carl Cargill, Netscape Communications, interview by USITC staff, May 7, 1997, Washington, DC.

Major International Standards Organizations Related to the IT Industry.

ISO. The International Organization for Standardization (ISO) is a private international agency dedicated to voluntary standardization. It is made up of national standards institutes from 130 countries. The standards-development process is lengthy and ultimately requires the majority consensus of technical committee members and 75 percent of the ISO voting membership before a standard may be published as an ISO standard. ISO covers work in all areas of standards development except those in the fields of electrical and electrotechnical standards, the domain of the IEC, and telecommunications, the expertise of the ITU. Because ISO is a nongovernmental organization, its members are not national governments but rather the principal standards institutes in their respective countries.

IEC. The International Electrotechnical Commission (IEC) is the global organization that prepares and publishes international standards for all electrical, electronic, and related technologies. It also operates worldwide programs for assessing conformity to those standards. Like the ISO, the IEC provides a global forum for the preparation and implementation of consensus-based voluntary international standards. The IEC charter embraces all electrotechnology, including electronics, magnetics, electromagnetics, fiber optics, and electroacoustics. IEC standards endeavor to guarantee the compatibility of electronic products or systems. Countries participate in the IEC through their national committees.

ITU. The International Telecommunications Union (ITU) is an international standards-development organization that is a treaty organization run under the auspices of the United Nations rather than being a voluntary organization. Governments, not industries, administer and enforce the regulatory telecommunications standards that come out of the ITU. The ITU typically develops recommendations that are implemented as national technical regulations by national telecommunications authorities.

Source: Constance R. Brown, "A Primer on Regulations and Standards," *Compliance Engineering: 1998 Reference Guide*, 1998.

standards or in their development of technical regulations, there is a much greater reliance in the United States than in the EU and Japan on obtaining input from private standards-development organizations, industry groups, consumers, and other interested parties in making decisions related to standards. Some industry observers suggest that the more fragmented U.S. approach may make it more difficult to promote U.S. standards-related activities abroad to the possible detriment of U.S. industries, including the IT industry.[72]

[72] Ibid.

Notwithstanding such differences, there are similarities in some of the standards and technical regulations of the United States and a number of its trading partners of particular relevance to the global IT industry that could serve as a basis for reducing some costly technical barriers to trade now facing the industry. Certain technical regulations related to electrical safety and electromagnetic compatibility adopted by regulatory agencies in the United States, the EU, Japan, and certain other countries are based on some of the same international standards, IEC 950 and CISPR 22 (see text box below), though sometimes with slight variations known as national deviations.[73] Despite such deviations, national governments adopt these international IT standards for the same general purposes: to provide for workers' and consumers' safety and to minimize the effects of electromagnetic interference generated from IT and electrical products on public telecommunications networks and radio spectrums. Government and industry officials in the United States and in a number of other IT-producing countries have begun discussions in various bilateral, regional, and multilateral fora such as the TEP, APEC, and the WTO to determine if these similar uses of international IT standards can serve as a basis for regulatory cooperation to reduce burdens on IT producers around the world.[74]

[73] National deviations to international standards are often necessary in the international standards-development process to address countries' social, geographical, climactic, or infrastructure differences. For example, electrical safety standards incorporated in various regulatory codes in the United States historically contained flammability tests due to the greater use of flammable materials such as wood in construction in the United States. In Europe, where traditional housing and building construction materials consisted of materials such as stone, brick, and plaster, flammability tests historically were not incorporated in electrical safety standards. However, over time, through participation in the international standards-development process, many national deviations are eventually adopted into the body of the international standard and the national deviations can be withdrawn. Thus, flammability requirements that were national deviations in the original edition of the principal standard referenced in U.S. requirements for electrical safety, Underwriters Laboratories (UL) 1950, are now contained in the body of the international standard for electrical safety, IEC 950. Underwriters Laboratories Inc., letter to USITC staff, July 17, 1998.

[74] ITI, "Information Technology Industry Council Applauds the APEC MRA," news release, June 5, 1998, p. 1; U.S. Department of State Telegram, message reference No. 130714, "ITA Negotiations to Continue," prepared by USTR, July 18, 1998; U.S. IT industry representatives, U.S. and foreign government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998; and TPCC, "A Strategic Standards Policy," pp. 38-50.

Important international standards often referenced in nations' technical regulations affecting IT products

International Electrotechnical Commission (IEC) 950: This standard applies to information technology equipment, including computer equipment, with a rated voltage not exceeding 600 V. IEC 950 specifies requirements intended to ensure safety for the operator and layman who may come into contact with the equipment and, where specifically stated, for service personnel.

International Special Committee on Radio Interference (CISPR) 22: This electromagnetic compatibility (EMC) standard is used to ensure that any equipment does not harm networks or other equipment in the same environment. The standard indicates the maximum allowable electromagnetic emissions either radiated or conducted at various frequencies. The intention of this standard is to establish uniform requirements for the radio disturbance level of equipment, including fixing disturbance limits, describing methods of measuring disturbance, standardizing equipment operating conditions, and interpreting measurement results.

Sources: International Electrotechnical Commission (1998); International Special Committee on Radio Interference (1998); and Information Technology Industry Council (1997).

The United States

The U.S. private-sector role in standards-setting activities is much larger than the private-sector roles in Europe and Japan. Some voluntary standards are set in the United States as de facto standards, by dominant companies whose standards are adopted by the marketplace and industry. Many U.S. voluntary standards are established by private firms participating in formal standards-development organizations.[75] The United States has over 600 standards-development organizations. Most U.S. standards-development bodies are characterized as nonhierarchical; they are governed by democratic rules relating to due process and voluntary consensus, and standards decisions tend to rise from the bottom up.[76] U.S. voluntary standards-setting organizations are open to non-U.S. firms' participation. The American National Standards Institute (ANSI) is the self-designated private national coordinating body for U.S. standards-development organizations and is also the U.S. member body within the ISO and the IEC (see text box below).

In the United States, the U.S. Trade Representative (USTR) has the lead role in the development of trade policy, and works closely with the U.S. private sector to reduce standards-related barriers to trade in multilateral and regional trade fora, and in response to bilateral trade issues related to standards and technical regulations. The Department of Commerce is responsible for assisting with certain non-agricultural technical issues. The Department of Commerce, in turn, has assigned to its National Institute of Standards and Technology (NIST) several responsibilities in the areas of standards information and technical assistance. However, NIST's role in supporting or promoting

[75] American National Standards Institute (ANSI) and industry officials, interviews by USITC staff, New York, NY, Sept. 27, 1997.

[76] OTA, *Global Standards: Building Blocks for the Future*, pp. 101-105.

U.S. Standards Body-- The American National Standards Institute

ANSI. The American National Standards Institute (ANSI) is the main private standards organization in the United States. ANSI operates as the United States' national committee to the International Organization for Standardization (ISO), and sponsors the U.S. National Committee to the International Electrotechnical Commission (IEC). ANSI itself does not write standards but works with other groups such as the Information Technology Industry Council and Electronics Industry Alliance that have agreed to write standards adhering to the ANSI due-process rules. ANSI also accredits the consensus process of U.S. standards development organizations. If a standard is approved, it becomes an American National Standard.

Source: Compiled by USITC staff from Constance R. Brown, "A Primer on Regulations and Standards," *Compliance Engineering: 1998 Reference Guide*, 1998, and the Information Technology Industry Council.

private-sector standards-setting work is limited compared with the roles of European and Japanese governments. Further, in the past, the U.S. Government had done little to promote the voluntary standards process abroad. Instead, its role had been confined principally to ensuring a fair and effective domestic standards-development process.[77] However, the National Technology Transfer and Advancement Act (NTAA) of 1995[78] tasks NIST with coordinating with state and local agencies on standards matters, and gives NIST a central role in coordinating conformity assessment activities with government agencies and the private sector. This coordination will help ensure that U.S. firms can compete effectively at the global level.[79] This is discussed in more detail in chapter 5.

Under the NTAA, NIST also coordinates the formulation of U.S. government technical regulations. This relatively transparent administrative process generally requires publication of proposed regulations and opportunities for public comment before rules are promulgated.[80] Executive orders also require developers of government technical regulations to base their decisions on cost-benefit criteria and Federal regulatory agencies are directed to use private sector standards whenever feasible.[81] The U.S. Government preference for using voluntary consensus standards was stated in the 1979 Trade Agreements Act, [82] which formally recognized the private sector's role in standards development.[83] It was reaffirmed in the NTAA and Office of Management and Budget (OMB) Circular A-119,[84] which directs Federal agencies to use voluntary standards whenever possible in both regulatory and procurement activities.

[77] Ibid., pp. 61-74.
[78] Pub. L. 104-113.
[79] NIST officials, e-mail correspondence with USITC staff, July 17, 1998.
[80] The administrative process for rulemaking is set out in the Administrative Procedure Act. 5 U.S.C. 551 et seq.
[81] OTA, *Global Standards: Building Blocks for the Future*, p. 105.
[82] The Trade Agreements Act of 1979, Public Law 96-39, 93 STAT. 144, July 26, 1979.
[83] OTA, *Global Standards: Building Blocks for the Future*, p. 54.
[84] OMB Circular No. A-119 (Oct. 20, 1993).

U.S. trading partners complain that the complex, decentralized, and heterogeneous U.S. standards-setting system often makes it difficult for foreign companies to gain sufficient information or understanding of U.S. standards and technical regulations, which hinders access to the U.S. market.[85] For instance, several EU and Japanese IT industry and government representatives indicate that there are at least six different regulatory agencies in the United States that have jurisdiction over technical regulations related to electromagnetic compatibility, the most notable of which include the FCC, the Federal Aviation Administration, and the Food and Drug Administration.[86] Further, in addition to OSHA's Federal jurisdiction over electrical safety requirements for electrical and electronic products used in the workplace, state and local regulatory agencies often have their own sometimes divergent electrical requirements related to building and office construction that may be relevant for foreign IT suppliers.[87]

Another major complaint of the U.S. standards system, expressed by the European Commission, is that the world-wide acceptance of pioneer U.S. technology, standards, and technical specifications in the past has led U.S. industry and standards-setting bodies to be disinterested in international standardization activities.[88] However, U.S. Government and industry representatives respond to this criticism by pointing out that technologically sophisticated sectors in the United States, such as computer and telecommunications equipment, have, in fact, been actively involved in international standardization activities, including at the ISO, IEC, and their joint technical committee (JTC 1) on IT. The United States has held leadership positions in these activities and has been actively involved in the development of international standards for some time, with substantial input and representation at meetings.[89]

Nonetheless, some experts have suggested that, overall, U.S. industry standards interests would be better represented with greater participation by U.S. companies in the international process and have faulted some U.S. firms for not actively and regularly participating in standards-development activities.[90] Some experts also assert that U.S. industry is hindered by the fact that European and Japanese governments help pay for their private sector's standards-setting activities whereas the U.S. Government does not.[91]

IT standards in the United States

Because many U.S. IT firms are global leaders and produce leading-edge technologies, U.S. voluntary IT standards have worldwide prominence and acceptance, particularly in the computer hardware, software, and telecommunications equipment sectors.[92] The U.S. private sector

[85] European Commission standards officials, interviews by USITC staff, May 21, 1998; and Japanese industry and government officials, telephone interviews by USITC staff, Jan. 14, 1998.

[86] Ibid.

[87] Ibid.

[88] European Commission officials, telephone interview by USITC staff, Sept. 8, 1998.

[89] U.S. Government and IT industry representatives, telephone interviews and meetings with USITC staff, Aug. 18- 20, 1998.

[90] U.S. IT industry representatives and standards officials, interviews by USITC staff, Sept. 26, 1997, and Feb. 17- 18, 1998.

[91] Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade."

[92] U.S. and EU IT industry representatives, government officials, and standards officials, in-person and telephone interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and Aug. 10, 1998, and European Commission Officials, telephone interview by USITC staff,

participates actively in international IT standards development and has played a strong leadership role in the ISO/IEC joint technical committee for IT standards.

Many U.S. Federal government IT technical regulations are harmonized with international standards, but conformity assessment procedures differ depending on the IT product and the regulatory agency. The U.S. technical regulations related to electromagnetic compatibility (EMC)[93] for IT equipment are harmonized with the CISPR 22 international standard. Under regulations of the FCC, computers and computer peripherals may be placed on the U.S. market under a supplier's declaration of conformity to CISPR 22, if its laboratory is specifically accredited to perform tests to CISPR 22. These accreditations are based on ISO and IEC guidelines. As an alternative to this process, manufacturers may perform tests in any laboratory approved by the FCC, with results sent to the FCC for review and approval in the form of a product certification.[94] U.S. safety-related technical regulations for IT products are based on the ANSI Standard for IT product safety, which is harmonized with IEC-950. As mentioned previously, OSHA requires third-party certification by independent, accredited laboratories for IT products used in the workplace.

European Union

In the EU, both national governments and the European Commission are involved in standards making and policies to some degree.[95] Approaches may be top-down, such as in France, where the major organization responsible for coordinating the standards system, Association Francais de Normalisation (AFNOR), is a state-approved organization under the supervision of the Ministry for Industry.[96] Standards setting also may be voluntary but centralized and strongly supported by the government, such as in Germany, where standards setting operates through a nationally recognized standards organization, the Deutsche Institute fur Normung e.V. (DIN).[97] Whereas EU member countries had traditionally focused on developing their own national standards, coordinated standards-development activities have become a cornerstone of the EU single-market process to allow companies and consumers in member countries to gain the benefits of a single market.[98]

The main EU standards-development bodies are CEN, CENELEC, and ETSI (see text box below). Some U.S. companies have expressed concern that European standards developed by the EU standards bodies could be used to discriminate against non-EU firms in the EU market.[99] U.S. Government and industry representatives assert that although the EU systems for both consensus

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[92] (...continued)
Sept. 8, 1998.

[93] See appendix C for a glossary of important terms used in this report.

[94] The laboratory need not be specifically accredited to perform tests to CISPR 22. FCC officials, telephone interviews by USITC staff, Sept. 18 and Sept. 21, 1998.

[95] OTA, *Global Standards: Building Blocks for the Future*, pp. 61-74; and U.S. and EU industry and standards officials, in-person and telephone interviews by USITC staff; Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and June 23, 1998.

[96] Ibid, and AFNOR, "About AFNOR," found at http://www.afnor.fr/sujet1.htm, retrieved Aug 7, 1998.

[97] OTA, *Global Standards: Building Blocks for the Future*, pp. 61-74; and U.S. and EU industry and standards officials, in-person and telephone interviews by USITC staff; Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and June 23, 1998.

[98] OTA, *Global Standards: Building Blocks for the Future*, pp. 61-74.

[99] Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade" and U.S. IT industry representatives and standards officials, interviews by USITC staff, Sept. 25, 1997, and Feb. 17-18, 1998.

European Union standards bodies.

CEN. The European Committee for Standardization (CEN), based in Brussels, develops voluntary European standards in all product sectors excluding electrical standards covered by CENELEC. With funding from the European Commission, CEN also writes standards to meet the "essential requirements" for product safety mandated in EU product directives. The standards work program is directed by seven technical sector boards covering building and civil engineering, mechanical engineering, health care, workplace safety, heating and cooling, transport and packaging, and information technology. Its membership consists of the national standards-writing organizations of the 18 countries of the EU and the European Free Trade Area (EFTA).

CENELEC. The European Committee for Electrotechnical Standardization (CENELEC) develops European standards for electrotechnology, which includes areas such as consumer electronics, electric power generation, electromagnetic compatibility, and information technology. CENELEC's aim is to remove any standards barriers to trade that result from conflicting requirements in the technical content of the national electrotechnical standards of its members. CENELEC bases most of its standards on those of the IEC. CENELEC also develops standards meeting EU product directives, with funding from the European Commission.

ETSI. The European Telecommunications Standards Institute (ETSI) is not part of the CEN/CENELEC structure, but has a cooperative agreement with those organizations. ETSI was created as a separate organization to develop appropriate technical specifications for the complex and specialized field of telecommunications. Membership is composed of the public telecommunications administrations of the EU and EFTA nations, as well as EU manufacturers and trade associations. ETSI's technical committees write European standards for telecommunications. Some of these standards are given the force of law through EU directives.

Source: Compiled by USITC staff from Constance R. Brown, "A Primer on Regulations and Standards," *Compliance Engineering: 1998 Reference Guide*, 1998.

standards and technical regulations follow consensus procedures and defer to international standards, they are less transparent than the U.S. processes.[100] CEN and CENELEC are not open to foreign participation, unlike U.S. voluntary standards organizations.[101] On the other hand, other experts

[100] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and July 20, 1998.

[101] CEN and CENELEC do not allow direct participation by non-EU firms, although a firm may participate indirectly through an EU subsidiary. Most U.S. standards-development organizations allow direct foreign participation. Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade" and NIST official, telephone interview by USITC staff, Sept. 18, 1998.

state that the EU process may be more likely to address smaller firms' and consumers' concerns than the U.S. process where multinational firms may have more influence.[102]

Some analysts believe that the substantial support the EU and member countries provide to these standards-setting bodies has strengthened these bodies' role in international standards activities, providing European companies with more effective representation and influence than U.S. firms in such work.[103] For instance, in 1991, 85 percent of all CEN and CENELEC standards, the principal EU standards, were determined to be identical to standards of the ISO and the IEC, but only 22 percent of U.S. national standards were identical or technically equivalent.[104] However, according to several U.S. Government officials, this close work between EU and international standards-setting bodies arose at least partly in response to U.S. and other third-party concerns during the formation of the European single market program (EC-92) that Europe-wide standards-setting activities might be closed to international participation.[105] Nonetheless, some U.S. industry representatives still assert that CEN has disproportionate influence in the ISO process because it can submit its standards to ISO to be voted on without modification to become international standards.[106]

Some U.S. industry representatives assert that EU technical regulations are often created within the EU Commission, with little input from EU or foreign industries until the process is well along and internal positions have been determined.[107] This differs from the U.S. regulatory processes, where agencies generally must follow the Administrative Procedure Act, publishing notice of proposed rulemaking and providing opportunity for public comment before adopting final rules.[108]

A number of IT industry observers state that EU governments have had more active and concerted strategies than the United States in promoting EU-based standards and standard systems in world markets to the detriment of U.S. producers. The EU and certain member states have established standards initiatives as part of foreign-aid programs, with the major goal of these policies being to

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[102] U.S. General Accounting Organization official, interview by USITC staff, Washington, DC, July 17, 1998.

[103] U.S. and EU standards experts, telephone interviews by USITC staff, July 20, 1998.

[104] OTA, *Global Standards: Building Blocks for the Future*, pp. 61-74.

[105] The coordinated work is embodied in two agreements: the Vienna Agreement outlines technical cooperation between the ISO and CEN, and the Lugano Agreement outlines cooperation between the IEC and CENELEC. Under these agreements, when undertaking new work, CEN and CENELEC must first ascertain whether the work can be done by the ISO and the IEC. See USITC, *The Effects of Greater Economic Integration Within the European Community on the United States: Fifth Followup Report*, USITC publication No. 2628, pp. 45-49; CEN, "About CEN," found at http://www.cenorm.be/AboutCEN.html#objectives, retrieved July 23, 1998; and IEC, "IEC-CENELEC Agreement on Common Planning of Work and Parallel Voting," Oct. 1996, found at http://www.iec.ch/cenelec.htm, retrieved July 23, 1998.

[106] Under the Vienna Agreement, CEN may develop standards and present them to the ISO for a vote. "Agreement on Technical Cooperation between ISO and CEN" (The Vienna Agreement), found at http://www.ansi.org/access/a3.html and Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade."

[107] Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards Technical Barriers to Free Trade," and U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[108] Ibid.

stimulate trade.[109] For example, the EU and Germany have provided millions of dollars to help establish electronic component test laboratories in large developing markets such as India. According to a 1997 report to the U.S. Congress, the EU recently provided a standards advisor to Saudi Arabia with a three-year budget of $2 million to establish a standards-development program in direct competition with that in the United States.[110] Meanwhile, the European Commission has provided Mexico and other Latin American countries with training and consultation in standardization, testing, and quality system certification.[111] Further, the United Kingdom, the Netherlands, and Ireland have provided training in standardization for emerging countries in Central Europe, Asia, and Latin America. According to the Office of Technology Assessment, these EU countries understand "that if they can influence the choice of standards in the developing world, trade will likely follow" since, once a standard is in place, "trading relationships become locked in."[112]

IT Standards in the EU

EU directives primarily concerning IT equipment are the Electromagnetic Compatibility (EMC) Directive, the Low Voltage Directive, and, for electrical products, the Machinery Directive; these three directives have been mandatory since January 1, 1997.[113] These directives are harmonized with international standards such as CISPR 22 for EMC and IEC 950 for electrical safety. They are horizontal directives, meaning that they cover all equipment unless the equipment falls within the scope of a specific product directive. EU EMC standards are expected to be successively refined during the next several years, resulting in a whole series of new standards and amendments, which in many cases will mean increased testing requirements in the EU.[114]

The methods for showing compliance with the EU IT directives may differ. For most electrical and electronic products subject to the Low Voltage and EMC Directives, acceptance of supplier's declaration is the norm.[115] However, certain products, such as radio transmitters, must be evaluated by third-party bodies for EMC certification.

In recent years, a significant amount of EU IT-related standards work has pertained to networks, interfaces, and interoperability, to provide the EU with a common information infrastructure. Much of the European standards-development work in the areas of software and systems integration has been conducted under the auspices of EU cooperative R&D programs such as the Research and Development in Advanced Communications Technology for Europe (RACE) and the European Strategic Program for Research and Development in Information Technology (ESPRIT). Nonetheless, despite the apparent strength of Europeans in international standards activities, many European-developed IT standards lag behind U.S. voluntary standards in global

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[109] OTA, *Global Standards: Building Blocks for the Future*, pp. 86-90.

[110] TPCC, "A Strategic Standards Policy," p. 39.

[111] OTA, *Global Standards: Building Blocks for the Future*, p. 90 and European Commission standards officials, interviews by USITC staff, May 21, 1998.

[112] Ibid; and Joseph Farell and Garth Soloner, "Competition, Compatibility, and Standards: The Economics of Horses, Penguins and Lemmings," in *Product Standardization and Competitive Strategy*, H. Landis Gabel, ed. (North Holland: Elsevier Science Publishers, 1997), pp. 1-21.

[113] Dag Bjorkof, "CE marking: A Sign of Compliance and a Gateway to Europe," *Compliance Engineering: 1998 Reference Guide*, 1998, pp. G1-G3.

[114] Dag Bjorkof, "EMC Standards and Their Application," *Compliance Engineering*, Nov.-Dec. 1997, pp. 121-131.

[115] John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," pp. 1-12.

prominence and acceptance in the computer hardware, software, and telecommunications equipment sectors, because of the competitiveness of U.S. firms.[116]

However, as foreign markets for information technology products become increasingly important, the use of international standards in the IT industries could grow. Some analysts suggest that the larger commitment of Europe to international standards activities could result in the eventual adoption of global IT standards that benefit European firms to the detriment of U.S. companies.[117] This has happened to an extent with the second generation cellular communications standard GSM,[118] which is used throughout Europe and most of Asia. GSM's widespread acceptance has benefited from European government officials' efforts beginning in the 1980s to promote it in Europe and internationally. Such efforts may also prove successful in the future; the European Commission has stated that the completion of the single market regulatory regime puts the EU in a position to pursue a "more outward looking" trade policy in the area of standards and conformity assessment.[119] The EC summarizes its trade objectives as follows: first, to reduce technical barriers to trade in overseas markets; and second, to encourage its trading partners to adopt standards and regulatory approaches based on, or compatible with, international and European practice.[120]

Japan

In Japan, voluntary standards are used to a greater degree than in the EU. However, as in Europe, standards development in Japan is more centralized than in the United States. Relevant government ministries work with private sector trade and professional associations to develop sectoral standards.[121] National standards are developed under the aegis of the Ministry of International Trade and Industry (MITI) and the Japanese Industrial Standards Committee (JISC), which is Japan's national standards body and a member of the ISO and IEC (see text box below).[122] JISC includes representatives of interested manufacturers, users, consumers, and academic societies, and works with MITI to develop Japan's voluntary standards, known as Japanese Industrial Standards (JIS), and the certification system for industrial and mineral products.[123] JIS cover product and process

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[116] U.S. and EU IT industry representatives, government officials, and representatives of standards organizations, in-person and telephone interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and Aug. 10, 1998.

[117] U.S. IT industry representatives and standards officials, interviews by USITC staff, Sept. 25, 1997, and Feb. 17-18, 1998.

[118] GSM stands for "global system for mobile communications".

[119] European Commission, "Community External Trade Policy in the Field of Standards and Conformity Assessment" *(COM(96)564 final, 13.11.96)*, Jan. 13, 1997, p. 1.

[120] Ibid.

[121] These ministries include the Ministry of Posts and Telecommunications, the Ministry of Health and Welfare, the Ministry of Transport, and the Ministry of Construction. John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," p. 75; and Communications Industry Association of Japan and Electronics Industry Alliance representatives, telephone interviews by USITC staff, May 5, 1998.

[122] OTA, *Global Standards: Building Blocks for the Future*, p. 23; and R.B. Toth Associates, *Transparency and Accessibility of the Japanese Standardization System*, Nov. 1991, p. 1.

[123] Approximately 8,200 Japanese Industrial Standards (JIS) currently exist and 16,000 approvals have been given to factories to affix JIS markings. "Outlook of Industrial Standardization in Japan," http://www.hike.te.chiba-u.ac/jp/ikeda/JIS/what1.html, retrieved June 16, 1998, and Koji Tanabe, "Globalization and the Role of Standards," in *Japan's Technical Standards: Implications for Global Trade and Competitiveness*, p. 67.

standards as well as conformity assessment procedures.[124] Foreigners may fully participate in JIS drafting committees and to a limited degree in JIS technical committees.[125]

JISC promotes JIS through the voluntary JIS marking and certification system. JISC states that the purposes of JIS and the marking system are to improve the quality of products, rationalize production, and ensure fair and simplified trade through the establishment and dissemination of appropriate and rational standards. Japanese and foreign factories manufacturing products that satisfy JIS standards may affix JIS marks to their products if the relevant Ministry determines that a company's standards and control practices can guarantee continuous production of such goods. A number of other Japanese laws set forth technical regulations for protecting human life, health, and the environment. Most are mandatory technical regulations such as those for electronic appliances under the Electrical Appliance and Material Control Law. However, according to the Japanese government, under the Industrial Standardization Law, these technical regulations must conform with JIS.[126]

The Japanese Government promotes Japanese standards internationally as well as domestically. MITI promotes the use of Japanese standards abroad through its foreign-aid and development programs.[127] With MITI funding, the Japan International Cooperation Agency has sponsored the study of standardization systems of rapidly developing Asian countries, such as China, Malaysia, and Thailand, and provided large grants to establish regional laboratories.[128] The Japanese Government has a long history of providing technical training in standardization to officials of companies and standard and industrial organizations in developing countries. Japan actively promotes its telecommunications equipment standards throughout Asia by providing the majority of the budget of some Asian standards bodies, such as the Asia Pacific Telecommunity, and provides the Secretariat for others, such as the ASIA ISDN Council.[129] Finally, similar to the EU, Japan also has provided standards-related assistance to Saudi Arabia, where it is funding a major standards program with the Saudi Arabia Standards Organization.[130] Some experts assert that this is a planned effort to establish Japanese standards in developing country markets, and sets the stage for Japan to export products meeting these standards.[131]

IT Standards in Japan

Certain Japanese IT standards are compatible with international standards, such as Japan's regulation for EMC of computing devices, which is based on internationally recognized CISPR 22 recommendations. However, the implementation of this standard in Japan differs somewhat from the process in other countries. In Japan this standard is voluntary, under the supervision of the

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[124] "JIS Marking System," http://www.hike.te.chiba-u.ac/jp/ikeda/JIS/what3.html, retrieved June 16, 1998.

[125] However, lack of fluency in Japanese can impede foreign participation since less than 1 percent of Japanese standards information is available in English and all actual drafting and approval is in Japanese. John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," pp. 80-81, and 84.

[126] Japanese Industrial Standards Committee (JISC), "Outlook of Industrial Standardization in Japan," *Industrial Standardization in Japan, 1994* (Tokyo: JISC, 1994), pp. 1-25.

[127] Japanese government officials, telephone interviews by USITC staff, May 8, 1998.

[128] John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," p. 90; and Carl Cargill, VP Standards, Netscape, interview by USITC staff, Washington, DC, May 7, 1997.

[129] John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," p. 86.

[130] TPCC, "A Strategic Standards Policy," p. 39.

[131] Carl Cargill, VP Standards, Netscape, interview by USITC staff, Washington, DC, May 7, 1997.

Voluntary Control Council for Interference by Information Technology Equipment (VCCI).[132] The VCCI is widely supported by major Japanese companies, and meeting the criteria, as evidenced by the VCCI compliance label, is increasingly perceived as an indication of product quality.[133] Only members of the VCCI are eligible to participate; however, membership is open to all interested parties, including foreign firms.

Other

Other trading partners with fairly well-established standards systems include Canada, Australia, and Hong Kong. However, many emerging countries in Asia and Latin America, and the former communist nations of Central Europe and the Newly Independent States of the former Soviet Union, are in the process of developing and implementing their own standards policies. To ensure consistent regulations and procedures globally and to maximize free trade, the WTO encourages its signatories to adopt international standards and conformity assessment procedures that are no more trade-restrictive than necessary to meet legitimate regulatory goals. Nonetheless, some countries are implementing their own technical regulations and conformity assessment requirements that conflict with some of these goals, as will be discussed in the following chapter.

U.S. Trade Obligations Related to Standards

As the importance of standards-related barriers to trade has become more evident in recent years, the United States and its trading partners have attempted to address these barriers through various multilateral, regional, and bilateral fora. Paramount among these is the 1994 WTO Agreement on Technical Barriers to Trade (TBT). NAFTA, APEC, and the Transatlantic Economic Partnership (TEP) of the United States and the EU are other fora that address standards-related barriers to trade, including those in the IT industry. However, the rules of the TBT take precedence over those of any other regional or bilateral structure; no regional or bilateral arrangements may contradict TBT principles or rules.[134] Nonetheless, arrangements consistent with the TBT may advance in terms of liberalization and, in some instances, are being used by trading partners to accelerate TBT implementation.[135] The following discussion briefly outlines U.S. trade obligations with respect to the WTO TBT, NAFTA, APEC, and TEP, and the aspects of these agreements that specifically attempt to address technical barriers to trade in the IT industry. This will provide a point of reference for more detailed evaluation of these agreements and possible alternative arrangements that will be discussed in chapters 4 and 5.

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[132] VCCI was formed in 1995 by four Japanese industry associations in response to a government request that electronics manufacturers participate in the control of electromagnetic interference. The Japanese Telecommunications Technology Council presented the Ministry of Posts and Telecommunications with standards based on CISPR 22, and industry responded by organizing the VCCI as the mechanism to implement a voluntary electromagnetic interference-control program.

[133] Roland W. Bubisch, "The VCCI: EMI Requirements in Japan," *Compliance Engineering: 1998 Annual Reference Guide*, 1998, pp. A115-A116.

[134] U.S. trade officials, telephone interviews by USITC staff, May 14, 1998.

[135] Ibid.

World Trade Organization Agreement on Technical Barriers to Trade

Significant progress in reducing global barriers to trade was made in the Uruguay Round, including acceptance by national governments of the WTO Agreement on Technical Barriers to Trade (TBT). The TBT superseded and expanded on the first GATT agreement on standards concluded under the Tokyo Round of multinational trade negotiations. Some analysts have pointed out that changes in the agreement significantly improve its potential to address standards-related barriers to trade.[136] The WTO TBT attempts to ensure that mandatory technical regulations, voluntary standards, and conformity assessment of products, services, and processes do not constitute unnecessary trade barriers.[137] The agreement contains disciplines related to the adoption of technical regulations and standards in WTO member countries, provisions on conformity assessment, and provisions on transparency. Generally, under the TBT, national governments are to apply their technical regulations on a nondiscriminatory basis and are to develop regulations that are no more trade-restrictive than necessary to meet legitimate objectives, which include national security requirements; the prevention of deceptive practices; and the protection of human health or safety, animal or plant life and health, or the environment. In general, if they exist, relevant international standards are to be used as a basis for a government's technical regulations, unless they are inappropriate due to various factors, such as climactic, geographical, or technological factors.[138]

Conformity assessment procedures must also be applied on a nondiscriminatory basis under the TBT. TBT transparency provisions provide for the publication of government-mandated technical regulations which manufacturers and suppliers must meet if they are to sell products in a given market. Further, each WTO member country must establish a single inquiry point to answer questions on technical regulations and conformity assessment procedures proposed or adopted by governments and on conformity assessment procedures applied by entities which have legal power to enforce technical regulations.

Other Agreements

NAFTA

U.S. standards commitments with regard to Mexico and Canada under the NAFTA, which went into effect on January 1, 1994, are contained in Chapter 9 of that agreement. The NAFTA accord on technical barriers encompasses all voluntary standards and technical regulations, including those applicable to "processes and production methods." To a large extent, the NAFTA accord on technical barriers resembles that of the WTO TBT.[139] However, NAFTA's technical barrier provisions go beyond the TBT in committing the parties to "make compatible" their standards-related measures "to the greatest extent practicable," provided that this does not reduce "the level

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[136] For readers interested in reviewing some of the major achievements of the WTO TBT compared to the predecessor GATT agreement established in the Tokyo Round, see National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 112-121 and Bernard Hoekman and Michel Kostecki, *The Political Economy of the World Trading System* (Oxford: Oxford University Press, 1997), pp. 112-116.

[137] WTO Agreement on Technical Barriers to Trade, Article 2-2 and Bernard Hoekman and Michel Kostecki, *The Political Economy of the World Trading System*, pp. 112-116.

[138] Ibid.

[139] Language of the two accords is parallel or identical in many places.

of safety or protection of human, animal or plant life or health, the environment or consumers." When harmonization is absent, NAFTA's technical barrier accord requires mutual recognition of technical requirements when equivalence is demonstrated; it also requires mutual recognition of conformity assessment procedures when parties are "satisfied" as to their adequacy. A decision not to afford mutual recognition is to be explained in writing on request.

In general, many U.S. industry observers assert that the NAFTA has been relatively successful in reducing many technical barriers to trade among the United States, Mexico, and Canada.[140] For example, a Committee on Standards-Related Measures among NAFTA partners that meets regularly to oversee NAFTA obligations and address specific concerns has helped resolve many standards-related problems. However, some impediments remain. USTR several times has called upon the Mexican government to adhere to its obligation to publish regulation changes with adequate time for public comment. Further, the U.S. Chamber of Commerce has cited problems in ensuring transparency, confusion about regulatory requirements, and inconsistent application of requirements as impediments to U.S. small business export expansion under NAFTA.[141] Many of Mexico's standards-related problems have pertained to marking and labeling requirements.

APEC

The Asia Pacific Economic Cooperation Forum (APEC), established in November 1989, currently consists of 18 Asian and American members, including the United States.[142] APEC's primary purpose is to provide a forum for governments in the region to discuss economic issues and promote economic cooperation. The guiding vision for APEC is "open regionalism," which embodies the principles of reduced trade and investment barriers in the Asia Pacific that do not raise new barriers to trade with partners outside the region.

As in the NAFTA, APEC has standards-related committees. APEC's Committee on Trade and Investment (CTI) oversees standards and conformance issues. In November 1994, the CTI established a formal Subcommittee on Standards and Conformance (SCSC), which is supported by an ad hoc technical working group that collects data on regional standards, testing, and certification requirements.

In June 1998, APEC trade ministers agreed to a Mutual Recognition Arrangement (MRA)[143] covering testing and certification of telecommunications and other IT equipment subject to

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[140] U.S. industry representatives and analysts, interviews by USITC staff, Sept. 23, 1997; Nov. 17-19, 1997; and May 6, 1996.

[141] Some of these problems are due to Mexico's extensive overhaul of its standards and certification system, which has been underway since 1992. This overhaul contains some positive features, such as greater opportunities for input in standards development. However, it involves numerous changes from prior practice as well as enforcement of prior regulations that were previously ignored.

[142] APEC members include the United States, Canada, Mexico, Chile, Japan, China, Taiwan, Hong Kong, Korea, Indonesia, Malaysia, Thailand, Singapore, Brunei, the Philippines, Australia, New Zealand, and Papua New Guinea. Three more economies, Peru, Russia, and Vietnam will accede to APEC membership before the end of 1998.

[143] APEC terminology refers to MRAs as mutual recognition arrangements rather than the more commonly used term mutual recognition agreements. See appendix C for a glossary of important terms used in this report.

telecommunications regulations.[144] IT products in the arrangement include any wireline or wireless product intended for connection to the public telecommunications network to send, process, or receive information, such as computers, telephones, modems, and transmitters, as well as software. Under the terms of the MRA, IT manufacturers may designate conformity assessment bodies to test and certify telecommunications equipment to the technical regulations of the importing market.[145] Individual APEC economies may choose to sign and implement the MRA on a bilateral basis with other APEC economies. APEC members have varying schedules for implementing the two phases of the MRA, covering mutual recognition of testing and certification.[146]

TEP

In May 1998, President Clinton and EU President Santer launched a new "Transatlantic Economic Partnership" (TEP) to strengthen a relationship established in 1995 between the United States and the EU known as the New Transatlantic Agenda (NTA).[147] These U.S.-EU initiatives were established to expand and deepen cooperation on economic issues by taking concrete steps to strengthen the multilateral trading system and enhance the transatlantic economic relationship. Under the auspices of the NTA, an MRA of conformity assessment procedures was concluded in 1997 and signed in 1998. The MRA encompasses several different sectors and issue areas, including in the IT sector (see text box below). This MRA was immediately commended by both the United States and the EU as demonstrating the types of tangible benefits that could accrue from a renewed US-EU economic partnership. In fact, the TEP envisions expanding the MRA to additional sectors. However, some U.S. industry representatives questioned aspects of the agreement and the process involved in its completion.[148] Some of the different views on the MRA and possible alternatives to the MRA will be presented in chapter 5.

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[144] USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement," press release, June 5, 1998.

[145] Ibid.

[146] For details of APEC members' schedules for implementing the MRA, see table 5-1 in chap. 5.

[147] USTR, "United States-European Union Transatlantic Economic Partnership," Federal Register Notice, June 9, 1998, vol. 63, No. 110, pp-31546-31548; "Building a Stronger World Community: The Transatlantic Economic Partnership," White House Fact Sheet, May 18, 1998; and "New Transatlantic Economic Partnership to Accelerate Trade Growth," White House press release, May 18, 1998.

[148] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998. Also see John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 79-80.

United States-European Union Mutual Recognition Agreement provisions related to IT equipment:

Basic provisions: The MRA covers $60 billion of transatlantic trade a year in IT equipment, as well as other non-IT products, such as pharmaceuticals and medical devices. With respect to IT products, during a 2-year phase-in period, there will be mutual acceptance of test data to U.S. and EU regulations. After the two-year period, certifications performed by a facility in the United States or the EU recognized under the MRA will be accepted. The MRA aims to reduce the cost of testing and certification and broaden manufacturers' choice of testing laboratories. Regulatory and legal changes are required to implement fully the agreement. Dispute resolution under the MRA will be handled by a Joint Committee and Joint Sectoral Committee for IT. For IT products, the MRA covers regulation of:

> ***Electrical safety*:** Electrical safety tests measure the level of risk for workers and consumers of electrical appliances, hand-held tools, electrical installation equipment, electronic equipment, and IT products. The relevant U.S. regulations are those of the Occupational Safety and Health Administration (OSHA) . The pertinent EU regulation is the EU low voltage directive.
>
> ***Telecommunications terminal equipment:*** This equipment encompasses any product intended for connection to the public telecommunications network to send, process, or receive information. This includes analog and digital equipment using wireline or wireless connection, as well as satellite terminal equipment, and radio transmitters.
>
> ***Electromagnetic compatibility:*** Electromagnetic compatibility (EMC) tests ensure that any equipment does not harm networks or other equipment in the same environment.

Source: *Agreement on Mutual Recognition Between the United States of America and the European Union*, found at http://www.ustr.gov/agreements/mra/mra1.pdf; and USTR official, facsimile transmission to USITC staff, Oct. 20, 1998.

CHAPTER 4
EXAMINATION OF EFFECTS OF STANDARDS-RELATED BARRIERS TO TRADE ON THE IT INDUSTRY

This chapter examines the effects of standards-related barriers to trade on the computer hardware, software, and telecommunications equipment sectors. U.S. IT producers have encountered a variety of standards-related barriers in international markets such as duplicative conformity assessment regimes; differing quality assurance, testing, and certification requirements; and disparate marking and labeling regulations. Even when standards and technical regulations are imposed for valid domestic reasons, they still often impose higher costs on foreign producers if products are required to undergo redundant testing and inspection.[149] Although little quantitative work has been done on the effects of such measures on the IT industry, by explaining how such issues affect the industry in some very specific ways, necessary ground work is laid for future empirical work in this area. As this chapter will show, standards-related barriers can be extremely costly for IT firms both financially and in terms of lost time in bringing products to market.

Standards-related barriers to trade result in various costs to firms. In general, costs can be categorized as administrative expenses and delays in getting products to market.[150] Administrative expenses include expenses related to product redesign to comply with technical requirements; firms incur costs such as wages to engineers who spend time redesigning a product and reconfiguring capital equipment to manufacture products with varying characteristics. Conformity assessment procedures on a product for sale in foreign markets also entail financial costs for firms, whether the assessment is to a country's specific technical regulations or are duplicative assessment procedures. In addition, firms incur expenses to keep abreast of technical regulations and conformity assessment requirements in foreign markets and to disseminate this information throughout the firm.

Finally, designing products to unique technical requirements or undergoing unnecessary or duplicative conformity assessment procedures often delay firms from bringing products to market. Delays can be especially harmful in the IT industry because of its exceedingly short product life cycles. A firm that must take time to redesign, test, or certify its products can lose sales opportunities if its technology is no longer considered cutting edge or competitors' products have already established a foothold by the time the product is brought to market.

Duplicative Conformity Assessment Requirements

As noted in chapter 3, many countries use common international standards as the basis for some of the technical regulations of most interest to IT manufacturers, those pertaining to electrical safety

[149] David Vogel, *Transatlantic Trade* (Washington, DC: Brookings Institution, 1997), pp. 1-13.

[150] See Michael P. Gallaway, "The General Equilibrium Implications of Fixed Export Costs on Market-Structure and Global Welfare," USITC Office of Economics Working Paper No. 94-12-B, Dec. 1994, pp. 1-38.

and electromagnetic compatibility (EMC). These standards are ISO 950 and CISPR-22, respectively (see text box in chapter 3).[151] However, even if technical regulations are similar or the same, a government may not accept foreign proof of conformity and may require that a product be tested or certified by conformity assessment bodies within its borders, which delays market entry. Duplicative conformity assessment is an inefficient use of resources for foreign suppliers, and can place foreign suppliers of IT equipment at a significant cost disadvantage compared with domestic manufacturers. Undergoing duplicative conformity assessment procedures has become an important trade issue for IT manufacturers.

Some countries differ markedly on how firms must demonstrate the compliance of IT products to technical regulations.[152] Some countries require tests conducted within their own geographic boundaries to demonstrate conformity. Others require, in addition, certification through a third-party organization before the product is allowed on the market.[153] In the latter case, some countries require government or third-party accreditation of the test or certification facility itself, or, in the case of supplier's declaration, accreditation of the firm's testing laboratories.

Conformity assessment may be more difficult for imports than for domestically produced products, whether on purpose or through disregard for the costs of regulatory compliance.[154] Regulators may refuse to accept information generated by foreign laboratories, such as safety test data, adding to the costs of multiple regulatory systems. For instance, the United States has complained about the EU's refusal to accept test data for telecommunications equipment, and U.S. telecommunications equipment representatives have stated that EU testing requirements for telecommunications equipment were consequently unnecessarily costly.[155] Industry sources estimated that the EU's tests took 6 to 8 weeks to complete; this constituted a relatively large percent of a product's 24 month life cycle and accounted for perhaps 5 to 10 percent of its value.[156] Representatives assert that impeding market entry in the first two months of a telecommunications product's life cycle was particularly damaging because most sales occur when the product is first put on the market.[157] The recently concluded U.S.-EU MRA intends to resolve some of these costly requirements.

U.S. IT producers also have noted adverse trade effects from duplicative conformity assessment in the Chinese market. China's safety certification requirements largely parallel those of Underwriters Laboratories and apply to all computers and monitors. One U.S. computer maker estimates that China's safety certification application costs approximately $10,000 per model and each certification takes up to six months.[158] The firm states that these safety requirements "impose financial and administrative burdens on foreign companies and undermine their ability to bring products to market in a timely manner. Working with very short lead times, computer companies

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[151] Brian D. Unter, "Maximizing Customer Benefits--A Global Model for Regulatory Reform," pp. 1- 24.

[152] Ibid.

[153] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 118.

[154] Brian D. Unter, "Maximizing Customer Benefits--A Global Model for Regulatory Reform," p. 24.

[155] "F.C.C. Ban on Electronic Testing by E.C. Labs May Provide Leverage to US Negotiators," *BNA International Trade Reporter*, May 9, 1990, p. 672 and TIA representative, interview by USITC staff, Washington, DC, Sept. 10, 1997.

[156] TIA representative, interview by USITC staff, Washington, DC, Sept. 10, 1997.

[157] Ibid.

[158] U.S. computer industry representative, facsimile transmission to USITC staff, May 5, 1997.

must be able to introduce their products to the market quickly or risk losing sales."[159] USTR also has noted that although China requires a quality license before manufactured goods can be imported, China does not accept U.S. certification of product quality or manufacturing procedures. USTR reports that obtaining such a license can be time-consuming and expensive.[160]

If testing is required in the importing country, problems occur regarding equal access to testing facilities.[161] In addition, when the testing facility is operated by domestic competitors, as often has been the case in certain countries like Japan and Korea, one analyst stated, "the danger of exclusionary tactics is obvious, as is the possibility of industrial espionage."[162]

Quality Registration, Testing, and Certification

U.S. IT producers also have encountered foreign requirements that they believe have no sound technical basis and are unnecessary. U.S. manufacturers have alleged that some foreign governments' requirements for quality systems registration, testing, and certification do not legitimately address concerns about public health, safety, the environment, or the prevention of deceptive practices, which are the only legitimate reasons under the TBT for imposing such requirements.[163] IT manufacturers allege that these unnecessary conformity assessment requirements are expensive and cost valuable time in terms of entry into important growing markets.

A quality system audit is an assessment of the methods a company uses, including management practices and internal documentation, to ensure that it manufactures a given product to particular specifications.[164] ISO 9000 and other quality systems standards originally were created as voluntary means for firms to demonstrate a supplier's ability to make a product of consistent quality.[165] Registration to such a system is particularly useful for high-volume transactions that require a high degree of confidence in product conformity.[166]

However, although such quality systems standards originally were intended to be voluntary, mandatory registration requirements have proliferated recently in many economies, particularly emerging ones.[167] Often such requirements appear to be unnecessary, existing primarily to protect a domestic industry. In some cases, the standards to which manufacturers must register duplicate internationally recognized quality system standards.

The costs of registering to quality systems standards can be substantial. In 1993, a survey of North American firms found that the average cost of registering to ISO 9000 exceeded $245,000 per

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[159] Ibid.

[160] United States Trade Representative (USTR), *1998 NTE*, p. 50.

[161] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, p. 24.

[162] Peter B. Edelman, "Japanese Product Standards as Non-Tariff Barriers: When Regulatory Policy Becomes a Trade Issue," *Stanford Journal of International Law*, Vol. 24, Spring 1988, pp. 389-446.

[163] WTO Agreement on Technical Barriers to Trade, Article 2-2.

[164] It is important to note that registration evaluates the quality assurance system, not the quality of the products themselves. National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 78 and John S. Wilson, *Standards: An APEC Agenda*, p. 25.

[165] John S. Wilson, *Standards: An APEC Agenda*, p. 25.

[166] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 78.

[167] U.S. IT industry representatives, interviews by USITC staff, Apr. 10 and Apr. 30, 1997, and May 6, 1998.

firm.[168] Most large multinational firms have long-standing quality assurance systems in place, and therefore they assert that registering to ISO 9000 is largely redundant and unnecessary.[169] This is the case with IBM, where officials have estimated that registering their facilities to ISO 9000 to meet EU requirements has cost $100 million.[170] U.S. industry representatives state that Brazil's requirement that telecommunications equipment manufacturers prove compliance to the Brazilian Association of Technical Norms' "Series 1900," Brazil's version of ISO 9000, is unnecessary and a barrier to trade.[171] Registration to Series 1900 duplicates regular ISO 9000 requirements. Further, a U.S. manufacturer states that because the Brazilian government does not grant quality system certification to a foreign firm unless it builds a plant in Brazil, the regulations in effect impede telecommunications equipment imports and force firms to invest in Brazilian production facilities.[172]

Several years ago, a dispute between the United States and Japan emerged when the Japan Accreditation Board, an agency of the Ministry of International Trade and Industry (MITI), proposed to make a new ISO 9000-type quality standard mandatory for all suppliers of software to the Japanese market.[173] One of the requirements of the new quality standard, ISO-9000-3, would be a twice a year on-site audit that would be in addition to semiannual audits that most global software and electronics firms already undergo on a voluntary basis to obtain the more general 9001 quality management certification.[174] U.S. industry representatives asserted that Japan's proposal appeared to permit only Japanese auditing firms to conduct on-site inspections of U.S. and other foreign firms to determine whether software and development processes conformed with the standard.

U.S. IT producers and trade officials asserted that the proposed Japanese quality management standard for software developers was another instance of supposed voluntary management standards proliferating as mandatory requirements.[175] U.S. industry and trade officials indicated that the proposed standard would result in "additional product costs, bureaucracy and time to market delays"

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[168] Certification to ISO 9000 requires an independent third party inspection and audit. This estimate included the additional costs of follow-up surveillance audits by registrars. National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 79 and John S. Wilson, *Standards: An APEC Agenda*, p. 25.

[169] John S. Wilson, *Standards: An APEC Agenda*, p. 25.

[170] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, p. 79 and U.S. industry official, interview by USITC staff, Sept. 27, 1997.

[171] The system was promulgated in December 1993. Equipment affected includes switching equipment, multiplexers, transmitters, and various other products. U.S. Department of Commerce, American Embassy Brasilia, *1994 National Trade Data Bank: Market Reports*, "Brazil: Telecom Local Content Regs," Jan. 14, 1994.

[172] However, at least one U.S. firm, with the assistance of USTR, was able to obtain the certification without building a plant in Brazil. TIA representative, interview by USITC staff, Washington, DC, Sept. 10, 1997, and U.S. industry representative, telephone interview by USITC staff, June 22, 1998.

[173] U.S. IT representatives, telephone interviews by USITC staff, July 14 and 16, 1998; and U.S. standards officials, interview by USITC staff, Sept. 26, 1997.

[174] Peter M. Tirschwell, "Japan to Seek US Accord On New Software Standards," *Journal of Commerce*, Aug. 8, 1995, pp 4-5, and 8A.

[175] They pointed out that quality management standards are increasingly misunderstood as indicators of product quality, whereas, in fact, they merely assess the consistency and quality of the design, development, and production processes of firms. U.S. and EU industry and standards officials, in-person and telephone interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; and June 23, 1998; U.S. government official and standards officials, interviews by USITC staff, July 24, 1998.

with no assurances that it would improve software quality.[176] Foreign software suppliers to Japan were also concerned that streamlined software development procedures and source codes could be vulnerable to exposure and could eventually be disclosed to competitors, "raising fears of industrial espionage."[177]

Because the proposal would have affected all types of software, whether for PC's, mainframes, or incorporated in other IT products, it drew complaints from several U.S. IT sectors, including the computer hardware, software, telecommunications equipment, and electronic component sectors.[178] According to the president of ITI, the Japanese proposal represented "the type of trade issue that is emerging in a post-GATT world--the technical, non-tariff barrier to trade."[179] Under pressure from the U.S. IT industry and the Clinton administration, the Japanese Government backed away from plans to require all foreign software to meet the proposed set of quality standards that both sides in the end agreed went beyond established international criteria.[180] However, U.S. trade and IT industry officials point out that it is imperative that both government and industry officials remain vigilant to these types of standards-related barriers to trade as they may become increasingly common in high-technology industries in the future.[181]

Many U.S. IT manufacturers also complain about unnecessary testing and certification requirements, particularly in rapidly growing markets where delayed market entry can be especially harmful. In particular, U.S. telecommunications equipment producers state that Brazil and China are the fastest-growing markets in the world for telecommunications equipment; thus, testing and certification requirements in these countries that appear to have no sound technical basis are especially deleterious to their competitiveness.[182] One example is Brazil's certification system for certain telecommunications equipment, namely optical fiber and fiber optic cable.[183] Although the Brazilian Government recognizes international standards for imported fiber and cable, it requires separate certification for different combinations of imported fiber and cable. Because the individual items' certification is already accepted by regulators, this requirement is redundant. A U.S. firm states that certifying all of the combinations of optical fiber and fiber optic cable it sends to its various customers in Brazil costs it time and money.[184]

U.S. IT representatives also state that China's requirement that fiber optic cable imports be inspected and certified as safe for human health has no technical basis and creates a barrier to U.S.

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[176] Peter M. Tirschwell, "Japan to Seek US Accord On New Software Standards," and U.S. and EU industry and standards officials, in-person and telephone interviews by USITC staff; Sept. 25, 1997; Nov. 17-19, 1997; and June 23, 1998.

[177] Peter M. Tirschwell, "Japan to Seek US Accord On New Software Standards."

[178] Ibid., and U.S. and EU industry and standards officials, in-person and telephone interviews by USITC staff; Sept. 25, 1997; Nov. 17-19, 1997; and June 23, 1998.

[179] ITI representatives, interview by USITC staff, Apr. 10 and 30, 1997, and Peter M. Tirschwell, "Japan to Seek US Accord On New Software Standards."

[180] Peter M. Tirschwell, "Japan to Seek US Accord On New Software Standards," U.S. standards officials, interview by USITC staff, Sept. 26, 1997; and U.S. IT representatives, telephone interviews by USITC staff, July 14 and 16, 1998.

[181] U.S. IT representatives, telephone interviews by USITC staff, July 14 and 16, 1998; and U.S. standards officials, interview by USITC staff, Sept. 26, 1997, and July 24, 1998; and U.S. Government official, interview by USITC staff, July 24, 1998.

[182] U.S. industry representative, telephone interview by USITC staff, June 22, 1998.

[183] An optical fiber cable consists of many strands of optical fiber bundled together.

[184] U.S. industry representative, telephone interview by USITC staff, June 22, 1998.

exports.[185] They point out that because fiber optic cable carries only optical waves and no electrical current it poses no health or safety risks.[186] Further, because optical fiber imports face no inspection requirement, industry representatives believe China is using this policy to aid its fledgling fiber optic cable industry. They assert the policy, instituted in 1997, has caused China's fiber optic cable imports to drop and also led many U.S. firms to enter into joint ventures to produce cable in China to avoid inspection requirements; however, Chinese government limits on joint ventures do not allow some manufacturers this option.[187] A U.S. industry representative asserts that, because the Chinese market for optical fiber and fiber optic cable is relatively nascent, it is extremely important for U.S. firms to establish themselves quickly in the market, and that China's policy precludes U.S. fiber optic cable producers from doing so.[188]

Marking and Labeling

Although the technical regulations of primary interest to IT manufacturers, those pertaining to electrical safety and electromagnetic compatibility, are similar in many countries, other technical regulations differ. Varying technical regulations create trade impediments for IT manufacturers who must spend time and money to assure that products conform to them. Technical regulations cited by many U.S. IT representatives as creating such trade barriers are differing product marking and labeling requirements.

In many cases, regulators have legitimate objectives for establishing marking and labeling requirements. Governments often establish marking and labeling requirements to provide consumers with information considered necessary by public officials. In addition, consumers often desire certain information on products. For example, many IT products are labeled with information regarding electrical safety, such as how to prevent electric shock.

However, often the extent of information required and prescriptive rules on how it must be presented, and more importantly, inconsistent implementation of these requirements, have been cited by U.S. IT firms as costly trade barriers.[189] Inflexible marking and labeling requirements mean that manufacturers can incur substantial costs when seeking to enter new markets or offer new products. Costs include added expenses for developing packaging and managing inventory and shipping. Further, because it is critical that IT products with the latest technology be brought to market quickly, U.S. firms assert that having to create special packaging or labels delays the roll-out of products and their ability to compete in foreign markets.[190]

Inflexible marking requirements are a particular problem for the IT industry due to its global nature. Many IT producers have manufacturing or assembly facilities in various locations throughout the world and produce goods in mass quantities before they know the exact destination for the products. Further, orders often are filled from whichever location has an adequate supply. Thus, different

[185] U.S. industry representatives, telephone interviews by USITC staff, June 22-23, 1998.

[186] This is in contrast to electrical cable, which has a potentially harmful electric current.

[187] U.S. industry representatives, telephone interviews by USITC staff, June 22-23, 1998.

[188] U.S. industry representative, telephone interview by USITC staff, June 23, 1998.

[189] U.S. industry representatives, interview by USITC staff, Washington, May 5, 1997; and U.S. industry representatives, telephone interviews by USITC staff, Sept. 23, 1997; Feb. 12, 1998; and May 6, 1998.

[190] U.S. industry representative, facsimile transmission to USITC staff, May 5, 1997; and U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

marking for specific markets can result in product inventory and shipping difficulties for IT firms.[191] This is exemplified in new Mexican requirements for commercial labeling, which require that imported products be marked with information about the importer, and affect both IT hardware and software.[192] Although in some instances, such information can be affixed after importation, this does not hold true for all products. Further, a firm essentially would have to set up a labeling process in Mexico, which may not be a feasible option.[193] Representatives of a U.S. producer that sells computer peripherals in Mexico that were manufactured in Asia say their firm has extreme difficulty adhering to these labeling requirements because it is difficult to predict a product's destination at the time it is manufactured.[194]

In addition, costs can be substantial if a government mandates that information must be printed directly on a product's packaging instead of on a label. For example, China's labeling law requires product and manufacturer information to be printed directly on the outer container of computer products, rather than on an adhesive label or sticker. This obligates manufacturers to spend time and resources to create special packaging for the Chinese market.[195]

Some marking and labeling requirements cited as trade barriers entail language-related requirements.[196] Language requirements are particularly onerous when a government mandates that only its language may appear on a product, which may require exporters to create separate labeling for different export markets. Producers assert that such requirements delay market entry, particularly in the "second-tier" markets with languages that are not as common as others.[197] According to one U.S. producer, Brazil requires that only Portuguese be used on software boxes.[198] This precludes an exporter from simply affixing a Portuguese language label to its product as a supplement to the English language packaging, a much cheaper option.

IT industry representatives state that inconsistencies in marking and labeling requirements are often the most significant trade barriers and that unclear regulations, coupled with insufficiently trained customs officials, have disrupted cross-border trade in many IT products. U.S. computer equipment and software exporters have asserted that Mexican guidelines on how markings should appear are inconsistently implemented by Mexican customs officials.[199] The regulations state that the size of the Spanish information must be at least the same size of the foreign language if both appear on a product.[200] According to U.S. IT representatives, at some entry points, customs officials require that

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[191] U.S. industry representatives, interview by USITC staff, Washington, May 5, 1997; and U.S. industry representatives, telephone interviews by USITC staff, Sept. 23, 1997; Feb. 12, 1998; and May 6, 1998.

[192] Mexico's mandatory technical regulations are known as Normas Officiales Mexicanas (NOMs). The technical regulation pertaining to product certification as well as marking and labeling is known is NOM 50, which took effect on March 1, 1997.

[193] There are requirements regarding performing the labeling within a given period of time after the product's importation and having someone licensed to perform the labeling. NIST official, telephone interview by USITC staff, Aug. 28, 1998.

[194] U.S. industry representatives, interview by USITC staff, Washington, May 5, 1997.

[195] U.S. IT industry representative, facsimile transmission to USITC staff, May 5, 1997.

[196] U.S. IT industry representatives, interviews by USITC staff, California, April 28, 1997 and Washington, May 5, 1997.

[197] U.S. IT industry representative, interview by USITC staff, California, April 28, 1997.

[198] Ibid.

[199] U.S. IT industry representatives, interview by USITC staff, Washington, May 5, 1997.

[200] NIST official, telephone interview by USITC staff, Aug. 28, 1998 and "Guideline of Official Mexican Standard NOM-050-SCFI-1994: Commercial Information- General Provisions for Products,"

(continued...)

the Spanish be the same size and font as the English, while at other entry points the print need not be the same.[201]

Costs of IT Standards-Related Barriers to Trade

Empirical economic analysis of the effects of standards-related barriers to trade is limited and methodology to measure the effects is largely underdeveloped.[202] Costs associated with standards-related barriers are difficult to quantify,[203] particularly costs of lost revenues due to time-to-market delays.[204] Further, it can be difficult to determine which standards-related measures are efficient and justified as opposed to those which are unnecessary and excessive.[205] However, other analysts assert that it is less a methodological problem than a data problem. They state that methods now exist to quantify the effects of standards-related barriers to trade but substantial efforts are required to acquire the requisite data and determine its proper aggregations to complete the quantitative analysis.

Nonetheless, some estimates indicate that the overall impact of standards-related measures on trade is substantial.[206] According to Department of Commerce estimates, $66 billion of the $110 billion in U.S. exports to Europe in 1993 were subject to EU-required product certification; $10 billion, primarily IT products, were subject to third-party certification.[207] A European Commission study in 1992 showed that streamlining the system of telecommunications terminal type approval in the EU could save approximately $600 million in testing and type approval costs and $1.2 billion in terms of accelerated market entry and production gains.[208] ITI has estimated that duplication of mandatory U.S. and European Union testing and certification for computers, telecommunications equipment, and other IT products costs U.S. companies and consumers more than $1.3 billion

[200] (...continued)
Official Gazette of the Federation, Jan. 24, 1996 (English translation), p. 27.

[201] "Guideline of Official Mexican Standard NOM-050-SCFI-1994: Commercial Information- General Provisions for Products," (English translation), pp. 6-7 and U.S. IT industry representatives, interview by USITC staff, Washington, May 5, 1997.

[202] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, p. 154.

[203] See Michael P. Gallaway, "The General Equilibrium Implications of Fixed Export Costs on Market Structure and Global Welfare, USITC Office of Economics working paper No. 94-12-B, pp. 1-38.

[204] Most studies of nontariff barriers, such as standards-related barriers, attempt to model and convert these to tariff equivalents even though many barriers do not raise the marginal costs of bringing a product to market. Country-specific technical standards and certification requirements are examples of overhead costs faced by importers. Attempts to measure the significance of such nontariff barriers using the assumption of tariff equivalence ignore disaggregated market structure effects that might be exploited in empirical work and have relevance for many sectors, including the IT sector. Gallaway, "*The General Equilibrium Implications of Fixed Export Costs*," p. 29.

[205] Ibid.

[206] OECD, "Product Standards, Conformity Assessment and Regulatory Reform," p. 14.

[207] National Research *Council, Standards, Conformity Assessment and Trade into the 21st Century*, p. 112.

[208] Mr. J. Richter, European Telecommunications Approvals Workshop, London, June 27-28, 1989; and OECD, *Telecommunications Type Approval: Policies and Procedures for Market Access*, p. 66.

annually.[209] Further, there are indications that global welfare costs of duplicative standards-related barriers to trade could be many times larger than the direct costs of such measures.[210]

ITI has estimated further that duplicative testing and certification requirements for telecommunications equipment and other IT products in the APEC region cost U.S. manufacturers and consumers $1.8 billion per year.[211] Finally, a comprehensive examination of various OECD countries' telecommunications terminal type approval requirements estimated that the costs of meeting the various requirements account for slightly over 2 percent of the price of exported products.[212]

The OECD has recommended that more thorough analysis of the economic effects of standards-related barriers to trade be undertaken, including in the IT industry.[213] Some experts note that methodologies for measuring standards-related barriers to trade need to be further examined and that more data must be collected.[214]

[209] John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," pp. 1-12.

[210] U.S. Government and IT industry economists, and IT industry in-person and telephone interviews by USITC staff, July-August 1998.

[211] John Sullivan Wilson, "Eliminating Barriers to Trade in Telecommunications and Information Technology Goods and Services: Next Steps in Multilateral and Regional Liberalization Efforts," In OECD Proceedings: *Regulatory Reform and International Market Openness* (Paris: OECD, 1996), pp. 131-153.

[212] OECD, *Telecommunications Type Approval: Policies and Procedures for Market Access*, p. 66.

[213] OECD, *Review of Tariffs and Non-Tariff Barriers: Non-Tariff Barriers and Trade Liberalization*, Mar. 9-10, 1998, p. 3.

[214] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, p. 154.

CHAPTER 5
PRINCIPAL FINDINGS AND RECENT PROPOSALS FOR REDUCING IT STANDARDS-RELATED BARRIERS TO TRADE

This chapter briefly summarizes this report's findings on standards-related barriers to trade in the IT industry and describes some recent proposals for reducing such barriers. Because of recent interest in MRAs to reduce some of the costs of duplicative conformity assessment requirements across countries, the chapter evaluates some recent bilateral and regional MRAs completed in the IT sector. A discussion of several alternative approaches to MRAs, suggested by U.S. and foreign trade officials and IT industry representatives as potentially less costly and less trade restrictive in certain circumstances, follows. Finally, the chapter concludes with an examination of some U.S. Government responses to strategic standards policies of the European Union and Japan.

Principal Findings

This study has identified standards-related measures as among the most important and costly trade barriers for manufacturers of IT products such as computer hardware, software, and telecommunications equipment. As previously seen, standards and technical regulations often serve important economic and social goals by facilitating production, reducing transaction costs, and protecting health, safety, and the environment. However, standards-related measures and the means by which government regulators assess the conformance of products, processes, or management systems to government-mandated standards, or technical regulations, can generate added costs for foreign manufacturers. They also may be used to protect domestic industries from competition.

The study finds that U.S. IT producers have encountered standards-related barriers to trade such as duplicative conformity assessment requirements; diverse quality assurance, testing and certification requirements; and differing marking and labeling requirements. However, despite the differences among conformity assessment systems, a number of countries' principal technical regulations related to IT standards are based on the same international standards and for the same general purposes: to assure electrical safety for IT workers and consumers; to ensure electromagnetic compatibility of IT products; and to protect public telecommunications networks and radio spectrum. The main differences among countries are primarily related to the means required to prove conformity to such regulations. As a result, most computer hardware, software, and telecommunications equipment manufacturers indicate that the standards-related barrier of greatest cost and time significance is the need to show compliance with duplicative government technical regulations repeatedly across countries.

Although there have been some attempts to quantify the economic costs of nontariff barriers to trade, there is a lack of quantitative work specifically analyzing the costs of standards-related

barriers to trade in the IT industry.[215] However, as the previous chapter indicates, estimates by the leading IT industry association suggest that duplication in mandatory testing and certification for computers, telecommunications equipment, and other IT products across countries results in significant costs for U.S. and foreign companies and consumers.[216] Studies completed by the National Research Council, the Brookings Institution, and the OECD also suggest that the costs of standards-related barriers to trade on the IT industry are substantial.[217] The following section examines MRAs and outlines some proposals put forth by trade officials and industry representatives for reducing costs associated with standards-related barriers.

Recent Proposals for Reducing IT Standards-Related Barriers

Mutual Recognition

Sometimes the costs of repeated conformity assessment in international markets may be reduced by establishment of agreements known as mutual recognition agreements (MRAs). An MRA is an agreement between parties to accept some or all aspects of one another's work based on the acceptance by one party of the results of another party of one or more elements of a conformity assessment or certification system. Both government and private-sector parties may be involved in MRAs.[218] A number of policy experts assert that agreements between governments to recognize national conformity assessment mechanisms have a potential to facilitate trade.[219] Ideally, a network of global MRAs enables manufacturers of regulated products to test products once and obtain certification and acceptance in all markets covered by such agreements. However, although MRAs may be appropriate in some cases, they may not always be the most effective means for reducing conformity assessment costs in IT products.

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[215] Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, p. 154.

[216] John S. Wilson, "Triennial Review of the Agreement on Technical Barriers to Trade," pp. 1-12.

[217] Deardorff, Alan V. And Robert M. Stern., *Measurement of Non-Tariff Barriers*, pp. 1-80; OECD, *Telecommunications Type Approval: Policies and Procedures for Market Access* (Paris: OECD, 1992), pp.1-66; Alan O. Sykes, *Product Standards for Internationally Integrated Goods Markets*, pp. 1-154; and National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 104-112.

[218] MRAs among private testing and certification organizations and large scale data exchange agreements may also be used to facilitate trade. Private testing bodies often help exporters overcome problems due their knowledge of and expertise in foreign countries' technical regulations and conformity assessment requirements. Agreements among private bodies in different countries sometimes are referred to as memoranda of understanding. Underwriters Laboratories Inc., letter to USITC staff dated July 17, 1998.

[219] National Research Council, *Standards, Conformity Assessment and Trade Into the 21st Century*, pp. 4-5.

An MRA concluded by the United States and the European Union on June 13, 1997,[220] covered over $60 billion of transatlantic trade a year in IT equipment and non-IT products.[221] For IT products, the MRA's annexes cover technical regulation of telecommunication equipment, electromagnetic compatibility, and electrical safety.[222] Also covered by the multisectoral agreement are regulation of pharmaceuticals, medical devices, and recreational craft. A major objective of the MRA is to help reduce the cost of testing and certification in the regulated sectors. Manufacturers will have their choice of testing laboratories broadened. Under the agreement, there will be mutual acceptance of test data to U.S. and EU regulations during a two-year phase-in period.[223] After the two-year period, certifications performed by any facility in the United States or the EU recognized under the MRA will be accepted. Further attention is required to ensure full MRA implementation, including necessary regulatory and legal changes required to implement the agreement. Dispute resolution under the MRA will be handled by a Joint Committee and Joint Sectoral Committee for IT, with decisions requiring the consent of both parties.[224]

Some industry supporters of the MRA estimate that it will result in direct savings to IT manufacturers of over $1.3 billion in reduced regulatory costs.[225] They also assert that IT firms will accrue additional benefits as a result of reduced time to market once applicable phase-in-periods are completed.[226] IT industry supporters of the MRA also state that it will provide them with a broader choice of testing laboratories.[227] Nevertheless, many IT industry representatives concur with some industry and standards analysts that the MRA will make the most progress in reducing standards barriers to trade in the traditionally more regulated telecommunications terminal equipment segment of the IT industry rather than in traditionally less regulated areas such as computers and software products.[228]

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[220] Although the United States and the European Union officials initialed the MRA on June 13, 1997, the MRA was not officially signed until May 12, 1998. For further discussion of the US-EU MRA, see USTR, "Mutual Recognition Fact Sheet," June 20, 1997; and EU, "EU Reaches MRA Agreements to Cut Red Tape with United States and Canada," *European Union News*, No., 41/97, June 13, 1997.

[221] OECD, *Product Standards, Conformity Assessment, and Regulatory Reform* (Paris: OECD, 1997) p. 26; and OECD, *Regulatory Cooperation in an Interdependent World* (Paris: OECD, 1994), p. 1.; and U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; May 6, 1998; and USTR official, facsimile transmission to USITC staff, Oct. 20, 1998. Also see John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 63-85.

[222] USTR, "Mutual Recognition Fact Sheet," June 20, 1997; and EU, "EU Reaches MRA Agreements to Cut Red Tape with United States and Canada," *European Union News*, No., 41/97, June 13, 1997.

[223] Ibid.

[224] Ibid.

[225] ITI representatives, interview by USITC staff, Apr. 30, 1997.

[226] Industry experts estimate the reduction in time necessary to complete the certification and testing process to be six to eight weeks, enabling international suppliers of IT goods to get their products to market much quicker than at present. John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 79-80.

[227] U.S. IT industry representatives, interviews by USITC staff, Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[228] Ibid; and Paul David and W. Edward Steinmueller, "Standards, Trade, and Competition in the Emerging Global Information Infrastructure Environment," in *Telecommunications Policy*, Vol. 20, No. 10, 1996, p. 1; John Wilson, "Regulatory Reform, Trade and Telecommunications Goods and Services," paper presented at OECD Workshop on Trade Policies and Trade Relations: Regulatory Reform and International Market Openness, Paris, 1997, pp. 1-18; and U.S. telecommunications equipment industry and trade association representatives, telephone interviews by USITC staff, Sept. 26 and Nov. 12, 1997; and June 24, 1998.

A number of IT industry experts, regulators, and trade officials assert that several lessons were learned from the U.S.-EU MRA.[229] First, the MRA may have been too broad, covering too many sectors and issues, which made it very time consuming and expensive to complete.[230] Secondly, less-regulated IT industry sectors, such as the computer sector, are now subsumed under a comprehensive MRA which presupposes regulatory structures in the United States and the EU. A third problem with the U.S.-EU MRA is its bilateral nature, limiting opportunities for other countries to participate in the agreement. Therefore, while expanding trade opportunities among the United States and EU countries, the MRA may impede trade with non-participants.[231] This does not take into account the global nature of the IT industry whereby different stages of the IT production process occur in different locations worldwide. On the other hand, strong supporters of the U.S.-EU MRA point out that the European Commission has completed similar MRAs with Australia and Canada and plans to negotiate similar MRAs with a number of other trading partners. However, according to some trade experts, excluding Asia from the MRA, or completing a separate MRA with individual countries, will add to the complexity and cost of the production process.[232]

More recently, APEC trade ministers concluded a sectorally based mutual recognition arrangement (MRA)[233] covering testing and certification of telecommunications and other IT equipment attached to networks. Ambassador Charlene Barshefsky, USTR, stated that the APEC Telecom MRA is the first multilateral MRA on telecommunications equipment.[234] Individual APEC economies may choose to sign and implement the MRA on a bilateral basis with other APEC economies. APEC ministers endorsed the MRA on June 5, 1998, and specified dates for 16 of the 18 APEC economies for bringing the MRA's provisions into effect (table 5-1).[235]

Under terms of the MRA, IT manufacturers will be able to have their products tested in the country where they are manufactured, then offer them for sale in any country covered by the MRA without further testing.[236] Products included in the arrangement are all telecommunications and other IT equipment subject to telecommunication regulations, including wireline and wireless, terrestrial, and satellite equipment. This could include computers, telephones, modems, transmitters, and software

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[229] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 25, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998. Also see John S. Wilson, "Telecommunications Liberalization: The Goods and Services Connection," pp. 79-80.

[230] Ibid.

[231] OECD, *Product Standards, Conformity Assessment, and Regulatory Reform*, p. 26; and OECD, *Regulatory Cooperation in an Interdependent World*, p. 1.

[232] John Wilson, "Regulatory Reform, Trade and Telecommunications Goods and Services," pp. 1-18; and U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[233] APEC terminology refers to MRAs as mutual recognition arrangements rather than the more commonly used term mutual recognition agreements. See appendix C for a glossary of important terms used in this report.

[234] USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement,"*USTR Press Release*, June 5, 1998, pp. 1-3.

[235] Chile and New Zealand indicated that participation is unnecessary for their economies due to the relative simplicity of their regulatory regimes for telecommunications equipment. USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement," pp. 1-3.

[236] Ibid.

Table 5-1
Annex to the APEC Telecommunications Ministerial Declaration: Indicative schedule for early voluntary sectoral liberalization in the mutual recognition arrangement on conformity assessment for telecommunications equipment

Country	Mutual Recognition of Test Reports (Phase I)	Mutual Recognition of Equipment Certifications (Phase II)
Australia	Australia already accepts test reports from other parties.	Suppliers' declarations are accepted now. Australia does not require certification.
Brunei Darussalam	2003	2003
Canada	End of 1998	End of 1999
China	2002 for network terminals.	To be advised.
Hong Kong, China	Already in effect.	Two to three month process required.
Indonesia	2005	To be advised.
Japan	July 1999	July 1999 (targeted, but could be 2000)
Korea	July 1999	To be advised.
Malaysia	2003	2003
Mexico	June 2001	To be advised.
New Zealand[1]	See footnote.	See footnote.
Papua New Guinea	December 2001	To be advised.
Philippines	2005	2006
Singapore	July 1999	End of 1999
Chinese Taipei	Already in effect.	2000 (targeted, but could be 2001)
Thailand	2004	2006
United States	FCC currently accepts test data from other parties.	July 1999

[1] The responsibility for setting the standards for attachment to telecommunications networks in New Zealand rests with network operators, not the Government - except in as far as electrical safety and electro-magnetic compatibility are concerned. Recognizing its potential to contribute towards removal of NTMs in the APEC region, New Zealand proposes to endorse the MRA.

Source: APEC secretariat, 1998.

that is intended for connection to the public telecommunications network to send, process, or receive information.[237]

[237] Other key elements of the MRA include (1) detailed procedures for designating, recognizing, and monitoring conformity assessment bodies, (2) a requirement for the acceptance of the results of conformity assessment procedures performed by these conformity assessment bodies, (3) a transition period for training and confidence building, (4) a joint committee to facilitate the implementation and running of the arrangement, and (6) due process requirements of all parties to the arrangement.

While APEC ministers endorsed the conclusion of the MRA text, that text "does not, in and of itself, create legally binding international obligations."[238] It is the decision of each APEC economy to decide how it will use the MRA.[239] USTR stated that it was the intention of the United States to rely on exchanges of letters to bring the MRA into force as a trade agreement with interested APEC trade partners.[240] The FCC adopted a notice of proposed rulemaking on May 14, 1998, which is the first step towards U.S. implementation of the APEC Telecom MRA, as well as the telecommunications annex of the multisectoral U.S.-EU MRA.[241]

According to U.S. trade officials, the APEC MRA will boost trade in telecommunications and IT goods among APEC members, affecting about $45 billion in current trade flows, or one-third of the global market.[242] Phase one of the MRA is expected to accelerate the completion of mutual acceptance of technical testing. Phase two will do the same for certification procedures.[243] The MRA would also accelerate necessary regulatory actions and cut redundant testing of IT goods. The purpose of the MRA is to streamline the conformity assessment procedures for a wide range of telecommunications and other related IT equipment and thereby facilitate trade among the participating parties.

Proponents of the APEC Telecom MRA suggest it has benefited significantly from lessons learned from the U.S.-EU negotiations that took almost four years to complete. For example, the APEC MRA was completed on a sectoral rather than on a multisectoral basis. U.S. trade negotiators and regulators found during the U.S.-EU negotiations that the sheer complexity of such a multisectoral agreement involving diverse sectors and issues required extensive technical and regulatory expertise that delayed final agreement considerably.[244] By focusing its efforts on the technical regulation of equipment affecting telecommunications networks in the APEC MRA, regulatory, trade, and IT industry officials in APEC economies were able to more effectively coordinate their activities in an efficient and timely manner. Further, since the APEC telecommunications MRA was a multilateral

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[238] USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement," pp. 1-3.

[239] USTR official, NIST Standards in Trade Workshop, Gaithersburg, MD, May 15, 1998.

[240] USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement," pp. 1-3.

[241] The FCC notice of proposed rulemaking, on implementation of the APEC, U.S.-EU, and other MRAs (ET Docket 98-68), may be viewed on the Internet at www.fcc.gov/oet/dockets.

[242] USTR, "Ambassador Barshefsky Announces Conclusion of APEC Telecommunications Equipment Mutual Recognition Arrangement," pp. 1-3; and USTR official, NIST Standards in Trade Workshop, Gaithersburg, MD, May 15, 1998.

[243] USTR official, NIST Standards in Trade Workshop, Gaithersburg, MD, May 15, 1998.

[244] Efforts to reach an MRA took over three years. From the outset, the EU insisted that the negotiations should result in a "balanced package" that included an umbrella text and sectoral annexes reflecting roughly equal value of coverage for both sides. A minimum initial package would, according to EU officials, include five of the seven sectors actively being discussed. These sectors, however, ranged considerably in terms of the degree of hazard associated with them, as well as the amount and type of regulatory oversight already in existence. In addition to including annexes on telecommunications, EMC, and electrical safety, the MRA covered some non-IT related areas, including pharmaceuticals, medical devices, recreational craft, and veterinary biologics. Negotiations over medical devices and pharmaceuticals, two sectors of particular commercial significance to the EU, proved especially difficult. U.S. Department of State telegram, "April 17 U.S.-EU New Transatlantic Agenda Task Force Meeting," message reference No. State 92440, prepared by U.S. Department of State, Washington, DC, May 16, 1997; U.S. Department of State telegram, "U.S.-EU Mutual Recognition Agreements (MRAs)-January 6-10 Negotiations," prepared by U.S. Mission to the EU, message reference No. 213, Jan. 13, 1997. Also see USITC, *The Year in Trade 1997: Operation of the Trade Agreements Program*, Pub. 3103, May 1998, pp. 95-96.

rather than a bilateral effort, a number of industry and trade officials assert that it overcomes some of the problems of exclusion that occur in agreements such as the U.S.-EU MRA.

On the other hand, some critics suggest that the APEC MRA may provide too much flexibility to member economies.[245] The APEC MRA is voluntary; members are not required to enter into it. Although 16 of 18 APEC economies have announced their intentions to participate in the MRA, their specific schedules for implementing both phases of the agreement vary greatly (table 5-1). Further, APEC economies may suspend the mutual recognition and acceptance of obligations with respect to other parties to the agreement within 60 days of notice. The critics state that lack of a more formal agreement such as the US-EU MRA could affect large-scale implementation of the APEC MRA if political and economic conditions change in the future.[246]

To resolve some of the problems described in the MRAs above, a number of government and industry observers believe that, in instances where MRAs are determined to be appropriate, global, rather than bilateral, MRAs would be more efficient in overcoming multiple testing and certification procedures.[247] Ideally, such MRAs would be transparent and based on objective recognition criteria, and all interested third parties would be given an opportunity to join the MRA. For instance, U.S. industry representatives recommended to U.S. trade officials that, although the WTO TBT agreement envisioned bilateral types of MRAs, the TBT should give attention to the emergence of regional and international agreement systems that are based on confidence building.[248] Some IT industry representatives stated that MRAs should not discriminate against products of third-party origin even if free-riding occurs.[249] They would prefer that MRAs focus on quality and competence of the conformity assessment systems rather than the origin of the products that are going to be assessed.[250] The recognition of conformity assessment results for products of third-party origin would also be helpful for many developing countries where conformity assessment services may not be adequate.[251]

Alternatives to MRAs

Although the WTO TBT supports the use of MRAs in certain circumstances, a 1997 report of the TBT Committee recognized that MRAs are not the only solution to standards-related barriers to trade (see text box below).[252] U.S. IT industry representatives and trade officials state that in

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[245] U.S. and EU IT industry representatives and government officials, telephone interviews by USITC staff, Aug. 10- 12, 1998.

[246] Ibid.

[247] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[248] U.S. industry representatives, interviews by USITC staff, Feb. 17-18, and May 6, 1998.

[249] U.S. IT industry representatives, government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[250] U.S. IT industry representatives, U.S. and foreign government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[251] Ibid.

[252] U.S. industry and standards organization representatives, interviews by USITC staff, Sept. 23-24, 1997; U.S. government trade and regulatory officials, interviews by USITC staff, Oct. 27, 1998; WTO Committee on Technical Barriers to Trade, *Report of the First Triennial Review of the Operation and*

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WTO Committee on Technical Barriers to Trade: MRAs

In 1997, The WTO Committee on Technical Barriers to Trade noted the emerging interest in concluding MRAs at the regulatory level by WTO member countries on a bilateral basis. It also noted concerns that had been expressed on "possible difficulties and problems associated with MRAs." These included problems related to cost, transparency, their discriminatory nature, opportunities for countries to enter into bilateral MRA negotiations, the need to take into account the quality of conformity assessment procedures rather than the origin of the product, and the efficiency and effectiveness of MRAs to solve problems of multiple testing and conformity assessment procedures.

Source: WTO Committee on Technical Barriers to Trade, *Report of the First Triennial Review of the Operation and Implementation of the Agreement on Technical Barriers to Trade*, Nov. 18, 1997.

addition to considering MRAs as a possible tool for overcoming multiple testing and conformity assessment requirements in international markets, alternative means, such as unilateral recognition and supplier's declaration, should also be considered for accomplishing the objectives of technical regulations.[253]

Unilateral Recognition

Another approach for nations' acceptance of results of conformity assessment by other countries is unilateral recognition. In 1997, a WTO review of the operation of the agreement highlighted members' obligations to ensure that conformity assessment procedures are not more strict or applied more strictly than is necessary to give importing members adequate confidence that products conform with relevant technical regulations or standards.[254] Specifically, Article 2.7 of the TBT states that "Members shall give positive consideration to accepting as equivalent technical regulations of other Members, even if these regulations differ from their own, provided that they are satisfied that these regulations adequately fulfill the objectives of their own regulations."[255]

According to some U.S. trade officials, what is often lost in discussions on MRAs is the basic TBT obligation concerning the unilateral acceptance of conformity assessment results conducted by

[252] (...continued)
Implementation of the Agreement on Technical Barriers to Trade, Geneva, Nov. 18, 1997; OECD, *Product Standards, Conformity Assessment and Regulatory Reform*, p. 22; and Brian D. Unter, "Maximizing Customer Benefits--a Global Model for Regulatory Reform."

[253] John Wilson, "The Economic Benefits of Removing Technical Barriers and Regulatory Barriers: Mutual Recognition Agreements and other Trade Facilitation Models," International Organization for Standardization Workshop on Mutual Recognition Agreements, Geneva, May 7, 1998, pp. 1-9.

[254] WTO Committee on Technical Barriers to Trade, *Report of the First Triennial Review of the Operation and Implementation of the Agreement on Technical Barriers to Trade*, Geneva, Nov. 18, 1997.

[255] Ibid.

bodies in other members' territories, whenever possible.[256] While the TBT provides some encouragement for MRAs, it also encourages its members to permit the participation of conformity assessment bodies located in the territories of other members on a nondiscriminatory basis. When this is possible, there is no need for mutual recognition and the additional costs and administrative layers that MRAs entail for governments and industries, both in terms of negotiating and implementing such agreements.

Because a number of governments require conformity assessment to the same or similar technical regulations in the IT industry, some IT industry and trade officials suggest that unilateral recognition by governments of other governments' conformity assessment results may be a less costly alternative to mutual recognition or other means of proving compliance to technical regulations.[257] According to these officials, when a conformity assessment body, wherever it is located, has demonstrated its procedures are based on international guides and standards, there often is a good basis for a presumption of conformity.[258]

Supplier's Declaration

U.S. IT industry representatives and trade officials suggest that another trade facilitation model that may be considered as an alternative to mutual recognition is supplier's declaration (table 5-2).[259] Supplier's declaration, they point out, is commonly agreed to be the least trade-restrictive approach to conformity assessment and was recognized as such in the report of the first triennial review of the TBT in 1997.[260]

[256] Article 6.1.

[257] WTO Committee on Technical Barriers to Trade, *Report of the First Triennial Review of the Operation and Implementation of the Agreement on Technical Barriers to Trade*; U.S. IT industry representatives, interviews by USITC staff, Apr. 30, June 12, and Sept. 26, 1997, and Apr. 27, 1998; and U.S. and foreign government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[258] Ibid.

[259] John S. Wilson, "The Likely Impact of U.S.-EU Sectoral Trade Liberalization," statement before U.S. International Trade Commission, Inv. No. 332-382, Sept. 23, 1997, p. 4.

[260] WTO Committee on Technical Barriers to Trade, Report of the First Triennial Review of the Operation and Implementation of the Agreement on Technical Barriers to Trade; U.S. IT industry representatives, interviews by USITC staff, Apr. 30, June 12, and Sept. 26, 1997; and Apr. 27, 1998; NIST Standards in Trade Workshop, Apr. 27, May 6, and May 7, 1998; and Brian D. Unter, "Maximizing Customer Benefits--A Global Model for Regulatory Reform."

Table 5-2
Selected countries whose technical regulations already accept supplier's declaration based on international electromagnetic compatibility or electrical safety standards:

	Electromagnetic Compatibility (CISPR-22)	Electrical Safety (IEC 950)
Australia	X	
Czech Republic	X	X
Canada	X	
European Union (EU-15)	X	X
Hong Kong		X
United States	X	

Source: Information Technology Industry Council, 1998.

According to IT industry standards experts, the United States should support supplier's declaration and third party conformity assessment procedures as are appropriate in a given sector based on safety, regulatory, and marketplace needs.[261]

Supplier's declaration involves a process by which a manufacturer or supplier declares that a product meets one or more standards based on the manufacturer's confidence in its quality control system, or the results of testing or inspection the manufacturer undertakes or authorizes others to undertake on its behalf.[262] This approach allows producers to use laboratories in which they have confidence and which are most conveniently located in relation to production facilities, reducing the cost and time associated with testing. For regulatory purposes, government authorities may ensure that the integrity of supplier's declaration is maintained by establishing requirements for who signs the declaration of conformity and requiring access to the declaration or compliance records.[263]

Further, according to U.S. IT industry representatives, a country's product regulations should require just one test (or set of tests) without constraints on the location of the test laboratory.[264] This avoids duplicative testing. IT industry representatives state that, whenever possible, regulatory authorities should recognize a manufacturer's test or a third-party test that conforms to ISO/IEC guidelines[265]

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[261] U.S. industry representatives, interviews by USITC staff, Feb. 17-18, and May 6, 1998.

[262] Ibid.

[263] Ibid.; and U.S. IT industry representatives, U.S. and foreign government officials, and representatives of standards organizations, interviews by USITC staff, Sept. 26, 1997; Nov. 17-19, 1997; Feb. 17-18, 1998; and May 6, 1998.

[264] Ibid.

[265] The Information Technology Industry Council suggested that the application of existing WTO disciplines could be used to advance implementation and adherence to international standards and guides relevant to IT products. These are (1) the International Electrotechnical Commission (IEC) 950 for electrical safety of IT equipment; (2) the International Special Committee on Radio Interference (CISPR) 22 for electromagnetic compatibility of IT equipment; (3) ISO/IEC Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories" as an indicator of the technical competence of laboratories; and (4) ISO/IEC Guide 22, "General Criteria for Supplier's Declaration of Conformity" as a basis for harmonized format and documentation requirements. As a first step, the Committee on Information Technology Products conducted a survey of ITA participants on their use of international

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based on supplier's declaration with no accreditation. Technical regulations should allow manufacturers to choose between a manufacturer's test and a third-party test based on cost, convenience, availability, perceived marketplace needs, and other business considerations.[266] Government regulatory authorities would equally recognize and accept a manufacturer's test or a third-party test.[267] The challenge to IT industry representatives and trade officials is convincing government regulators that this will not compromise regulators' objectives of ascertaining worker and consumer safety and the effective operation of public telephone networks and radio spectrums.

At a meeting of the WTO TBT Committee on March 27, 1998, in Geneva, the U.S. Government put forward a paper for discussion on the use of supplier's declaration of conformity as a cost-effective tool for regulators to meet legitimate policy objectives, such as ensuring safety and health. One example of a regulator's use of this tool is the FCC's recognition of supplier's declaration for PC's and PC peripherals, provided supporting test results are obtained from an accredited laboratory. Other countries' allowance of supplier's declaration in certain cases involving IT equipment was also noted.

However, the paper acknowledged that supplier's declaration is just one tool for demonstrating product conformity to standards and technical regulations. It pointed out that regulatory reliance on supplier's declaration must be underpinned by an effective post-market surveillance system with "spot checks" and an opportunity to impose penalties for non-compliance. Another factor that may be relevant to the willingness of regulators to rely on supplier's declaration is the extent to which national laws regarding manufacturer's liability supplement efforts by a regulatory agency to assure compliance with technical regulations. Finally, regulators may believe a different approach to conformity assessment may be necessary for confidence that the product fulfills the technical regulation.[268]

The U.S. paper received much interest at the March 27 TBT Committee meeting. Hong Kong, for instance, stated that the exchange of information on supplier's declaration is important because it is an approach which presents an alternative to MRAs.[269]

> [Hong Kong] felt that MRAs are not necessarily the best way to facilitate trade and that there are other mechanisms which may be overlooked and it is important to examine all mechanisms to determine which one will best help ensure the desired outcome. [270]

Some less advanced economies, such as India, also agreed that the proposal had merit for reducing trade barriers.[271] However, India stated that some of their industries do not currently have the capabilities to rely on supplier's declaration.[272] Other countries promised to submit additional information on their experiences with use of supplier's declaration and the TBT Committee agreed to continue discussion of the proposal.

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[265] (...continued)
standards.

[266] ITI industry representatives, interviews by USITC staff, 1997-98.

[267] Ibid.

[268] FCC and U.S. Department of Labor officials, interviews by USITC staff, Jan.-Mar. 1998.

[269] U.S. Department of State telegram, "WTO Committee on Technical Barriers to Trade," message reference No., prepared by U.S. Mission, Geneva, July 22, 1998.

[270] Ibid.

[271] Ibid.

[272] Ibid.

Strategic Standards Policies

As indicated in chapter 3, many industry observers believe that Japan, and, more recently, the EU, have done more to promote their standards and technical regulations internationally than the United States, particularly in developing countries with relatively nascent national standards policies.[273] In sectors such as computer hardware and telecommunications equipment, gaining and keeping global market share is dependent in large part on having access to foreign markets with comparable standards and technical regulations, be they mandatory or voluntary. Developing countries' adoption of Japanese or EU standards and standards-related processes provides markets for Japanese or EU manufacturers, often to the detriment of U.S. producers.

According to U.S. trade and standards agencies, unlike the EU and Japan, which have carefully coordinated strategic standards strategies, the United States "has adhered to pluralistic and uncoordinated systems for various standards- and conformity assessment-related activities."[274]

> While this approach may work domestically, it significantly hampers the United States internationally. Furthermore, the international and domestic costs of the various disjointed conformity assessment activities are extremely high, with both government and industry faced with multiple, duplicate assessment. These increase product cost, waste time and staff resources, and could be perceived by our trading partners as a technical barrier to trade. There is a need for the various entities, both government and private sector, to work together to create and maintain sound technical arrangements for the United States on whose structures and functions all members of the public and private sectors agree.[275]

A 1997 report to Congress by the Trade Promotion Coordinating Committee, chaired by the Secretary of Commerce, stated that an effective U.S. standards strategy must achieve a coordinated approach among U.S. industry, U.S. Government agencies, and U.S. voluntary standards bodies.[276] It also stated that such a strategy required working with "non-European counterparts to develop cooperative and coordinated international standards positions that reflect Asian, Latin American and North American interests."[277] This is needed to counter increased efforts by the EU to establish its standards and conformity assessment system in third-country markets, especially in Asia and Latin

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[273] TPCC, "A Strategic Standards Policy," pp. 38-50; European Commission, "Community External Trade Policy in the Field of Standards and Conformity Assessment," p. 1; Carl Cargill, Netscape Communications, interview by USITC staff, May 7, 1997, Washington, DC; Statements before Subcommittee on Technology, Committee on Science, U.S. House of Representatives, hearing on "International Standards: Technical Barriers to Free Trade"; John P. Stern, "The Japanese Technology Infrastructure: Issues and Opportunities," p. 86; and U.S. IT industry representatives and standards officials, interviews by USITC staff, Sept. 25, 1997, and Feb. 17-18, 1998.

[274] NIST, National Technology Transfer and Advancement Act of 1995, PL 104-113, Mar. 7, 1996, Plan for Implementation, transmitted to United States Congress, June 7, 1996; and TPCC, "A Strategic Standards Policy," pp. 38-50.

[275] TPCC, "A Strategic Standards Policy," pp. 38-50.

[276] Ibid.

[277] Ibid.

America, as well as in Central European countries through use of its EU accession agreements with those countries.[278]

As indicated in chapter 3, the USTR is responsible for providing leadership for the United States on all aspects of international policy matters related to international trade, including leadership in all multilateral, regional, and bilateral negotiations regarding standards-related measurers. In this regard, U.S. IT industry representatives assert that USTR has worked closely and successfully in recent years with the U.S. private sector to reduce standards-related barriers to trade in multilateral and regional trade fora, such as the WTO and APEC, and in response to bilateral trade issues related to standards and technical regulations.[279]

In the United States, NIST historically has been responsible for guiding and coordinating Federal agencies' involvement in the U.S. standards-setting process but has had little mandate to work on global standards-related activities. However, the 1995 Technology Transfer and Advancement Act substantially revised NIST's guidance policy, allowing it to take a more active role in promoting U.S. interests in global standards setting activities.[280] As a result of the Act, NIST has begun working with Federal agencies to come up with a coherent strategy on standards and has initiated a variety of activities with the private sector, including conferences and individual discussions.[281]

Further, some U.S. embassies, including those in Argentina, Mexico, Saudi Arabia, and India, and the U.S. Mission to the EC in Brussels, have standards attaches who are working to promote U.S. standards abroad.[282] These standards attaches, coupled with NIST standards workshops,[283] enable the United States to establish close working relationships with technical and regulatory specialists in those markets.[284] NIST has plans to expand the standards expert program to other important markets such as Russia, China, and Brazil.[285] However, such expansion is contingent upon Congressional approval.

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[278] Ibid.

[279] ITI, "Considering a U.S. National Standards Strategy - Building on a Framework for Success," Position Statement of the Information Technology Industry Council, Sept. 11, 1998, pp. 1-7.

[280] NIST official, telephone interview by USITC staff, June 29, 1998. For more information see NIST's website at http://ts.nist.gov/ts/htdocs/210.htm.

[281] For example, on September 23, 1998, in conjunction with the U.S. celebration of World Standards Day, NIST and the American National Standards Institute, ANSI, co-hosted a summit entitled "Toward a National Standards Strategy Meet Global Needs" at the Ronald Reagan International Trade Center in Washington, D.C.

[282] NIST official, telephone interview by USITC staff, June 29, 1998.

[283] The standards information program of NIST's office of standards services is responsible for providing standards-related information to U.S. and foreign organizations, as well as standards-related assistance to U.S. industry. The major program areas are the National Center for Standards and Certification Information (NCSCI), which serves as the U.S. WTO TBT equiry point required under Article 10 of the TBT, and provides for non-agricultural standards-related issues.

[284] TPCC, "A Strategic Standards Policy," pp. 38-50.

[285] Ibid.

APPENDIX A
GLOSSARY

Accreditation: Procedures by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks.

Certification: Procedure by which a third party gives written assurance that a product, process, or service conforms to specified requirements.

Certification mark: A sign or symbol that is used exclusively by the operator of a third-party certification program to identify products or services as being certified.

Certification of conformity: Action by a third party, demonstrating that adequate confidence is provided that a duly identified product, process, or service is in conformity with a specific standard or other normative document.

Conformity: Fulfillment by a product, process, or service of all requirements specified.

Conformity assessment: The determination of whether a product or process conforms to particular standards, specifications, or technical regulations. Activities associated with conformity assessment may include testing, certification, accreditation, and quality assurance system registration.

Consortium standard: a standard published by a limited group of companies or organizations. The group decides the process and voting procedures for its development, revision, and maintenance. The standard services the group's need. The group may or may not share these standards with those outside the consortium.

De facto standard: A standard arising from nonrequired processes in the competitive marketplace. When a particular set of product or process specifications gains market share such that it acquires authority or influence, that set of specifications is then considered a de facto standard.

Design standard: A standard that specifies precisely how a product must be made. Design standards are considered to be much more restrictive than performance standards. (See performance standard.)

Electromagnetic compatibility (EMC): The ability of equipment to function satisfactorily in its electromagnetic environment without introducing intolerable disturbances to anything in that environment.

Electromagnetic interference (EMI): The degradation of the performance of a device, transmission channel, or system caused by an electromagnetic disturbance.

Harmonized standards: Standards on the same subject approved by different standardizing bodies that establish interchangeability of products, processes, and services, or mutual understanding of test results or information provided according to these standards.

International standards: All standards which have significant de facto international use or an established base for international acceptability.

International standardizing organization: Standardizing organization whose membership is open to the relevant national body from every country. (This definition is undergoing review in the WTO.)

Laboratory accreditation: Formal recognition that a testing laboratory is competent to carry out specific tests or types of tests.

Mutual recognition agreement: Agreement between governmental or nongovernmental parties to accept some or all aspects of one another's work. Usually based on the acceptance by one party of results, presented by another party, from the implementation of one or more designated functional elements of a conformity assessment or certification system. Commonly referred to as MRAs.

National standards body: Standard body recognized at the national level, that is eligible to be the national member of the corresponding international and regional standards organizations. The American National Standards Organization (ANSI), a voluntary, non-profit body, has been designated the United States' national standards body. In some countries, the designated national standards body is a government entity.

Performance standard: A standard that defines a product's characteristics in terms of how it is to function. Because this type of standard leaves open to the designer the issue of how the product achieves the desired functionality, performance standards are considered less restrictive than design standards. (See design standard.)

Quality management system: The organizational structure, responsibilities, practices, procedures, processes, and resources for implementing, and maintaining quality management.

Quality system registration: Assessment and periodic audit of the adequacy of a producer's quality assurance system by a third party known as a quality system registrar.

Standard: The World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT) defines a standard as a "[d]ocument approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which *compliance is not mandatory*." This is in contrast with the TBT definition of a technical regulation (or mandatory standard), as a "[d]ocument which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which *compliance is mandatory*." The TBT states that technical regulations "may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method." Standards and technical regulations "may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."

Standards-related measures: Standards-related measures include certification, testing, labeling, and conformity assessment requirements.

Technical regulation: A mandatory standard set by governments. Regulation that provides technical requirements, either directly or by referring to or incorporating the content of a standard, technical specification, or code of practice. Voluntary standards developed for private use often become mandatory when referenced within government regulation or procurement. The TBT defines a technical regulation as a "[d]ocument which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which *compliance is mandatory*."

Test: Technical operation that consists of the determination of one or more characteristics of a given product, process, or service according to a specified procedure.

APPENDIX B
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APPENDIX C
LIST OF CONTRIBUTORS

Companies

AMP, Inc.
IBM
Compaq Computer
Corning, Inc.
Dell Computer Corp.
Hewlett-Packard Corp.
Lexmark
Lucent Technologies, Inc.
McAfee
Microsoft Corp.
Motorola Corp.
Netscape Communications
Texas Instruments
Underwriters Laboratories Inc.

Standards Organizations

American National Standards Institute
International Organization for Standardization
International Electrotechnical Committee

Associations

Business Software Alliance
Communications Industry Association of Japan
Electronic Industries Alliance
Electronic Industry Association of Japan
Information Technology Industry Council
Telecommunications Industry Association

Government Agencies

European Commission
Ministry of Posts and Telecommunications (Japan)
Office of the United States Trade Representative
U.S. Department of Commerce
    National Institute of Standards and Technology
    International Trade Administration
U.S. Department of Labor
    Occupational Health and Safety Administration
U.S. Federal Communications Commission
U.S. General Accounting Office

Other

Bear, Steans & Co. (New York)
Deutsche Morgan Grenfell (New York)