NISTIR 6492

A Review of U.S. Participation in the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC)

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Abstract

This report describes the role of international standards, their importance in world trade, and the extent of U.S. participation in the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) over the 32 year period from 1966 to 1998. To the extent possible, a comparison of U.S. exports with U.S. participation in the ISO and IEC is provided. Mention is also made of the World Trade Organization's Agreement on Technical Barriers to Trade.

Key Words: Agreement on Technical Barriers to Trade; American National Standards Institute (ANSI); IEC; ISO; international standards; participation; trade; and, United States National Committee (USNC).

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1. Introduction

In 1964, J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology, addressed an International Panel on Global Standardization. His words still resonate today.

> "American industry's lack of participation in helping chart the future course of global standardization may be costing the nation valuable trade dollars that otherwise might wipe out the balance of payments problem. For a leading industrial nation to refrain from participating in global standards work is to state to the rest of the world that either we don't think the items involved are important, or we think we have a design or production method which is superior to everyone else's. We know that neither of these statements is universally true. If we do not become more sensitive to trends and if we are not able to respond quickly, we are inviting serious problems for our economy."[1]

Since 1964, the United States has become increasingly dependent on international trade but has suffered in terms of trade balance. This has an adverse impact not only on U.S. industry but also on U.S. competitiveness and on the U.S. position in the global market.

Although there are many reasons for the decline of the trade balance, the need to improve U.S. involvement in international standardization activities is as significant today as it was in 1964. Several recent activities and reports have addressed these concerns and have emphasized the importance of U.S. participation in international standardization activities.

The 1997 Trade Policy Agenda states that one of the Administration's major objectives is the support of the World Trade Organization and implementation of its agreements.[2] One of those is the Agreement on Technical Barriers to Trade, which establishes the idea that technical regulations, conformity assessment procedures, and standards should be applied on a non-discriminatory basis and should be based on international standards and guidelines when appropriate. The objective of this Agreement is to deter the use of these measures as barriers to trade.

There are many efforts to encourage U.S. industry to more actively participate in international standardization activities. In the 1996 National Export Strategy, one of five major recommendations in the area of standards is to "emphasize technical assistance programs as a basis for long term internationalization of standards and harmonization efforts."[3] There are also efforts to promote compatible systems and participation of other countries in these international activities. Congress requested the National Research Council to study the U.S. standards and conformity assessment structure and to produce a report with recommendations on ways in which the United States could strengthen its system, increase trade, and improve the domestic economy. Published in 1995, the report made a total of 10 recommendations, noting that the future strength of the United States in the global economy will depend on "innovative methods to promote goods and services overseas. The U.S. Government must also continue to exercise leadership in the international community by aggressively removing the remaining barriers to trade".[4]

An earlier NIST (then NBS-National Bureau of Standards) report described the results of a study to assess the benefits of participation in international standards activities. The results suggested that industry participation in international standards activities is an effective means of increasing trade. Intangible benefits, such as enhanced markets and economies of scale, are also substantial and can be achieved through continued industry representation in appropriate international groups.[5]

More recently, members of the American National Standards Institute (ANSI) have come together in a series of meetings and workshops with the goal of creating a national standards strategy. The objective of the strategy is to improve the U.S. contribution to global standardization. Discussion regarding the different components of the strategy is currently underway among ANSI members.

This report presents historical information on the extent of U.S. participation and leadership roles in two private sector international standardization bodies, perspectives on the organizations involved, the present role of international standards in world trade, and the correlation between the U.S. position in international standardization activities and in world trade.

2. Background of the Study

This publication serves as an update to the original NBSIR 88-3698, **A Review of U.S. Participation in International Standards Activities**. It focuses on U.S. participation in technical committees and sub-committees within two private sector international standards development organizations, namely the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Due to the volume of information involved, this publication does not address U.S. participation in any of the other activities within each of these organizations (e.g., the Committee on Conformity Assessment and the Committee on Consumer Policy in the ISO, conformity assessment schemes in the IEC). Specific mention is also made of the World Trade Organization's Agreement on Technical Barriers to Trade.

U.S. participation in private sector international standardization activities is voluntary. Direct involvement and payment of the associated expenses depend upon the perceived interests of the industries that may be affected by resultant standards. Consequently, some U.S. companies and industries have been very active in international standards-making committees, while others have not participated at all. The objective of this study was to collect, analyze and present data that might summarize the extent of past and present U.S. participation in the activities of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) over the 32-year period from 1966-1998, and to compare that data with export product groupings to identify any correlations. This information was developed to help readers assess how U.S. involvement and future leadership activities should perhaps be modified to reflect the nation's productive capacity and market size and to strengthen the U.S. position in the world economy.

The following sections describe various NIST responsibilities, the significance of international standards in world trade, background on the ISO and the IEC, and how the United States is represented in those bodies. Separate sections briefly describe the World Trade Organization (WTO) Agreement on Technical Barriers to Trade and Annex 3 of that Agreement, the Code of Good Practice for the Preparation, Adoption and Application of Standards. A review of U.S. participation levels in ISO and IEC over the 32-year period from 1966 to 1998 is provided, followed by a comparison of U.S. exports with U.S. participation in the ISO and IEC.

2.1 NIST's Responsibilities Regarding Representation of U.S. Interests in International Standards Organizations

Title IV, Section 413 of the Trade Agreements Act of 1979 (19 U.S.C. 2531-2573), P.L. 96-39, authorized the implementation of all agreements negotiated during the General Agreement on Tariffs and Trade (GATT) Tokyo Round, including those relating to non-tariff barriers. Section 413 of the Act directs the Secretaries of Commerce and Agriculture to ensure that they are kept informed of the adequacy of representation in international standards-related activities, to identify any activities that might substantially affect the commerce of the United States, and to coordinate with the Special Representative (the Office of the United States Trade Representative, USTR) with respect to international standards-related activities. USTR is responsible for coordinating U.S. discussions and negotiations with other countries with respect to standards-related activities.

Title IV also specifies that the United States should be represented in non-treaty or private international standards organizations (e.g., ISO and IEC) by a recognized "organization member." Responsibility rests with the Secretaries of Commerce and Agriculture to determine and ensure that U.S. interests are being adequately represented and that U.S. commerce is not adversely affected by that "organization member's" participation in private international standards organizations. There are no guidelines or definitions given for what is deemed to be adequate representation of U.S. interests.[6] The American National Standards Institute (ANSI) serves as the U.S. member body to the ISO and, through its U.S. National Committee, to the IEC.

Within NIST, Technology Services's Office of Standards Services is responsible for carrying out several Title IV functions. These include maintaining an inquiry point on standards, conformity assessment, and technical regulations, and monitoring the adequacy of U.S. representation in private international standards activities, particularly with regard to the potential impact on international trade. The 1994 revision of the Trade Agreements Act (P.L. 103-465), also entitled the Uruguay Round Agreements Act, did not amend these responsibilities.[7]

In addition to its responsibilities under the Trade Agreements Act, NIST serves as a coordinator of standards-related activities within the federal government. Under OMB Circular A-119, which serves as implementation guidance for the National Technology Transfer and Advancement Act of 1995 (P.L. 104-113), NIST is directed to:

- coordinate and foster executive branch implementation of the Act and, as appropriate,

provide administrative guidance to assist agencies in implementing the Act, including guidance on identifying voluntary consensus standards bodies and voluntary consensus standards;

- sponsor, chair and support the Interagency Committee on Standards Policy (ICSP), which considers agency views and advises agency heads on the Act;
- report to the Director of the Office of Management and Budget (OMB) concerning the implementation of the policy provisions of the Act;
- establish procedures for agencies to use when developing directories and establish procedures to make these directories available to the public; and,
- issue guidance to other agencies to improve coordination on conformity assessment.[8]

To ensure a coordinated effort between the public and private sectors in both domestic and non-treaty international standards activities, NIST and ANSI signed a Memorandum of Understanding (MoU). Revised and renewed in 1998, this MoU states that NIST and ANSI will serve as links between private sector standards and conformity assessment interests and government interests. The ultimate objective of this cooperative effort is to enhance and strengthen the national voluntary consensus standards system of the United States while supporting continued U.S. competitiveness and economic growth.[9] Other government agencies, U.S. standards developing organizations (SDOs), trade associations, and companies are members of ANSI. Representatives of these organizations participate in various ANSI fora which are, in part, responsible for determining ANSI policy and structure. These fora also serve as mechanisms which facilitate discussion of current issues of interest.

3. Role of Standards at the International Level

3.1 Impacts on Trade

Standards are more important today than ever before. In the international marketplace, standards developed through voluntary processes are highly desirable because they represent a broad-based consensus of all interested parties, including producers (exporters), users (importers), governments, consumers, and academia. Nations that actively participate in developing international standards may be able to influence the provisions to favor their own products or those that they prefer for some reason. Since trading countries competing in the global marketplace are inclined to be aggressive in exploiting every opportunity to favor these products through the standards development process, it seems incumbent on the United States to participate vigorously in international standardization activities if it intends to maintain existing trade outlets and find new markets. In terms of economic development, market size, and access to other markets, the United States ranks in the forefront among the world's industrialized nations. But in terms of trade balance, the United States has not kept pace with other developed countries. The U.S. position has been eroded by many factors, including the rapid growth of the U.S. economy relative to the growth of other economies, the strength of the U.S. dollar versus other currencies, and financial crises in other countries.[10] It is also possible that the U.S. position in the world economy has been affected by other countries' standards and conformity assessment

requirements.

3.2 The Politics of International Standardization

International trade has become an increasingly important factor in the growth of the world economy. Nations are living in

> "a world in which global trade between nations continues to grow at a rate 3 to 4 times faster than national economies; a world in which the design, manufacturing, marketing, and customer service operation of a growing majority of individual enterprises are distributed across many countries; and a world in which electronic communications have dramatically increased technical collaboration between experts in academia, governments, and industries from all countries."[11]

The objective of international standardization and related activities is to facilitate the exchange of goods and services at the international level and to promote cooperation in the areas affected by international standards.

The negotiation and adoption of technical standards for all classes of products and services takes on many roles in the global arena. These roles can lead to formation of economic and political coalitions among nations and regions, market segmentation among major producers, and even social change among different cultures. National and regional groups have competing interests, and they can intervene or use regulations and standards for political purposes. This is particularly true with respect to new technologies. Standards can be invoked to act as non-tariff barriers, protecting one country's industry or new technology from other countries. Differences in technical standards can be effectively manipulated by governments to segment markets.

4. Trends in U.S. International Trade

International trade activity has grown steadily in importance to the U.S. economy since World War II. The U.S. trade balance for goods and services was positive until approximately 1975. Negative balances have resulted since that time due to many factors, some of which were mentioned earlier. During 1998, the U.S. goods trade balance deficit was $272.9 billion, an increase from the 1997 deficit of $198 billion, while the balance of payments current account deficit increased to $233.5 billion from a deficit of $155.2 million in 1997.[12]

Most major U.S. trading partners have experienced slower rates of growth than that found in the United States. Between 1993 and 1998, the United States grew at an average annual rate of 3.4 %. The next fastest growing economy in the G-7 countries over this same period was that of the United Kingdom, whose growth rate averaged 3.0 % each year while other European OECD economies averaged 2.5 % per year. Growth in Japan averaged less than 1 % a year during these same years.[13]

The United States continues to be the world's largest international trader. However, the U.S. share of total world merchandise exports has decreased markedly since 1960 when the U.S. percentage of total world merchandise exports stood at 18%. By 1998, that percentage had decreased to 12.6 %. Over that same period, the U.S. share of world merchandise imports increased from 13.1 % in 1960 to 17.6 % in 1998.[14] Chart 1 in the Appendix demonstrates the changes in U.S. share of world merchandise exports and imports since 1960. Chart 2 depicts the share of world merchandise exports and imports of other selected countries. At $944 billion, U.S. imports were 202 % greater than those of Germany, the second largest importer, and 298 % greater than those of the United Kingdom.

5. The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC)

5.1 Historical Perspective

International standardization started over 90 years ago in the electrotechnical field. While some attempts were made in the 1930's to develop international standards in other fields, it was not until the 1940's that significant efforts were devoted to development of international standards. During the 1950's and 1960's, international standardization activities were devoted almost entirely to the development of international agreements on basic standards. These early efforts addressed issues primarily related to international harmonization of such procedures and requirements as interchangeability, vocabularies, and standards for units and symbols. In the 1960's and 1970's, greater emphasis was placed on using international standards in lieu of national standards. Voluntary adoption of the General Agreement on Tariffs and Trade (GATT) Standards Code in 1979 reflected growing acceptance of the concept of relying on international standards for all classes of finished products, materials, and services. In the 1980's and 1990's, there was increasing recognition of the role that standards and standards-related issues play in trade. As a result of the Uruguay Round talks, the WTO was established in 1995. One of the Agreements under the WTO is the Agreement on Technical Barriers to Trade (TBT Agreement). As of November, 1999, the WTO had 135 members, all of which are responsible for adhering to the provisions of the TBT Agreement.

The best known private sector standards development organizations operating in the international arena are the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Together, they form the world's largest non-governmental forum for voluntary industrial and technical collaboration at the international level. A third large standards development organization is the International Telecommunication Union (ITU), a treaty organization which develops Recommendations in the area of telecommunications standardization. U.S. participation in the ITU is coordinated by the U.S. State Department. More information on the ITU can be found on the ITU homepage at: http://www.itu.int.

5.2 The International Organization for Standardization (ISO)

The International Federation of the National Standardizing Associations (ISA) was established in 1926 to coordinate international mechanical engineering standardization activities. In 1947, the ISA was replaced by the ISO. The mission of the current ISO is "to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity."[15] The first ISO standard was published in 1951. Upon its establishment in 1947, ISO membership consisted of 27 national standards bodies; at present, the ISO is comprised of standards bodies from over 130 countries, of which 90 are participating member bodies, 36 are correspondent members, and 7 are subscriber members.[16] Correspondent members do not participate in technical work and do not have voting rights, but are allowed to attend meetings as observers. Subscriber members are countries which pay reduced membership fees for the same privileges as correspondent members. Table 1 in the Appendix lists current members of the ISO.

The scope of ISO work extends over all fields except electrical and electronic standards, which are the responsibility of the IEC. The wide variety of subjects addressed by the ISO ranges from screw threads to solar energy. As of December 1998, work in the ISO was carried out through some 2,859 technical bodies: 186 Technical Committees (TC's), 576 Subcommittees (SC's), 2,057 Working Groups, and 40 Ad Hoc Study groups. At that time, 11,950 ISO standards and 37 ISO/IEC Guides had been published. In addition, 695 new work items were registered in 1998, most originating in the sectors of engineering technologies, electronics, information technology and telecommunications, and materials technologies.[17] Table 2 in the Appendix details the title, number designation, and year of establishment for each ISO Technical Committee.

More than 75 % of the ISO member bodies are governmental institutions or organizations incorporated by public law. The remainder are non-governmental standards organizations. ANSI, the U.S. member body to ISO, is one of the few private sector member bodies, and the United States is currently one of the few major industrialized nations that does not have a governmental institution serve as its ISO member body. Under the ANSI-NIST MoU, ANSI serves as the recognized U.S. member body to the International Organization for Standardization (ISO), and, through the U.S. National Committee, to the International Electrotechnical Commission (IEC).

With regard to budgets, sources of financial support and functional responsibilities, the national member bodies differ significantly. Annual budgets of ISO member bodies range from less than 1 million Swiss francs (approximately $ .6 million) to more than 20 million Swiss francs (approximately $ 12 million). More than 50% of ISO member bodies, including those in Japan, Mexico, South Korea and most of the Eastern European countries, depend entirely or almost entirely on government grants as their main source of revenue. In contrast, in Canada and many countries in Western Europe and South America, ISO member bodies receive a portion of financial support from the central government, ranging from 3 % to 97 %. The remainder of these bodies' funding originates with subscriptions and sales of publications and certification fees, among other activities.[18] ANSI, the U.S. member body, does not receive direct government

funding for its standardization activities although some U.S. Government agencies pay ANSI dues and participate in standards development activities. In addition to membership fees, ANSI's other primary sources of funding include publication sales and donations. While travel and other expenses for delegates from other countries to the ISO are often paid by governmental institutions or organizations incorporated by national law (e.g., BSI in the United Kingdom, or AFNOR in France), ANSI does not pay such expenses for U.S. delegates to attend ISO committee meetings.

Traditionally, the level of industrialization, the political and legal system, and other factors shape national standardization policies and activities. These also account in part for the marked differences in the approach, organizational settings, and responsibilities of national standards bodies from one country to another. For example, many ISO member bodies are responsible for activities relating to metrology, but this activity is the responsibility of other institutions in other countries. Similarly, certification and quality services may be primary tasks for some national standards bodies, but not others.[19] Table 5 in the Appendix compares information on budgets, resources, and responsibilities for the United States and the top 10 U.S. trading partners which have ISO member bodies.

The operational costs of the ISO itself are estimated at 150 million Swiss francs per year. The Central Secretariat is financed by TC and SC Secretariat fees (80 %) and revenues from subscriptions and other publications (20 %). Annual membership fees are calculated based on approximately 50 % of a member country's gross national product and 50 % of that country's trade volume. Each member is also responsible for the costs associated with the individual Technical Committee and Sub-Committee secretariats they hold.

The ISO Central Secretariat in Geneva, Switzerland coordinates ISO operations, administers voting and approval procedures, and publishes international standards.

Any member body that wishes to participate in the work of any of the 186 Technical Committees may do so without incurring any additional fees. Member organizations which decide to take an active part in the work of a Technical Committee or Sub-Committee are known as "P" (participating) members of that committee or sub-committee, meaning that they have an obligation and right to participate in meetings and to vote. One of the P members is designated to act as the secretariat of the Technical Committee or Sub-Committee. Those nations that wish only to be kept informed of ongoing work are called "O" (observer) members. They have the right to attend meetings as observers, but not to vote. A request to study a technical subject may be initiated by one or more member bodies or by an organization outside the ISO. If at least five members are willing to participate actively, a new technical committee will be formed.

5.2.1 Development of an ISO Standard

There are six steps in the standards development process within the ISO. The process description, based on the ISO/IEC Directives, Part 1, can be found in Table 6 in the Appendix.[20]

5.3 The International Electrotechnical Commission (IEC)

Based in Geneva, Switzerland, the IEC was established in 1906. The present IEC is composed of 49 National Committees (NC) whose countries collectively represent some 71 % of the world's population, 78 % of total electric energy production, and 87 % of total electric energy consumption.[21] The objective of the IEC is to promote international cooperation on all questions of standardization in the fields of electrical and electronic engineering. Each National Committee is required to be as representative as possible of all electrical-related interests in its country including manufacturers, users, governmental authorities, and educational and professional bodies. Many NCs receive a large amount of support from industry; many are recognized and financially supported by their governments.

In addition to the 49 National Committee members, there are 6 Associate members and 5 Pre-Associate members. Associate members do not participate in technical work and do not have voting rights, but are allowed to attend meetings as observers. The IEC also offers a Pre-Associate membership which provides countries with support from the IEC Central Office or any neighboring full member National Committee to form a national electrotechnical committee. The aim of Pre-Associate membership is to enable national standardization bodies to become familiar with electrotechnical standardization at the international level with the goal of applying for Associate Membership within five years and eventually establishing a National Committee. Table 1 in the Appendix lists current members of the IEC.

The work of the IEC is currently carried out by 90 Technical Committees (TC), 95 Sub-Committees (SC), and close to seven hundred working groups. The committees currently span a wide range of electrotechnical sectors and were responsible for developing over 4000 standards by the end of 1998. In addition, 261 New Work Item Proposals were registered and 379 standards were published in 1998, primarily in the areas of: safety, household and similar equipment (20 %); measurement, control and general testing (18 %); electronic components and sub-assemblies (16 %); and telecommunication, electronic systems and equipment (13 %).[22] Table 4 in the Appendix lists the title, number designation, and year of establishment of each IEC Technical Committee.

Budget data, sources of financial support and functional responsibilities for most National Committees (NC) is not available. However, similar to many ISO member bodies, many NCs depend partially or fully on government support. In addition, the majority of their revenue is typically derived from sales of publications and membership fees.

The operational costs of the IEC are estimated at 19.5 million Swiss francs per year ($ 11.7 million). The Central Office is primarily financed by revenues from subscriptions and other publications (82 %) and royalties and certification fees (16 %). Annual membership fees are calculated based 50 % on a member's gross national product and 50 % on that member's electricity consumption. Each member is also responsible for the costs associated with the

individual Technical Committee and Sub-Committee secretariats they hold.[23]

The IEC Central Office in Geneva, Switzerland helps to coordinate IEC operations, administer voting and approval procedures, and publish international standards.

Similar to the ISO, IEC NCs which participate in a TC or an SC are "P" members, and NCs which want to be kept informed of ongoing work are "O" members.

5.3.1 Development of an IEC Standard

IEC standards are developed in accordance with the ISO/IEC Directives, Part 1; the development process is outlined in Table 6 in the Appendix.

5.4 Relationship between the ISO and the IEC

The ISO and the IEC have a formal agreement in place which establishes a non-duplicative and cooperative relationship between the two organizations. In accordance with this agreement, the two organizations complement each other in the field of international standardization. The IEC is responsible for issues relating to international standardization in the electrical and electronic engineering fields, while other areas are the responsibility of the ISO. In areas which do not relate to a particular technology, the ISO assumes responsibility for the work and ensures that any electrotechnical issues which arise are addressed in consultation with the IEC. To facilitate this coordination, the ISO and the IEC have established a Joint Presidents' Coordination Group (JPCG) and a Joint Technical Advisory Board (JTAB). Various liaisons have also been established between individual ISO and IEC Technical Committees and one Joint Technical Committee (JTC 1) has been established in the area of information technology. These cooperative efforts help ensure non-duplication while maximizing efficiency.[24]

The ISO and IEC have significantly different structures and operational procedures due in part to different historical developments and the normal segmenting of major engineering disciplines. The two organizations also distribute tasks differently between the official staffs in Geneva and the secretariats of technical committees and subcommittees. ISO committee secretariats do most of their own work in terms of document dissemination, meeting minute preparation, photocopying, etc. In contrast, IEC secretariats rely more on the Central Office staff in Geneva for such support. In terms of membership, the IEC has fewer members than the ISO. Whereas the IEC is essentially comprised of industrialized and newly industrialized countries, a number of lesser developed countries belong to the ISO even though they do not often participate in specialized technical work. Table 1 in the Appendix lists current members of the ISO and the IEC.

5.5 Official Languages

The official languages of the ISO and the IEC are English, French, and Russian. Documents are

developed and distributed in both English and French. TC and SC meetings may be conducted in both English and French, while WG meetings are generally not bilingual. The member body for the Russian Federation provides all interpretation and translation into or from Russian.

6. World Trade Organization (WTO) Agreement on Technical Barriers to Trade

The provisions of the Agreement on Technical Barriers to Trade (TBT Agreement) and of the Code of Good Practice for the Adoption, Application and Preparation of Standards have important implications for ISO and IEC member bodies. A summary of some of the key provisions of the Agreement are provided below.

Specific provisions under the TBT Agreement pertain to technical regulations, standards, conformity assessment practices, notification requirements, and standards developing bodies. In the area of technical regulations and standards, the TBT Agreement states that members should:

- ensure national treatment of products, i.e., accord the same treatment to imported products as that accorded to similar domestically-produced goods;
- accord the same treatment to all similar imported products, regardless of origin;
- ensure that any technical regulations and standards used to protect human, animal or plant life or health or the environment are not more trade-restrictive than necessary;
- use, in part or in whole, relevant international standards as a basis for technical regulations whenever possible;
- participate in relevant international standards bodies to develop and adopt appropriate technical regulations and standards;
- recognize technical regulations of other members as equivalent provided these regulations meet the objectives of their own regulations;
- emphasize product performance requirements rather than design or descriptive requirements; and,
- notify other members of proposed technical regulations and standards that might significantly affect trade.

Conformity assessment provisions of the Agreement cover testing and certification programs, inspection, registration, laboratory accreditation and quality system registration. Specific provisions encourage members to:

- ensure non-discrimination toward products;
- restrict the use of conformity assessment procedures which create unnecessary obstacles to international trade;
- use international guides or recommendations pertaining to conformity with technical regulations and standards issued by international standards developing bodies;
- participate in international standards bodies which develop conformity assessment guides and recommendations with the goal of harmonizing conformity assessment procedures;
- notify other members of proposed conformity assessment procedures that might significantly affect trade;
- recognize conformity assessment procedures of other members as equivalent provided

these procedures provide guarantees of health and safety equivalent with those of their own procedures; and,

- allow conformity assessment bodies located in territories of other Members to participate in conformity assessment procedures under conditions no less favorable than those accorded to bodies located within their territory or the territory of any other country.

In addition to the measures mentioned above, the TBT Agreement contains several other important mechanisms aimed at facilitating international trade. Article 10 of the Agreement requires each member to establish and maintain an enquiry point to be responsible for responding to requests from other members pertaining to technical regulations, standards, and conformity assessment procedures and notifying proposed governmental and state technical regulations, standards and conformity assessment procedures which might significantly affect trade. The enquiry point also disseminates information about proposed foreign regulations to interested domestic parties. NIST provides the U.S. enquiry point for all activities except sanitary and phytosanitary (SPS) activities; the U.S. Department of Agriculture is responsible for maintaining the SPS enquiry point.

The Agreement text also incorporates special provisions for developing countries. Specifically, the Agreement encourages developed country members to provide technical assistance to developing country members in any or all of the areas covered by TBT Agreement provisions. The Agreement also states that in certain circumstances, developing members may be excused from adhering to the provisions of the TBT due to developmental, financial, and trade needs.

6.1 Code of Good Practice for the Adoption, Application and Preparation of Standards

Annex 3 of the TBT Agreement contains the Code of Good Practice for the Preparation, Adoption, and Application of Standards. The Code is open to acceptance by any standardizing body within the territory of a WTO Member and outlines general guidelines for the preparation and use of standards. The Code encourages standards bodies to operate in a transparent manner, ensure nondiscrimination toward imported products, and align national standards with international standards whenever possible. Adoption of the Code is voluntary and more than 100 standards bodies currently adhere to the Code. In the United States, ANSI is a signatory to the Code on behalf of approximately 250 of its 450 standards developing members.

7. U.S. Member Bodies in the ISO and the IEC

The American National Standards Institute (ANSI) and the United States National Committee (USNC) of the International Electrotechnical Commission are the U.S. member bodies to the ISO and the IEC, respectively; the USNC reports to the ANSI Board of Directors. ANSI was formed in 1918 and evolved through many forms until it adopted its present form and name in 1969.

ANSI is a private sector, non-profit federation with approximately 1400 members, including government agencies, standards developing organizations, companies, consumers, and trade

associations interested in standards. ANSI was a founding member of the ISO and plays an active role in its governance. ANSI is one of five permanent members of the governing ISO Council, and one of four permanent members of ISO's Technical Management Board. U.S. participation, through the U.S. National Committee, is also strong in the IEC. Representatives of the USNC sit on the IEC Council Board, the Committee of Action, and the Conformity Assessment Board.

ANSI credentials U.S. delegates to the ISO and IEC and provides these delegates with: criteria and procedures to guide them in their operations and in reaching consensus on positions relating to international standards activities; advice from ANSI/USNC staff; communication on ISO/IEC TC and SC matters on which ANSI/USNC need recommendations from the delegates; and guidance on coordination between parallel national and international standards development. The U.S. delegates do not have official government standing in ISO and IEC deliberations, but generally represent public interest views.

7.1 U.S. Participation in the ISO

ANSI coordinates U.S. participation in ISO Technical Committees and Sub-Committees through technical advisory groups (TAGs). These TAGs are typically administered by trade associations, technical or professional societies, or government agencies. A U.S. TAG's primary purpose is to develop and transmit, via ANSI, U.S. positions on activities and ballots of relevant ISO technical committees. ANSI is responsible for establishing the TAG and often names a committee or organization that maintains or is developing parallel domestic standards to serve as the TAG. ANSI then generally appoints the secretariat or sponsor of the national standards developing group to serve as the TAG administrator.

In 1966, the U.S. held secretariats for 10 (8.4 %) of the 118 ISO Technical Committees that existed at that time. These secretariats were as follows:

TC 11 - Unification of Boiler Code (the United States still holds this Secretariat)
TC 28 - Petroleum Products (the United States still holds this Secretariat)
TC 36 - Cinematography (the United States still holds this Secretariat)
TC 42 - Photography (the United States still holds this Secretariat)
TC 61 - Plastics (the United States still holds this Secretariat)
TC 66 - Determination of Viscosity (this TC has been dissolved)
TC 85 - Nuclear Energy (this Secretariat is now held by Germany)
TC 97 - Computers and Information Processing (this TC has been folded into JTC1, the Secretariat of which is still held by the United States)
TC 104 - Freight Containers (the United States still holds this Secretariat)
TC 108 - Mechanical Vibration and Shock (the United States still holds this Secretariat)

By 1986, the United States held 16 (9.8 %) of the 164 ISO Technical Committees Secretariats. At that time, the United States still maintained the Secretariats for TC 11, TC 28, TC 36, TC 42, TC 61, TC 97, TC 104 and TC 108. In addition, TC 66 had been dissolved and the United States

had gained the following TC Secretariats:

TC 20 - Aircraft and Space Vehicles (the United States still holds this Secretariat)
TC 31 - Tires, Rims, and Valves (the United States still holds this Secretariat)
TC 68 - Banking (the United States still holds this Secretariat)
TC 127 - Earthmoving Machinery (the United States still holds this Secretariat)
TC 131 - Fluid Power Systems (the United States still holds this Secretariat)
TC 153 - Valves (this Secretariat is currently vacant)
TC 161 - Control and Safety Devices for Non-industrial Gas-fired Appliances and Systems (this Secretariat is now held by Germany)
TC 189 - Ceramic Tile (the United States still holds this Secretariat)

Also in 1986, the United States held the secretariats for 69 (10.6 %) of the 645 subcommittees and was the convener of 212 (13.6 %) of the 1556 ISO Working Groups. Of the 2365 leadership positions available in the ISO at that time, the United States held 297 or 12.6 % of them. In addition, out of the 164 ISO Technical Committees in existence in 1986, the United States was designated an active participant in 113 (68.8 %) TCs, an observer in 48 (29.2 %) TCs and was not represented in three (1.8 %) TCs. U.S. delegates to the ISO in 1986 were drawn primarily from private companies.[25]

By 1998, the United States held the secretariats for 31 (16.8 %) of the 184 TCs, 110 (18.7 %) of the 587 SCs, and 431 (21.3 %) of the 2,020 Working Groups. These figures include the Joint Technical Committee (JTC) 1. When added together, the United States held 572 (20.5 %) of the 2791 leadership positions available in the ISO. The United States was designated as an active participant in 136 (73.9 %) TCs and as an observer in 7 (3.8 %). The U.S. did not participate in 41 (22.2 %) ISO Technical Committees.[26] Table 2 in the Appendix lists the status of U.S. participation in current ISO Technical Committees. Table 3 in the Appendix lists the number of TC, SC, and WG Secretariats held by ISO member bodies as of December, 1998.

Since 1988, the United States has assumed the Secretariat of approximately 70 TCs and SCs. Some of the areas where the United States has assumed responsibility include: information technology; fasteners; shipbuilding; steel; zinc; aircraft and space vehicles; equipment for fire protection and fire fighting; textiles; machine tools; welding; building construction; gears; materials; equipment and offshore structures for petroleum and natural gas industries; health informatics; implants for surgery; and, refrigeration. For a complete list of ISO TC and SC Secretariats assumed by theUnited States since 1988, please see Table 7 in the Appendix. Table 8 in the Appendix lists ISO TC and SC Secretariats which have been relinquished by the United States since 1988.

It should be noted that it is advantageous to hold a Secretariat, including the ability to incorporate

certain technologies into the standards, promoting development of standards that reflect domestic interests, and ensuring that the United States is represented in international discussions. Figure 1 below demonstrates the progression in Secretariats held by the United States in the years 1982 to 1998. Figure 2 depicts the percentage of ISO Secretariats held by various countries from the years 1966-1998. The percentage of ISO secretariats held by the United States has increased since 1966. In terms of ISO secretariats held, the U.S. ranked third in 1966, holding about 9 % of TC and SC Secretariats. This percentage remained constant when U.S. Working Group convenorships were factored in. In 1986, the United States ranked fourth, with 10.5 % of ISO TC and SC Secretariats (12.2 % including WG convenorships) and in 1998, the United States ranked second at 18.3 %, behind Germany in terms of TC and SC Secretariats held but ranked first, at 20.5 %, when WG convenorships were factored in.[27]

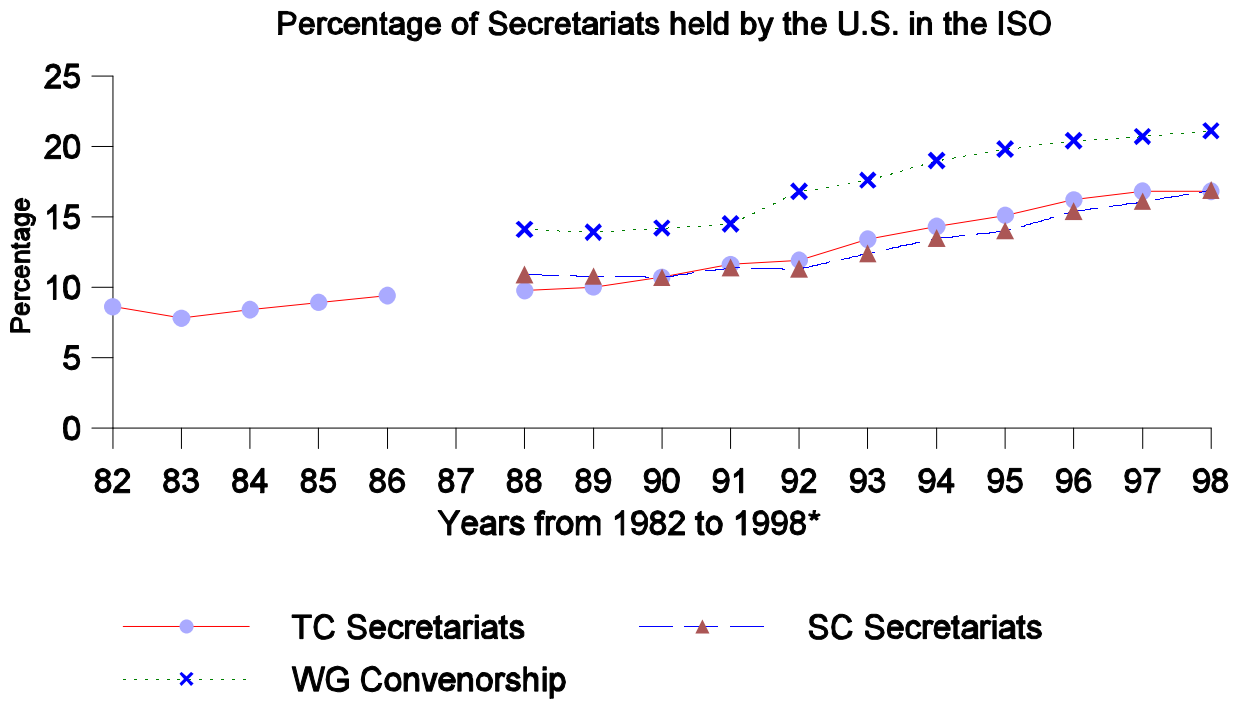

Figure 1. Percentage of Secretariats held by the United States in the ISO
* Data for the year 1987 is not available
Source: International Organization for Standardization. 1966-1998. *ISO Memento*. Geneva: ISO Central Secretariat.

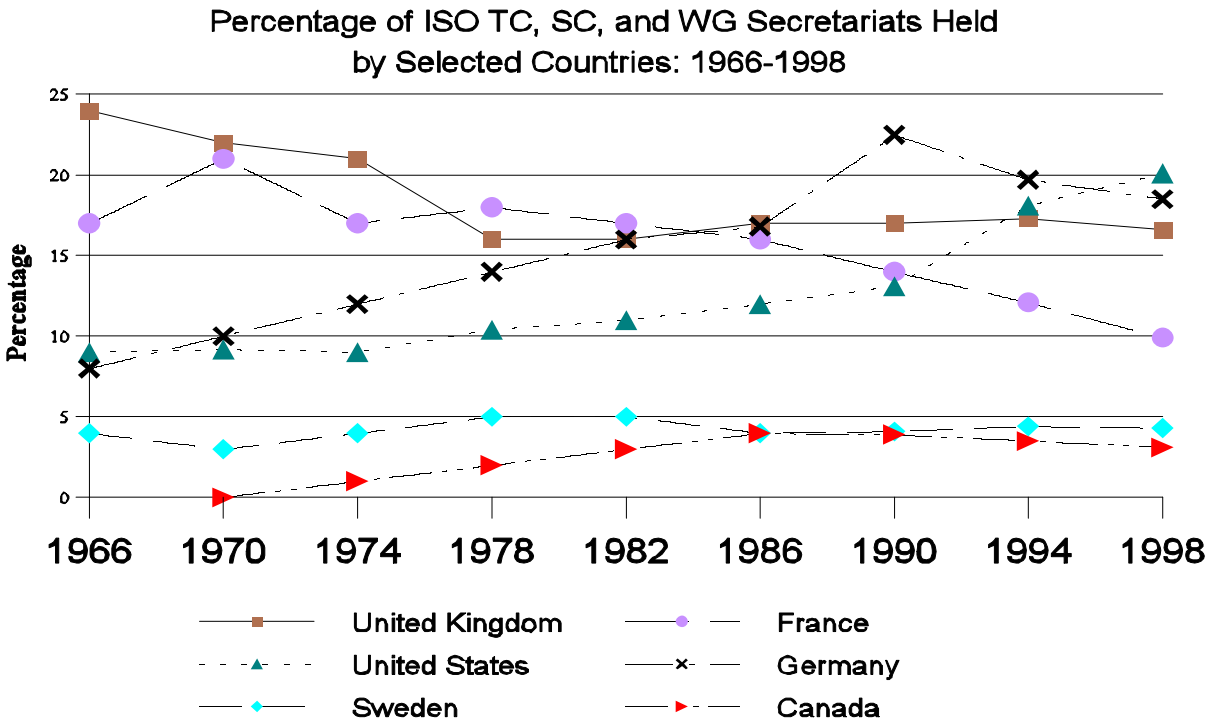

Figure 2. Percentage of ISO TC, SC, and WG Secretariats held by Selected Countries: 1966-1998
Source: International Organization for Standardization. 1966-1998. *ISO Memento*. Geneva: ISO Central Secretariat

7.2 U.S. Participation in the IEC

The U.S. National Committee (USNC) of the IEC manages U.S. participation in the technical work of the IEC. It takes part in the Commission's entire technical program and holds secretariats of approximately 31 technical committees and subcommittees. Among them are committees that develop international standards in the areas of semiconductor devices, household appliances, air-conditioning appliances, laser equipment, solar photovoltaic energy systems, fiber optics systems, design automation, and electrical insulation systems, among others.

The USNC appoints a technical advisor (TA) and a technical advisory group (TAG) to develop the U.S. viewpoint for each TC and SC. Technical advisors and TC/SC delegates are drawn from U.S. professional societies, trade associations, companies, government agencies, and testing laboratories concerned with the development of national electrotechnical standards. The technical advisor develops the U.S. position on IEC committee matters by consulting with the advisory group. The technical advisor is also responsible for ensuring the U.S. position is presented to the appropriate IEC Technical Committee.

ANSI provides secretariat services to the USNC, its Executive Committee, technical advisors, and technical advisory groups.

In 1966, the USNC held the secretariats of 7 (12.2 %) of the 57 TCs that existed and 5 (5.2 %) of the 96 SCs that existed. This represents 7.8 % of the total TC and SC Secretariats in 1966. TC Secretariats held by the USNC in 1966 are listed below, followed by SC Secretariats:

Technical Committee Secretariats held

TC 4 - Hydraulic turbines (this Secretariat is currently held by the Canadian NC)
TC 19 - Internal combustion engines (this TC no longer exists)
TC 25 - Quantities and units and their letter symbols (this Secretariat is currently held by the Italian NC)
TC 37 - Surge arresters (this Secretariat is still held by the USNC)
TC 53 - Computers and information processing (this TC no longer exists)
TC 56 - Reliability and maintainability (this Secretariat is currently held by the United Kingdom NC)
TC 58 - Methods of measurement of electrical properties of metallic materials (this TC no longer exists)

Sub-Committee Secretariats held

SC 15B - Endurance tests (this SC no longer exists)
SC 31H - Apparatus for use in the presence of ignitable dust (this Secretariat is still held by the USNC)
SC 46B - Waveguides and their accessories (this Secretariat is currently held by the French NC)
SC 53B - Title Unknown (this SC no longer exists)
SC 59A - Electric dishwashers (this Secretariat is currently held by the Spanish NC)

By 1986, the USNC held the secretariats for 13 (16.2 %) of the 80 TCs and 20 (16.2 %) of the 123 SCs then in existence. At that time, the USNC still maintained the TC and SC Secretariats for TC 4, TC 25, TC 37, SC 15B, SC 31H, SC 46B, and SC 59A. In addition, TC 19, TC 53, TC 58, and SC 53B had been dissolved and TC 56 was no longer held by the USNC. By 1986, the USNC had gained the following TC and SC Secretariats:

Technical Committee Secretariats gained

TC 5 - Steam turbines (this Secretariat is currently held by the United Kingdom NC)
TC 46 - Cables, wires and waveguides for telecommunications equipment (this Secretariat is still held by the USNC)
TC 48 - Electromechanical components for electronic equipment (this Secretariat is still held by the USNC)
TC 52 - Printed circuits (this Secretariat is still held by the USNC)
TC 61 - Safety of household and similar electrical appliances (this Secretariat is still held by the USNC)
TC 72 - Automatic controls for household use (this Secretariat is still held by the USNC)
TC 74 - Safety of data processing equipment and office machines (this Secretariat is still held by the USNC)
TC 76 - Laser equipment (this Secretariat is still held by the USNC)
TC 82 - Solar photovoltaic energy systems (this Secretariat is still held by the USNC)
TC 85 - Measuring equipment for basic electrical quantities (this Secretariat is currently

held by the Hungarian NC)

Sub-Committee Secretariats gained

SC 2J - Classification of insulation systems for rotating machinery (this SC has been disbanded)
SC 12F - Equipment used in the mobile services (this SC no longer exists)
SC 22G - Semiconductor power converters for adjustable speed electric drive systems (this Secretariat is still held by the USNC)
SC 31A - Flameproof enclosures (this Secretariat is still held by the USNC)
SC 46D - Connectors for r.f. cables (this Secretariat is still held by the USNC)
SC 48B - Connectors (this Secretariat is still held by the USNC)
SC 48C - Switches (this SC no longer exists)
SC 59H - Microwave appliances (this SC no longer exists)
SC 61B - Safety of household microwave ovens (this Secretariat is currently held by the United Kingdom NC)
SC 61D - Appliances for air-conditioning for household and similar purposes (this Secretariat is still held by the USNC)
SC 61G - Safety of projectors (this SC no longer exists)
SC 62D - Electromedical equipment (this Secretariat is still held by the USNC)
SC 65B - Elements of systems (this Secretariat is still held by the USNC)
SC 66B - Oscilloscopes (this SC no longer exists)
SC 66D - Analyzing equipment (this SC no longer exists)
CISPR/A - Radio interference measurements and statistical methods (this Secretariat is still held by the USNC)

Of the 203 TC and SC Secretariat positions available in the IEC in 1986, the USNC held 33, or 16.2 %, of them. At that time, the USNC was designated an active participant in 140 (68.9 %) TCs and SCs, an observer in 50 (24.6 %) TCs/SCs and was not represented in 13 (6.4 %) TCs/SCs. U.S. delegates to the IEC in 1986 were drawn primarily from private companies (85 %) with the remainder from trade associations and government agencies.[28]

Since 1986, the USNC has assumed the Secretariat of approximately 13 TCs and SCs. Some of the areas where the USNC has assumed responsibility include: electrical apparatus for the detection of flammable gases; semiconductor devices; fiber-optic systems and active devices; and, electrical insulation systems. For a complete list of IEC TC and SC Secretariats assumed by the USNC since 1986, please see Table 9 in the Appendix. Table 10 lists IEC TC and SC Secretariats which have been relinquished by the USNC since 1986.

In 1998, the USNC held the secretariats for 14 (15.7 %) of the 89 TCs and 17 (17.9 %) of the 95 SCs. Information was not available on IEC Working Groups. In sum, the USNC held 31 (16.8 %) of the 184 TC and SC Secretariats available in the IEC. The USNC was designated as an active participant in 77 (74.4 %) TCs and was not designated as an observer in any TC. The USNC did not participate in 12 (24.4 %) ISO Technical Committees.[29] Table 4 in the Appendix lists the current title, number designation, Secretariat, and USNC participation status for all IEC

TCs.

Figure 3 below depicts the percentage of total IEC TC and SC Secretariats held by various countries from the years 1966-1998. The percentage of IEC secretariats held by the USNC has increased since 1966. The percentage of IEC TC and SC Secretariats held by the USNC increased from about 8 % in 1966 to 16 % in 1986. In 1966, the USNC ranked fourth behind the NCs of the United Kingdom, France and Germany. In 1986, the USNC ranked second behind the NC of France. By 1998, the USNC ranked first in terms of the percentage of TC and SC secretariats held with approximately 16.8 % of all TC and SC secretariats.

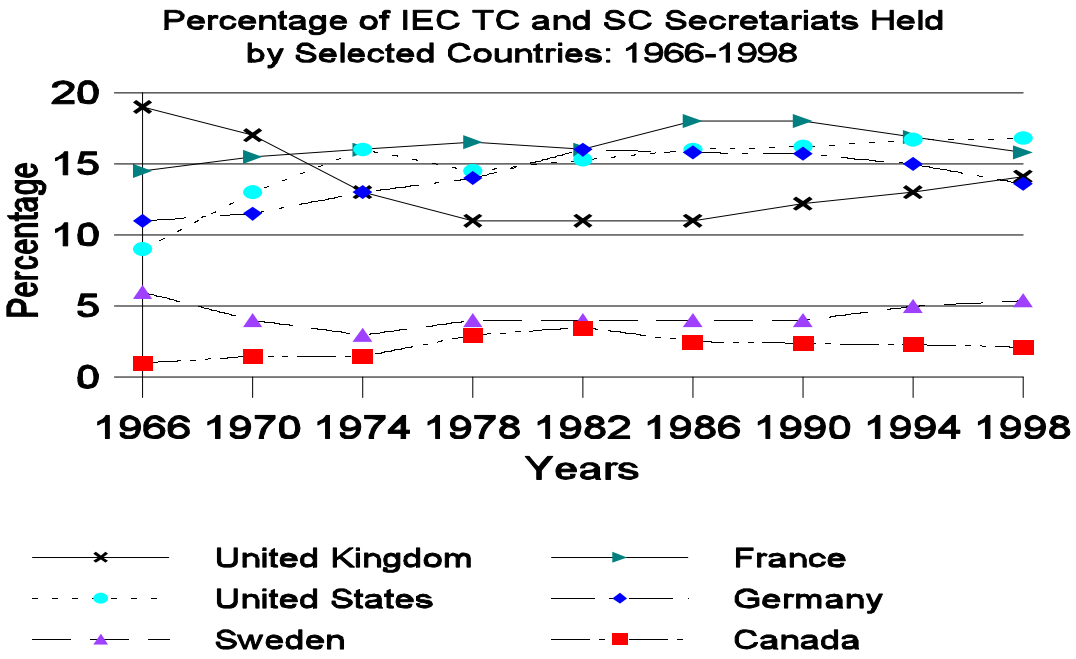

Figure 3. Percentage of IEC Secretariats Held by Selected Countries: 1966-1988

Sources: 1) Cooke, Patrick. 1988. *A Review of U.S. Participation in International Standards Activities*. Gaithersburg, MD.
2) United States National Committee (USNC). 1999. *National Committee's Status Participation in TC/SC Work*. New York.

8. Comparison of Trade Data with U.S. Participation in the ISO and the IEC

This section provides a rough analysis of U.S. participation in the ISO and the IEC compared to trade data obtained from the International Trade Administration of the Department of Commerce. This material is based upon a recent document compiled for input into the National Standards Strategy discussions. The status of U.S. participation in corresponding ISO and IEC TCs whose

work relates directly or indirectly to each major product grouping was identified through ANSI. Unfortunately, the aggregation of trade data reports and product definitions make it extremely difficult to exactly match export product groupings with ISO and IEC Technical Committee activities. This is due to the fact that many committees concentrate on specific technical disciplines, such as acoustics or air quality, rather than products. Also, due to the volume of data involved, U.S. participation in ISO and IEC Sub-Committees could not be included. The data compiled in Figure 4 below represent the best subjective matching of the percentages of TC Secretariats held by the United States within the ISO and/or IEC Technical Committees whose work directly or indirectly relates to a particular product group. The order of product groups follows 1997 export ranking data obtained from the Department of Commerce. Table 11 in the Appendix lists the ISO and IEC TCs which were included in the top five industries mentioned below.

Industry (*Sub-industries included in these categories are listed immediately following this table)	**Value of 1997 U.S. Exports in each Industry (in Billions of US Dollars)**	**% of TC Secretariats held by U.S.**	**Country holding largest % of TC Secretariats/# of Secretariats held**
Industrial Machinery and Equipment*	158.9	20 of 80 = 25 %	United States/20
Chemicals and allied products*	158.8	0 of 5 = 0 %	None
Electronic and other electrical equipment*	157.3	9 of 31 = 29 %	United States/9
Motor vehicles and other transportation equipment*	136.1	4 of 9 = 44 %	United States/4
Fabricated metal products	99.3	1 of 5 = 20 %	None
Printing and publishing	98.4	0 of 1 = 0 %	Germany/1
Instruments and related products*	55.9	5 of 28 = 17.8 %	Germany/8
Paper and allied products	55.0	0 of 1 = 0 %	Canada/1
Primary metal industries	53.2	0 of 12 = 0 %	Germany/2, France/2, and Japan/2
Rubber and miscellaneous plastics products*	52.0	1 of 1 = 100 %	United States/1
Lumber and wood products	42.8	0 of 3 = 0 %	None

Petroleum and coal products	35.2	1 of 2 = 50 %	None
Stone, clay and glass products	33.7	2 of 6 = 33 %	United States/2 and Germany/2
Apparel and other textile products	28.4	0 of 4 = 0 %	South Africa/2
Textile mill products	25.5	0 of 2 = 0 %	United Kingdom/2
Miscellaneous manufacturing industries*	24.8	2 of 14 = 14 %	Germany/4
Furniture and fixtures	22.1	0 of 2 = 0 %	None

***Sub-Industries**

Industrial Machinery and Equipment Sub-industries: computers and computer peripherals; electrical power systems; heating and cooling equipment; pollution control equipment; oil and gas field machinery; construction equipment; security and safety equipment; mining equipment; water resources equipment; food processing and packaging equipment; agricultural machinery and equipment; pumps, valves and compressors; machine tools and metalworking equipment; general industrial equipment; and, materials handling equipment.

Chemicals and Allied Products Sub-industries: industrial chemicals; drugs and pharmaceuticals; cosmetics and toiletries; and, agricultural chemicals.

Electronic and other Electrical Equipment Sub-industries: electronic components; telecommunications equipment; airport and ground support equipment; and, films, videos and other recordings.

Motor vehicles and other Transportation Equipment Sub-industries: aircraft and associated equipment; motor vehicle parts and accessories; autos and light trucks

Instruments and Related Products Sub-industries: laboratory and scientific instruments; electrical power systems; medical equipment; defense equipment; process controls; electrical industry products test equipment

Rubber and Miscellaneous Plastics Products Sub-industries: plastic materials and resins

Miscellaneous Manufacturing Sub-industries: musical instruments and parts; sporting goods and recreational equipment; and, giftware

Figure 4. Comparison of Trade Data with U.S. Participation in the ISO and the IEC
Source: Sector Map prepared for December 13-14, 1999 National Standards Strategy meeting. ANSI and NIST staff. 11-25.

This compilation, although rough in many respects, indicates that U.S. representation and level of effort do relate to trade value, favoring higher technology product groups over those in basic product categories. The overall percentage of U.S.-held TC Secretariats in the ISO and the IEC in 1998 was 16.5 %. In contrast, the percentage of U.S.-held TC Secretariats related to the top five export industries was 26.2 %.

9. Findings of this Report

1. In terms of percentage gain in U.S.-held TC and SC secretariats and improved rankings among member countries, U.S. participation levels in both the ISO and the IEC have grown since 1966. Looking at the numbers, U.S. performance in the ISO has been slightly better than that of

USNC performance in the IEC since 1966, but noticeably better in the ISO than the IEC between 1986 and 1998. Data for 1966, 1986, and 1998 indicate the following:

	1966		1986		1998	
	% U.S.-held TC and SC Secretariats	**Ranked**	**% U.S.-held TC and SC Secretariats**	**Ranked**	**% U.S.-held TC and SC Secretariats**	**Ranked**
ISO	9.0	3rd - behind U.K. and France	10.5	4th - behind Germany, U.K., and France	18.3 (including JTC 1)	2nd - behind Germany
IEC	7.8	5th - behind U.K., Netherlands, France, and Germany	16.2	2nd - behind France	16.8	1st

After a decline of USNC-held TC and SC secretariats in the IEC from 1976 to 1980, USNC secretariats then gained 5 % in the years from 1980-1986 for a total of an 8.4 % gain between 1966 and 1986. From 1986 to 1998, an additional 0.6 % was gained, putting the USNC first in terms of percentage of secretariats held. The overall gain from 1966 to 1998 in USNC-held IEC TC and SC Secretariats was 9.0 %. The USNC currently ranks first overall in terms of percentage of Secretariats held and has secured 5 IEC TC and 7 SC Secretariats since 1986. These include two of nineteen recently established TCs: TC 93 - Design Automation and TC 98 - Electrical Insulation Systems.

In contrast, the United States has gained 9.3 % of ISO TC and SC Secretariats since 1966 with 7.8 % of that increase occurring between 1986 and 1998. As mentioned above, USNC-held IEC Secretariats increased only 0.6 % between 1986 and 1998. The United States has also been named Secretariat for 10 of the 30 ISO TCs which have been established since 1986. The areas in which the United States has assumed these Secretariats are: ceramic tile; gas turbines; sterilization of health care products; road transport informatics; building environmental design; cleanrooms and associated controlled environments; general aspects for healthcare products; clinical laboratory testing and in vitro diagnostic test systems; elevating work platforms; and, health informatics.

2. As previously discussed, ISO member bodies from each member country are registered by voting or non-voting status in each ISO Technical Committee. Voting is limited to participating members; non-voting to observer members. The participant-observer mix, which may also be

calculated as the participant:observer (P:O) ratio, varies from country to country and depends on many factors. Among these factors are the extent of industrial development, value placed on influencing standards developing through participation or value placed on obtaining information through observing the process. In 1986, the P:O ratio in the ISO ranged from 0.1 for Yugoslavia (16 P memberships to 139 O memberships) to 17.2 for Germany. The P:O ratio for the United States was 2.4 in 1986 but by 1998, this ratio had changed to 19.6 (137 P memberships to 7 O memberships). In 1998, the United States was not a member of 45 Technical Committees.

In the IEC, the 1998 P:O ratio for the USNC was 77 (77 P memberships to no O memberships). The United States was not a member of 12 IEC Technical Committees. The P:O ratio for members varied from 89 for Germany to 0.1 for Croatia.

3. The general improvements in U.S. participation levels and secretariat strength in the ISO and IEC from 1966 through 1998 cited in the first two findings above appear to correlate inversely with the decline in the overall U.S. share of world merchandise exports. U.S. involvement in ISO and IEC standards activities seems to correlate more directly with the sustained growth of world trade overall rather than on the level of U.S. exports. It is therefore possible that U.S. gains in ISO and IEC standards activities primarily benefit, and are the result of, interests of U.S.-based multinational corporations whose business enterprises have become increasingly international and whose profits relate to global markets where production facilities, commodities, goods and services, and money cross national borders.

4. Although the effect of such economic factors as tariffs and quotas on U.S. exports can be quantified, it is difficult to estimate the effect of any direct benefits that accrue from participation in voluntary international standardization activities. As previously cited, there are significant intangible benefits which accrue to those industries that do participate. U.S. companies have indicated that various benefits accrue to them from participation in international standardization activities. Such participation:

- contributes to the development of a broader market base for exports;
- results in the development of higher quality standards benefitting U.S. products;
- provides the basis to counter foreign competition;
- promotes universal product or test method standards to enhance economies in manufacturing operations; and,
- supports the goal of one standard used worldwide.

The comparison of export data with U.S.-held ISO and IEC TC secretariats held indicates that U.S. efforts tend to favor those product groups with newer technologies and higher export values. Those product groups that predominate as export strengths for the United States are those concerning industrial machinery and equipment, chemicals, and electronic and electrical equipment. Even though ISO subject areas are broader in scope than IEC subject areas, overall U.S. participation levels and U.S.-held secretariat strengths have favored ISO activities more than IEC activities since 1986.

5. U.S. export success and participation in ISO and IEC standardization activities are evident in certain product areas. Of the top 5 export industries, the United States holds ISO or IEC TC Secretariats in 4 industries and does not hold any Secretariats in the chemicals and allied products industry. The apparent strengths regarding standards participation and dollar volume of U.S. exports include, among others, the following areas: computers and computer peripherals; electrical power systems; motor vehicles and parts; airplanes and parts; telecommunications equipment; electrical machinery, apparatus, and appliances; and, oil and gas field machinery. Exports for 1998 are lower for some of the more basic product groups. In the corresponding ISO and IEC TCs for these basic product groups, the statistics indicate there are fewer U.S.-held Secretariats and less U.S. participation in the relevant TCs. These products include, among others: furniture; footwear; cosmetics; stone products; apparel; primary metals; paper; and, wood manufactured products.

6. It must also be noted that, independently of the trade figures, representatives of some sectors and organizations in the United States claim that the U.S. voice in certain areas in the ISO and the IEC has not been as strong as it could be. Current efforts are underway to improve U.S. representation in these areas.

10. Conclusion

Trade data are subject to many economic factors, including changes in currency exchange rates, differential economic growth in foreign countries, and structural shifts in industry sectors. This publication has tried to provide an overview of U.S. participation levels in the ISO and the IEC from 1966 to 1998 and to correlate that participation with export product groupings. The analysis has shown that U.S. participation is strong in both the ISO and the IEC but has increased more rapidly in the ISO in recent years. Participation in TCs which correspond to key exports is also strong. However, ANSI, U.S. industry, trade associations, standards developers and other interested parties should maintain U.S. gains and comparative advantages held in current ISO and IEC affiliations. Steps can be taken to strengthen the U.S. position in technical committees dealing with products where the U.S. can exploit its potential for exporting.

A national educational program should be undertaken by ANSI and industry trade groups to make relevant parties more aware of the role of international standards and the benefits to the U.S. economy that can result from improved U.S. participation. Such a program would help maintain and enhance U.S. competitiveness and ensure high-quality standards. It would also help ensure continued U.S. participation in ISO and IEC activities at a time which many government agencies and industries are restructuring, merging, or simply shifting resources.

In addition, a series of economic studies should be undertaken to analyze the impact of multiple standards and duplicative or onerous conformity assessment requirements at the domestic and international level for different key sectors.

At the celebration of the 28th Annual World Standards Day, October 14, 1997, International

Organization for Standardization (ISO) President Liew Mun Leong, International Electrotechnical Commission (IEC) President Bernard H. Falk, and International Telecommunication Union (ITU) Secretary General Pekka Tarjanne gave a joint speech which included the following excerpt:

"ISO, IEC and ITU on the one hand, and the WTO on the other, must make sure the message is heard by their respective members: world trade needs worldwide standards....there must be a similar commitment to reliance on international standards which enable businesses and customers alike in the developing global market to draw the maximum benefits."[30]

APPENDIX

Page

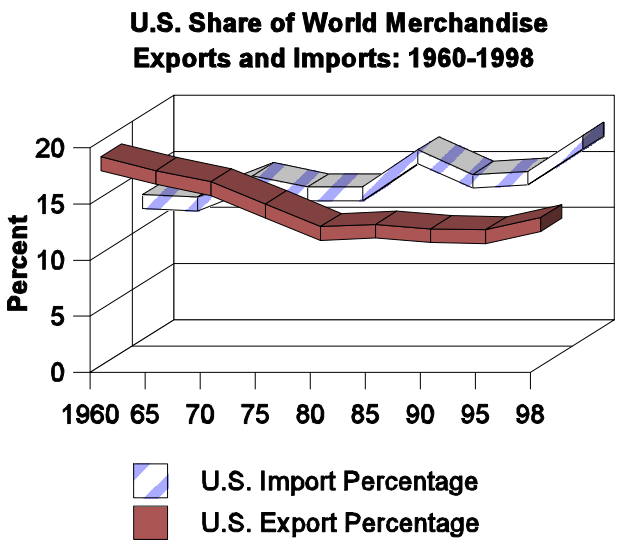

Chart 1. U.S. Share of World Merchandise Exports and Imports: 1960-1998
Source: World Bank. 1999. *Entering the 21st Century: World Development Report 1999/2000.* Washington, DC.

Chart 2. Merchandise Exports and Imports of Selected Countries: 1998
Source: World Bank. 1999. *Entering the 21st Century: World Development Report 1999/2000.* Washington, DC.

Table 1
Membership of Countries in the ISO, IEC, and the WTO TBT
Code of Good Practice for the Preparation, Adoption and Application of Standards

COUNTRY	ISO	IEC	Standards Code
Albania	M*		
Algeria	M		
Antigua and Barbuda	S*		
Argentina	M		Instituto Argentino de Normalización (IRAM)
Armenia	M		
Australia	M	M	Australian Communications Authority (ACA) Australian Communications Industry Forum Limited (ACIF) Australian Gas Association (AGA) Standards Australia (SAA)
Austria	M	M	Österreichisches Normungsinstitut (ON) Österreichischer Verband für Elektrotechnik (ÖVE)
Azerbaijan	C*		
Bahrain	C		Standards and Metrology Directorate (BSMD)
Bangladesh	M		Bangaldesh Standards and Testing Institution (BSTI)
Barbados	M		Barbados National Standards Institution (BNSI)
Belarus	M	M	
Belgium	M	M	Institut Belge de Normalisation (IBN)
Benin	S		
Bolivia	C		Instituto Boliviano de Normalización y Calidad (IBNORCA)
Bosnia and Herzegovina	M	A*	
Botswana	M		Botswana Bureau of Standards
Brazil	M		Associação Brasileira de Normas Técnicas (ABNT)
Brunei Darussalam	C		

Bulgaria	M	M	Committee for Standardization and Metrology (BDS)
Cambodia	S		
Canada	M	M	Standards Council of Canada (SCC)
Chile	M		Instituto Nacional de Normalización (INN)
China	M	M	
Colombia	M	PA*	Instituto Colombiano de Normas Técnicas y Certificación (ICONTEC)
Congo	C		
Costa Rica	M		Instituto de Normas Técnicas de Costa Rica (INTECO)
Côte d'Ivoire	C		
Croatia	M	M	
Cuba	M	PA	Oficina Nacional de Normalización (NC)
Cyprus	M	A	
Czech Republic	M	M	Czech Standards Institute (CSNI)
Denmark	M	M	Danish Standards Association
Dominican Republic	S		Dirección General de Normas y Sistemas de Calidad (DIGENOR)
Ecuador	M		Instituto Ecuatoriano de Normalización (INEN)
Egypt	M	M	Egyptian Organization for Standardization and Quality Control (EOS)
El Salvador	C		Consejo Nacional de Ciencia y Tecnología (CONACYT)
Eritrea		PA	
Estonia	C	A	
Ethiopia	M		
European Organizations			European Telecommunications Standards Institute (ETSI) European Committee for Electrotechnical Standardization (CENELEC) European Committee for Standardization (CEN)
Fiji	S		
Finland	M	M	Finnish Standards Association (SFS)

France	M	M	Association Française de Normalisation (AFNOR)
Germany	M	M	Deutsches Institut für Normung E.V. (DIN)
Ghana	M		
Georgia	C		
Greece	M	M	Hellenic Organization for Standardization (ELOT)
Grenada	S		Grenada Bureau of Standards (GDBS)
Guatemala	C		
Guinea	C		
Guyana	S		Guyana National Bureau of Standards (GNBS)
Hong Kong, China	C		Electrical and Mechanical Services Department Highways Department Office of the Telecommunications Authority Transport Department Works Bureau
Hungary	M	M	Magyar Szabványügyi Testület (MSZT)
Iceland	M	A	Icelandic Council for Standardization (STRI)
India	M	M	Bureau of Indian Standards (BIS)
Indonesia	M	M	Badan Standardisasi Nasional (BSN)
Iran	M		
Ireland	M	M	National Standards Authority of Ireland (NSAI)
Israel	M	M	Standards Institution of Israel (SII)
Italy	M	M	Italian Electrotechnical Committee (CEI) Ente Nazonale Italiano di Unificazione (UNI)
Jamaica	M		Jamaica Bureau of Standards (JBS)
Japan	M	M	Consumer Product Safety Association (CPSA) Fair Trade Commission Japan Construction Mechanization Association (JCMA) Japan Environment Association (JEA) Japanese Industrial Standards Committee (JISC) Japan Marine Standards Association (JMSA) Ministry of Agriculture, Forestry and Fisheries Ministry of International Trade and Industry Japan Iron and Steel Federation (JISF)
Jordan	C		

Kazakstan	M		
Kenya	M	PA	Kenya Bureau of Standards (KEBS)
Korea, Democratic P. Republic	M		
Korea, Republic of	M	M	Korean Agency for Technology and Standards (KATS)
Kuwait	M		
Kyrgyzstan	C		
Latvia	C	A	
Lebanon	C		
Libya	M		
Lithuania	C	A	
Luxembourg	M	M	Service de l'Energie de l'Etat (SEE)
Macedonia	M		
Madagascar	C		
Malawi	C		Malawi Bureau of Standards
Malaysia	M	M	Department of Standards Malaysia (DSM)
Mali	C		
Malta	C		
Mauritius	M		
Mexico	M	M	Dirección General de Normas (DGN) National Standardizing and Certifying Association for the Electrical Sector National Standardizing and Certifying Association for the Construction Sector Normex National Textile Standardizing Institute Electronic Standardization and Certification
Moldova	C		
Mongolia	M		Mongolian National Centre for Standardization and Metrology (MNCSM)
Morocco	M		Service de Normalisation Industrielle Marocaine (SNIMA)
Mozambique	C		Instituto Nacional de Normalização e Qualidade (INNOQ)

Namibia	C		
Nepal	C		
Netherlands	M	M	Dutch Standardization Institute
New Zealand	M	M	Environment Choice New Zealand Standards New Zealand (SNZ)
Nicaragua	C		
Nigeria	M		
Norway	M	M	Norges Standardiseringsforbund (NSF) Norsk Elektroteknisk Komite (NEK)
Oman	C		
Pakistan	M	M	Pakistan Standards Institute (PSI)
Panama	M		Ministerio de Comercio e Industrias (MICI)
Papau New Guinea	C		
Paraguay	C		
Peru	C		Instituto Nacional de Defensa de la Competencia y de la Protección de la Propriedad Intelectual (INDECOPI)
Philippines	M	M	Bureau of Product Standards (BPS)
Poland	M	M	Polski Komitet Normalizacyjny (PKN)
Portugal	M	M	Instituto Português da Qualidade (IPQ)
Qatar	C		
Romania	M	M	Asociatia de Standardizare din România (ASRO)
Russian Federation	M	M	
Saint Lucia	S		
Saudi Arabia	M	M	
Senegal			Institut Sénégalais de Normalisation (ISN)
Seychelles	C		
Singapore	M	M	Singapore Productivity and Standards Board (PSB)
Slovakia	M	M	Slovak Office of Standards, Metrology and Testing (UNMS)
Slovenia	M	M	Standards and Metrology Institute (SMIS)
South Africa	M	M	South African Bureau of Standards (SABS)

Spain	M	M	Asociación Española de Normalización y Certificación (AENOR)
Sri Lanka	M		Sri Lanka Standards Institution (SLSI)
Sudan	C		
Sweden	M	M	Allmänna Standardiseringsgruppen (STG) Byggstandardiseringen (BST) Hälso-och Sjukvårdsstandardiseringen (HSS) Kran-och Hisstandardiseringen (IKH) Informationstekniska standardiseringen (ITS) Svenska Elektriska Kommissionen (SEK) Standardiseringen I Sverige (SIS) Material- och Mekanstandardiseringen (SMS) Tyrckkärlsstandardiseringen (TKS)
Switzerland	M	M	Pro Telecom Schweizerische Normen-Vereinigung (SNV) Swiss Electrotechnical Committee (CES)
Syria	M		
Tanzania	M		Tanzania Bureau of Standards (TBS)
Thailand	M	M	Thai Industrial Standards Institute (TISI)
Trinidad and Tobago	M		Trinidad and Tobago Bureau of Standards (TTBS)
Tunisia	M		Institut national de la normalisation et de la propriété industrielle (INNORPI)
Turkey	M	M	Türk Standarlari Enstitüsü (TSE)
Turkmenistan	C		
Uganda	C		Uganda National Bureau of Standards (UNBS)
Ukraine	M	M	
United Arab Emirates	C		
United Kingdom	M	M	British Standards Institute (BSI)
United States	M	M	American National Standards Institute (ANSI)
Uruguay	M	PA	Instituto Uruguayo de Normas Técnicas (UNIT)
Uzbekistan	M		
Venezuela	M		Fondo para la Normalización y Certificación de la Calidad (FONDONORMA)
Vietnam	M		
Yugoslavia	M	M	

Zambia			Zambia Bureau of Standards
Zimbabwe	M		Standards Association of Zimbabwe (SAZ)

*M=Member
*S=Subscriber Member
*C=Correspondent Member
*A=Associate Member
*PA=Pre-Associate Member

Sources:1) "ISO Members Worldwide". *ISO Homepage*.<http://www.iso.ch/addresse/address.html> (16 April 1999).
2) "IEC Members". *IEC Homepage*. <http://www.iec.ch/seatop-e.htm> (21 April 1999).
3) "List of Standardizing Bodies that have Accepted the Code of Good Practice for the Preparation, Adoption and Application of Standards" G/TBT/CS/1/-G/TBT/CS/1/Add.4. *WTO Homepage*. <http://www.wto.org> (15 December 1999).

Table 2
Title, Number Designation, Year of Establishment, Secretariat, and U.S. Level of Participation for ISO Technical Committees

Title and Number Designation of ISO TCs	Year of Establishment	Secretariat	U.S. Level of Participation
JTC 1 Information Technology	1987	ANSI (USA)	P*
TC 1 Screw threads	1947	SIS (Sweden)	P
TC 2 Fasteners	1947	DIN (Germany)	P
TC 4 Rolling bearings	1947	SIS (Sweden)	P
TC 5 Ferrous metal pipes and metallic fittings	1947	SNV (Switzerland)	N*
TC 6 Paper, board and pulps	1947	SCC (Canada)	P
TC 8 Ships and marine technology	1947	JISC (Japan)	P
TC 10 Technical drawings, product definition and related documentation	1947	SIS (Sweden)	P
TC 11 Boilers and pressure vessels	1947	ANSI (USA)	P
TC 12 Quantities, units, symbols, conversion factors	1947	SIS (Sweden)	P
TC 14 Shafts for machinery and accessories	1947	DIN (Germany)	P
TC 17 Steel	1947	JISC (Japan)	P
TC 18 Zinc and zinc alloys	1947	IBN (Belgium)	P
TC 19 Preferred numbers	1947	AFNOR (France)	N
TC 20 Aircraft and space vehicles	1947	ANSI (USA)	P
TC 21 Equipment for fire protection and fire fighting	1947	BSI (United Kingdom)	P

TC 22 Road vehicles	1947	AFNOR (France)	P
TC 23 Tractors and machinery for agriculture and forestry	1947	AFNOR (France)	P
TC 24 Sieves, sieving and other sizing methods	1947	DIN (Germany)	P
TC 25 Cast iron and pig iron	1947	BSI (United Kingdom)	P
TC 26 Copper and copper alloys	1947	DIN (Germany)	N
TC 27 Solid mineral fuels	1947	BSI (United Kingdom)	P
TC 28 Petroleum products and lubricants	1947	ANSI (USA)	P
TC 29 Small tools	1947	AFNOR (France)	P
TC 30 Measurement of fluid flow in closed conduits	1947	BSI (United Kingdom)	P
TC 31 Tyres, rims and valves	1947	ANSI (USA)	P
TC 33 Refractories	1947	BSI (United Kingdom)	P
TC 34 Agricultural food products	1947	MSZT (Hungary)	O*
TC 35 Paints and varnishes	1947	NNI (Netherlands)	O
TC 36 Cinematography	1947	ANSI (USA)	P
TC 37 Terminology (principles and coordination)	1947	ON (Austria)	P
TC 38 Textiles	1947	BSI (United Kingdom)	P
TC 39 Machine tools	1947	UNI (Italy)	P

TC 41 Pulleys and belts (including veebelts)	1947	Vacant	P
TC 42 Photography	1947	ANSI (USA)	P
TC 43 Acoustics	1947	DS (Denmark)	P
TC 44 Welding and allied processes	1947	AFNOR (France)	P
TC 45 Rubber and rubber products	1947	DSM (Malaysia)	P
TC 46 Information and documentation	1947	DIN (Germany)	P
TC 47 Chemistry	1947	Vacant	O
TC 48 Laboratory glassware and related apparatus	1947	DIN (Germany)	N
TC 50 Lac	1947	BIS (India)	N
TC 51 Pallets for unit load method of materials handling	1947	BSI (United Kingdom)	P
TC 52 Light gauge metal containers	1947	AFNOR (France)	N
TC 54 Essential oils	1947	AENOR (Spain)	P
TC 56 Mica	1947	BIS (India)	N
TC 58 Gas cylinders	1947	SIS (Sweden)	P
TC 59 Building construction	1947	NSF (Norway)	P
TC 60 Gears	1947	ANSI (USA)	P
TC 61 Plastics	1947	ANSI (USA)	P
TC 63 Glass containers	1947	UNMS (Slovakia)	N
TC 65 Manganese and chromium ores	1947	GOST R (Russian Federation)	N

TC 67 Materials, equipment and offshore structures for petroleum and natural gas industries	1947	ANSI (USA)	P
TC 68 Banking, securities and other financial services	1948	ANSI (USA)	P
TC 69 Applications of statistical methods	1948	AFNOR (France)	P
TC 70 Internal combustion engines	1949	BSI (United Kingdom)	P
TC 71 Concrete, reinforced concrete and pre-stressed concrete	1949	ANSI (USA)	P
TC 72 Textile machinery and machinery for dry-cleaning and industrial laundering	1949	SNV (Switzerland)	P
TC 74 Cement and lime	1950	IBN (Belgium)	P
TC 76 Transfusion, infusion and injection equipment for medical use	1951	DIN (Germany)	P
TC 77 Products in fiber reinforced cement	1952	IBN (Belgium)	N
TC 79 Light metals and their alloys	1953	AFNOR (France)	P
TC 81 Common names for pesticides and other agrochemicals	1953	BSI (United Kingdom)	P
TC 82 Mining	1955	DIN (Germany)	N
TC 83 Sports and recreational equipment	1955	DIN (Germany)	O
TC 84 Medical devices for injections	1956	AFNOR (France)	P
TC 85 Nuclear energy	1956	DIN (Germany)	P
TC 86 Refrigeration	1957	ANSI (USA)	P
TC 87 Cork	1957	IPQ (Portugal)	N
TC 89 Wood-based panels	1957	DIN (Germany)	P

TC 91 Surface active agents	1958	ISIRI (Iran)	P
TC 92 Fire tests on building materials, components and structures	1958	BSI (United Kingdom)	P
TC 93 Starch (including derivatives and by-products)	1958	AFNOR (France)	N
TC 94 Personal safety--protective clothing and equipment	1959	SAA (Australia)	O
TC 96 Cranes	1960	Vacant	P
TC 98 Bases for design of structures	1960	PKN (Poland)	P
TC 100 Chains and chain wheels for power transmission and conveyors	1960	BSI (United Kingdom)	P
TC 101 Continuous mechanical handling equipment	1961	DIN (Germany)	N
TC 102 Iron ores	1961	JISC (Japan)	P
TC 104 Freight containers	1961	ANSI (USA)	P
TC 105 Steel wire ropes	1962	BSI (United Kingdom)	N
TC 106 Dentistry	1962	BSI (United Kingdom)	P
TC 107 Metallic and other inorganic coatings	1962	ANSI (USA)	P
TC 108 Mechanical vibration and shock	1963	ANSI (USA)	P
TC 109 Oil burners and associated equipment	1963	BSI (United Kingdom)	N
TC 110 Industrial trucks	1963	DIN (Germany)	P
TC 111 Round steel link chains, chain slings, components and accessories	1963	BSI (United Kingdom)	P

TC 112 Vacuum technology	1964	ANSI (USA)	P
TC 113 Hydrometric determinations	1964	BIS (India)	P
TC 114 Horology	1964	SNV (Switzerland)	N
TC 115 Pumps	1964	AFNOR (France)	P
TC 116 Space heating appliances	1964	SNZ (New Zealand)	N
TC 117 Industrial fans	1964	AFNOR (France)	P
TC 118 Compressors, pneumatic tools and pneumatic machines	1965	SIS (Sweden)	P
TC 119 Powder metallurgy	1965	SIS (Sweden)	P
TC 120 Leather	1965	BIS (India)	P
TC 121 Anaesthetic and respiratory equipment	1965	BSI (United Kingdom)	P
TC 122 Packaging	1965	TSE (Turkey)	P
TC 123 Plain bearings	1967	GOST R (Russian Federation)	N
TC 125 Enclosures and conditions for testing	1967	SAA (Australia)	N
TC 126 Tobacco and tobacco products	1968	DIN (Germany)	P
TC 127 Earth-moving machinery	1968	ANSI (USA)	P
TC 128 Glass plant, pipeline and fittings	1969	DIN (Germany)	N
TC 129 Aluminum ores	1969	AFNOR (France)	P
TC 130 Graphic technology	1969	DIN (Germany)	P

TC 131 Fluid power systems	1969	ANSI (USA)	P
TC 132 Ferroalloys	1969	GOST R (Russian Federation)	N
TC 133 Sizing systems and designations for clothes	1969	SABS (South Africa)	N
TC 134 Fertilizers and soil conditioners	1969	ISIRI (Iran)	P
TC 135 Non-destructive testing	1969	JISC (Japan)	P
TC 136 Furniture	1969	SIS (Sweden)	P
TC 137 Sizing system, designations and marking for boots and shoes	1970	SABS (South Africa)	N
TC 138 Plastics pipes, fittings and valves for the transport of fluids	1970	JISC (Japan)	O
TC 142 Cleaning equipment for air and other gases	1970	AFNOR (France)	N
TC 144 Air distribution and air diffusion	1970	BSI (United Kingdom)	N
TC 145 Graphical symbols	1970	BSI (United Kingdom)	P
TC 146 Air quality	1971	DIN (Germany)	P
TC 147 Water quality	1971	DIN (Germany)	P
TC 148 Sewing machines	1971	DIN (Germany)	N
TC 149 Cycles	1971	BIS (India)	P
TC 150 Implants for surgery	1971	DIN (Germany)	P
TC 152 Gypsum, gypsum plasters and gypsum products	1971	AFNOR (France)	P
TC 153 Valves	1971	Vacant	P

TC 154 Documents and data elements in administration, commerce, and industry	1972	SNV (Switzerland)	P
TC 155 Nickel and nickel alloys	1973	SCC (Canada)	P
TC 156 Corrosion of metals and alloys	1974	GOST R (Russian Federation)	P
TC 157 Mechanical contraceptives	1974	SIS (Sweden)	P
TC 158 Analysis of gases	1974	NNI (Netherlands)	N
TC 159 Ergonomics	1974	DIN (Germany)	P
TC 160 Glass in building	1974	BSI (United Kingdom)	P
TC 161 Control and safety devices for non-industrial gas-fired appliances and systems	1974	DIN (Germany)	N
TC 162 Doors and windows	1975	NSF (Norway)	P
TC 163 Thermal insulation	1975	SIS (Sweden)	P
TC 164 Mechanical testing of metals	1975	JISC (Japan)	P
TC 165 Timber structures	1976	SCC (Canada)	P
TC 166 Ceramic ware, glassware and glass ceramic ware in contact with food	1976	ANSI (USA)	P
TC 167 Steel and aluminum structures	1977	NSF (Norway)	P
TC 168 Prosthetics and orthotics	1977	DIN (Germany)	P
TC 170 Surgical instruments	1977	DIN (Germany)	N
TC 171 Micrographics and optical memories for document and image recordings, storage and use	1978	AFNOR (France)	P

TC 172 Optics and optical instruments	1978	DIN (Germany)	P
TC 173 Technical systems and aids for disabled or handicapped persons	1978	SIS (Sweden)	O
TC 174 Jewelry	1978	DIN (Germany)	N
TC 175 Fluorspar	1978	SABS (South Africa)	N
TC 176 Quality management and quality assurance	1979	SCC (Canada)	P
TC 177 Caravans	1979	BSI (United Kingdom)	N
TC 178 Lifts, escalators, passenger conveyors	1979	AFNOR (France)	P
TC 179 Masonry	1980	DIN (Germany)	P
TC 180 Solar energy	1980	SAA (Australia)	P
TC 181 Safety of toys	1980	DS (Denmark)	P
TC 182 Geotechnics	1981	NNI (Netherlands)	N
TC 183 Copper, lead and zinc ores and concentrates	1983	SAA (Australia)	N
TC 184 Industrial automation systems and integration	1983	AFNOR (France)	P
TC 185 Safety devices for protection against excessive pressure	1983	ANSI (USA)	P
TC 186 Cutlery and table and decorative metal hollow-ware	1984	BSI (United Kingdom)	N
TC 187 Colour notations	1985	SIS (Sweden)	N
TC 188 Small craft	1985	SIS (Sweden)	P
TC 189 Ceramic tile	1986	ANSI (USA)	P

TC 190 Soil quality	1986	NNI (Netherlands)	N
TC 191 Animal (mammal) traps	1985	SCC (Canada)	P
TC 192 Gas turbines	1988	ANSI (USA)	P
TC 193 Natural gas	1988	NNI (Netherlands)	P
TC 194 Biological evaluation of medical and dental materials and devices	1988	DIN (Germany)	P
TC 195 Building construction machinery and equipment	1989	PKN (Poland)	N
TC 196 Natural stone	1989	AENOR (Spain)	N
TC 197 Hydrogen energy technologies	1990	SCC (Canada)	P
TC 198 Sterilization of health care products	1990	ANSI (USA)	P
TC 199 Safety of machinery	1991	DIN (Germany)	P
TC 201 Surface chemical analysis	1991	JISC (Japan)	P
TC 202 Microbeam analysis	1991	CSBTS (China)	P
TC 203 Technical energy systems	1991	SIS (Sweden)	P
TC 204 Road transport informatics	1992	ANSI (USA)	P
TC 205 Building environmental design	1992	ANSI (USA)	P
TC 206 Fine ceramics	1992	JISC (Japan)	P
TC 207 Environmental management	1993	SCC (Canada)	P
TC 208 Thermal turbines for industrial application (steam turbines, gas expansion turbines)	1993	DIN (Germany)	N

TC 209 Cleanrooms and associated controlled environments	1993	ANSI (USA)	P
TC 210 General aspects for healthcare products	1994	ANSI (USA)	P
TC 211 Geographic information/Geomatics	1994	NSF (Norway)	P
TC 212 Clinical laboratory testing and in vitro diagnostic test systems	1994	ANSI (USA)	P
TC 213 Dimensional and geometrical product specifications and verification	1996	DS (Denmark)	P
TC 214 Elevating work platforms	1996	ANSI (USA)	P
TC 215 Health informatics	1998	ANSI (USA)	P
TC 216 Footwear	N/A	AENOR (Spain)	N
TC 217 Cosmetics	N/A	ISIRI (Iran)	N
TC 218 Sawn timber and sawlogs, semi-manufactures of timber	N/A	NSF (Norway)	P
TC 219 Floor coverings	N/A	BSI (United Kingdom)	N
TC 220 Cryogenic vessels	N/A	AFNOR (France)	N

*P=Participant *O=Observer *N=non-participant

Source: 1) "List of Technical Committees". *ISO Homepage*.<http://www.iso.ch/meme/memento.html> (14 December 1999).
2) International Organization for Standardization. 1998. *ISO Memento*. Geneva: ISO Central Secretariat.

Table 3
ISO Technical Committee, Sub-Committee, and Working Group Secretariats as of December 1998

Member body	**Country**	**TC**	**SC**	**WG**	**Total**
ABNT	Brazil	-	3	4	7
AENOR	Spain	2	2	7	11
AFNOR	France	19	63	190	272

ANSI	USA	30	93	409	532
BIS	India	5	5	3	13
BSI	United Kingdom	21	91	336	448
CSBTS	China	1	5	15	21
CSNI	Czech Republic	-	1	6	7
DIN	Germany	29	115	365	509
DS	Denmark	3	4	35	42
DSM	Malaysia	1	1	2	4
ELOT	Greece	-	2	1	3
GOST R	Russian Federation	7	21	10	38
IBN	Belgium	3	2	16	21
ICONTEC	Colombia	-	1	-	1
IPQ	Portugal	1	1	3	5
ISIRI	Iran	2	1	1	4
JISC	Japan	7	19	77	103
MNISM	Mongolia	-	-	1	1
MSZT	Hungary	1	1	-	2
NNI	Netherlands	7	16	69	92
NSAI	Ireland	-	-	2	2
NSF	Norway	4	13	34	51
ON	Austria	1	1	13	15
PKN	Poland	2	3	5	10
PSB	Singapore	-	-	2	2
SAA	Australia	4	5	37	46
SABS	South Africa	3	3	3	9
SCC	Canada	7	13	60	80
SFS	Finland	-	3	9	12
SII	Israel	-	3	3	6

SIS	Sweden	13	22	85	120
SNV	Switzerland	3	17	27	47
SNZ	New Zealand	1	1	3	5
TBS	Tanzania	-	1	-	1
TISI	Thailand	-	-	1	1
TSE	Turkey	1	4	-	4
UNI	Italy	1	16	37	54
UNMS	Slovakia	1	2	-	3
Technical committees, subcommittees and working groups which have no Secretariat		3	16	79	98
Total		**183**	**570**	**1950**	**2703**
Ad hoc study groups					**39**
Total number of working parties (excluding JTC1)					**2742**

Source: International Organization for Standardization. 1998. *ISO Memento*. Geneva: ISO Central Secretariat.

Table 4
Title, Number Designation, Year of Establishment, Secretariat, and USNC Level of Participation for IEC Technical Committees

Title and number designation of IEC TCs	Year of Establishment	Secretariat	U.S. Level of Participation
TC 1 Terminology	1908	France	P*
TC 2 Rotating Machinery	1939	United Kingdom	P
TC 3 Documentation and Graphical Symbols	1912	Sweden	N*
TC 4 Hydraulic Turbines	1911	Canada	P
TC 5 Steam Turbines	1927	United Kingdom	N
TC 7 Overhead Electrical Conductors	1919	United Kingdom	N
TC 8 Standard Voltages, Current Ratings and Frequencies	1919	Italy	N
TC 9 Electric Railway Equipment	1924	France	P
TC 10 Fluids for Electrotechnical Applications	1924	Italy	P
TC 11 Overhead Lines	1972	France	P
TC 13 Equipment for Electrical Energy Measurement and Load Control	1926	Hungary	P
TC 14 Power Transformers	1948	United Kingdom	P
TC 15 Insulating Materials	1952	Italy	P
TC 16 Basic and Safety Principles for Man-Made Interface, Marking, and Identification	1927	Germany	P
TC 17 Switchgear and Controlgear	1927	Sweden	P
TC 18 Electrical Installations of Ships and of Mobile and Fixed Offshore Units	1927	Norway	P
TC 20 Electric Cables	1933	United Kingdom	P
TC 21 Secondary Cells and Batteries	1931	France	P
TC 22 Power Electronics	1934	Switzerland	P
TC 23 Electrical Accessories	1934	Belgium	P
TC 25 Quantities and Units, and their Letter Symbols	1935	Italy	P
TC 26 Electric Welding	1936	Germany	P

TC 27 Industrial Electroheating Equipment	1937	Poland	N
TC 28 Insulation Coordination	1939	France	N
TC 29 Electroacoustics	1954	Denmark	P
TC 31 Electrical Apparatus for Explosive Atmospheres	1948	United Kingdom	P
TC 32 Fuses	1946	France	P
TC 33 Power Capacitors	1946	Italy	P
TC 34 Lamps and Related Equipment	1948	United Kingdom	P
TC 35 Primary Cells and Batteries	1950	Japan	P
TC 36 Insulators	1949	Germany	P
TC 37 Surge Arresters	1951	USA	P
TC 38 Instrument Transformers	1951	Italy	N
TC 39 Electronic Tubes	1952	Netherlands	P
TC 40 Capacitors and Resistors for Electronic Equipment	Not Available	Netherlands	P
TC 42 High-Voltage Testing Techniques	1949	Canada	P
TC 44 Safety of Machinery - Electrotechnical Aspects	1959	United Kingdom	P
TC 45 Nuclear Instrumentation	1960	Russian Federation	P
TC 46 Cables, Wires, Waveguides, R.F. Connectors, and Accessories for Communication and Signalling	1960	USA	P
TC 47 Semiconductor Devices	1961	USA	P
TC 48 Electromechanical Components and Mechanical Structures for Electronic Equipment	1961	USA	P
TC 49 Piezoelectric and Dielectric Devices for Frequency Control and Selection	1960	Germany	P
TC 51 Magnetic Components and Ferrite Materials	1958	Japan	P
TC 52 Printed Circuits	1954	USA	P
TC 55 Winding Wires	1962	France	P
TC 56 Dependability	1965	United Kingdom	P

TC 57 Power System Control and Associated Communications	1964	Germany	P
TC 59 Performance of Household Electrical Appliances	1964	Germany	P
TC 61 Safety of Household and Similar Electrical Appliances	1966	USA	P
TC 62 Electrical Equipment in Medical Practice	1968	Germany	P
TC 64 Electrical Installations and Protection Against Electric Shock	1967	Germany	P
TC 65 Industrial-process Measurement and Control	1968	France	P
TC 66 Safety of Measuring, Control and Laboratory Equipment	1992	United Kingdom	P
TC 68 Magnetic Alloys and Steels	1968	Germany	P
TC 69 Electric Road Vehicles and Electric Industrial Trucks	1969	USA	P
TC 70 Degrees of Protection Provided by Enclosures	1970	Germany	P
TC 71 Electrical Installations for Outdoor Sites under Heavy Conditions (Including Open-cast Mines and Quarries)	1971	Australia	N
TC 72 Automatic Controls for Household Use	1971	USA	P
TC 73 Short-circuit Currents	1972	Norway	N
TC 74 Safety and Energy Efficiency of IT Equipment	1972	USA	P
TC 76 Optical Radiation Safety and Laser Equipment	1974	USA	P
TC 77 Electromagnetic Compatibility	1973	Germany	P
TC 78 Live Working	1975	Canada	P
TC 79 Alarm Systems	1979	France	P
TC 80 Maritime Navigation and Radiocommunication Equipment and Systems	1980	United Kingdom	P
TC 81 Lightning Protection	1980	Italy	P

TC 82 Solar Photovoltaic Energy Systems	1981	USA	P
TC 85 Measuring Equipment for Electrical and Electromagnetic Quantities	1983	Hungary	P
TC 86 Fibre Optics	1984	USA	P
TC 87 Ultrasonics	1985	United Kingdom	P
TC 88 Wind Turbine Systems	1987	Netherlands	P
TC 89 Fire Hazard Testing	1988	Canada	P
TC 90 Superconductivity	1989	Japan	P
TC 91 Electronics Assembly Technology	1990	Japan	P
TC 92 Safety of Audio, Video and Similar Electronic Equipment	1990	Netherlands	P
TC 93 Design Automation	1992	USA	P
TC 94 All-or-nothing Electrical Relays	1992	Germany	N
TC 95 Measuring Relays and Protection Equipment	1992	France	P
TC 96 Small Power Transformers, Reactors and Power Supply Units: Safety Requirements	1993	France	P
TC 97 Electrical Installations for Lighting and Beaconing of Aerodromes	1994	France	P
TC 98 Electrical Insulation Systems (EIS)	1994	USA	P
TC 99 System Engineering and Erection of Electrical Power Installations in Systems with Nominal Voltages above 1kv A.C. and 1.5KV D.C., Particularly Concerning Safety Aspects	1994	Australia	P
TC 100 Audio, Video and Multimedia Systems and Equipment	1995	Netherlands	P
TC 101 Electrostatics	1996	Germany	P
TC 102 Equipment Used in Radio Communications for Mobile Services and for Satellite Communication Systems	1996	Japan	N
TC 103 Transmitting Equipment for Radiocommunication	1996	France	N

TC 104 Environmental Conditions, Classification and Methods of Test	1997	Sweden	P
TC 105 Fuel Cell Technologies	1998	Germany	P
TC 106 Testing Instrumentation and Methods of Measuring Electric and Magnetic Fields Associated with Human Exposure	1999	Canada	P
CISPR International Special Committee on Radio Interference	1934	United Kingdom	P

*P=Participant *N=Non-participant

Sources: 1) United States National Committee (USNC). 1999. *National Committee's Status Participation in TC/SC Work*. New York.

2) "Technical Committees and Subcommittees". *IEC Homepage*. <http://www.iec.ch/seatop-e.htm> (28 November 1999).

Table 5
Basic Data on ISO Member Bodies for the United States and the Top 10 U.S. Trading Partners
(information on abbreviations used can be found on the next page)

ISO Member Body Country - Abbreviated*	Legal Status of Member Body**	Annual Budget (1995) in Swiss Francs	Total Staff (Direct/Indirect Personnel)	Sources of Revenue (in %)***					Responsibilities ****							
				G	S	P	C	O	S	P	C	Q	M	E	T	R
Canada - SCC	PG	8,600,000	72	53	.1	27.9		19		!				!		
Japan - JISC	GD	31,000,000	95/170	100					!		!			!		!
Mexico - DGN	GD	258,090	482/240	100					!	!	!	!	!	!	!	
China - CSBTS	GD	2,857,000	350/21,000	100					!	!	!	!	!	!	!	
Germany - DIN	PS	129,000,000	825/351	16	18	53	4	9	!	!	!	!		!		!
United Kingdom - BSI	PL	172,900,000	1800	3.9	6.8	11.4	62.6	15.3	!	!	!	!		!	!	
#France - AFNOR	PG	103,000,000	598/250	22.3	77.7				!	!	!	!		!		
Korea - KATS	GD	31,818,182	329	100					!		!	!	!		!	!
Singapore - PSB	PL	55,061,600	1043	34.1	.4	.8	35.9	28.8	!	!	!	!	!	!	!	!
Italy - UNI	PG	17,624,000	106/40	32.2	19.9	35.3	1.4	11.2	!	!	!	!		!		
U.S.A. - ANSI	PS	24,000,000	110		43	34	4	19	!	!	!			!		

* Abbreviations of Member Bodies:
SCC - Standards Council of Canada
JISC - Japanese Industrial Standards Committee
DGN - Dirección General de Normas
CSBTS - China State Bureau of Technical Supervision
DIN - Deutsches Institut für Normung
BSI - British Standards Institute
AFNOR - Association Française de Normalisation
KATS - Korean Agency for Technology and Standards
PSB - Singapore Productivity and Standards Board
UNI - Ente Nazionale Italiano di Unificazione
ANSI - American National Standards Institute

**Designation of Legal Status of ISO Member Bodies:
GD - Governmental Department
PL - Organization Incorporated by Public Law
PG - Organization Incorporated by Private Law but granted official Recognition by a governmental authority
PS - Private Sector Organization

***Sources of Revenue:
G - Government Grants
S - Subscriptions
P - Publications
C - Certification/Testing
Q - Other

****Responsibilities
S - Standards Preparation
C - Certification
M - Metrology
T - Testing
P - Sale of Publications
Q - Quality Services
E - Education
A - Applied Industrial Research

- Taiwan is the sixth largest trading partner of the United States but does not have an ISO Member Body

Source: International Organization for Standardization. 1996. *ISO Members (Eighth Edition).* Geneva: ISO Central Secretariat.

Table 6
Development of ISO and IEC Standards

Stage 1: Proposal stage The first step in the development of an International Standard is to confirm that a particular International Standard is needed. A new work item proposal (NP) is submitted for vote by the members of the relevant TC/SC to determine the inclusion of the work item in the programme of work. The proposal is accepted if a majority of the P-members of the TC/SC votes in favor and at least five P-members declare their commitment to participate actively in the project. At this stage a project leader responsible for the work item is normally appointed.
Stage 2: Preparatory stage Usually, a working group of experts, the chairman (convener) of which is the project leader, is set up by the TC/SC for the preparation of a working draft. Successive working drafts may be considered until the working group is satisfied that it has developed the best technical solution to the problem being addressed. At this stage, the draft is forwarded to the working group's parent committee for the consensus-building phase.
Stage 3: Committee stage As soon as a first committee draft is available, it is registered by the ISO Central Secretariat/IEC Central Office. It is distributed for comments and, if required, voting, by the P-members of the TC/SC. Successive committee drafts may be considered until consensus is reached on the technical content. Once consensus has been attained, the text is finalized for submission as a draft International Standard (DIS).
Stage 4: Enquiry stage The draft International Standard (DIS) is circulated to all ISO member bodies/IEC National Committees by the ISO Central Secretariat/IEC Central Office for voting and comment within a period of five months. It is approved for submission as a final draft International Standard (FDIS) if a two-thirds majority of the P-members of the TC/SC are in favor and not more than one-quarter of the total number of votes cast are negative. If the approval criteria are not met, the text is returned to the originating TC/SC for further study and a revised document will again be circulated for voting and comment as a draft International Standard.
Stage 5: Approval stage The final draft International Standard (FDIS) is circulated to all ISO member bodies/IEC National Committees by the ISO Central Secretariat/IEC Central Office for a final Yes/No vote within a period of two months. If technical comments are received during this period, they are no longer considered at this stage, but registered for consideration during a future revision of the International Standard. The text is approved as an International Standard if a two-thirds majority of the P-members of the TC/SC are in favor and not more than one-quarter of the total number of votes cast are negative. If these approval criteria are not met, the standard is referred back to the originating TC/SC for reconsideration in the light of the technical reasons submitted in support of the negative votes received.

Stage 6: Publication stage Once a final draft International Standard has been approved, only minor editorial changes, if and where necessary, are introduced into the final text. The final text is sent to the ISO Central Secretariat/IEC Central Office which publishes the International Standard.
Review of International Standards (Confirmation, Revision, Withdrawal) All International Standards are reviewed at least once every five years by the responsible Technical Committee or Subcommittee.

Source: "Stages of the Development of International Standards". *ISO Homepage*. <http://www.iso.ch/infoe/proc.html> (12 December 1999).

Table 7
ISO TC and SC Secretariats Assumed by the United States Since January, 1988

ISO TC or SC	Title of Committee
JTC 1/SC 22	Information technology - Programming languages, their environments and systems software interfaces
JTC 1/SC 31	Information technology - Automatic identification and data capture techniques
JTC 1/SC 32	Information technology - Data Management Services
JTC 1/SC 34	Information technology - Document description and processing languages
TC 2/SC 9	Fasteners - Hose clamps
TC 8/SC 1	Shipbuilding - Lifesaving and fire protection
TC 8/SC 2	Shipbuilding -Marine environment
TC 8/SC 3	Shipbuilding - Piping and machinery
TC 17/SC 13	Steel - Railway rolling stock material
TC 18/SC 3	Zinc - Primary zinc
TC 20/SC 13	Aircraft and space vehicles - Space data and information transfer systems
TC 20/SC 14	Aircraft and space vehicles - Space systems and operations
TC 21/SC 5	Equipment for fire protection and fire fighting - Fixed fire extinguishing systems
TC 38/SC 11	Textiles – Care labeling of textiles and apparel
TC 38/SC 19	Textiles - Burning behavior of textiles and textile products
TC 38/SC 22	Textiles - Product specifications
TC 39/SC 2	Machine tools - Test conditions for metal cutting machine tools
TC 44/SC 4	Welding and allied processes - Welding and allied process/Arc welding equipment
TC 44/SC 5	Welding and allied processes - Testing inspection of welds
TC 59/SC 2	Building construction - Terminology, symbols and unification of language
TC 60	Gears
TC 67	Materials, equipment and offshore structures for petroleum and natural gas industries
TC 67/SC 4	Materials, equipment and offshore structures for petroleum and natural gas industries - Drilling and production equipment
TC 68/SC 2	Banking, securities and other financial services - Security management and general banking operations
TC 69/SC 4	Applications of statistical methods - Statistical process control
TC 71	Concrete, reinforced concrete and prestressed concrete
TC 71/SC 4	Concrete, reinforced concrete and prestressed concrete - Harmonization of performance requirements for concrete structures
TC 72/SC 3	Textile machinery and machinery for dry-cleaning and industrial laundering - Machinery for fabric manufacture

ISO TC or SC	Title of Committee
TC 72/SC 7	Textile machinery and machinery for dry-cleaning and industrial laundering - Data Interfaces for Monitoring and Control of Textile Machinery
TC 86	Refrigeration
TC 86/SC 2	Refrigeration - Terms and definitions
TC 92/SC 2	Fire safety - Fire tests on building materials, components and structures - Fire resistance
TC 94/SC 1	Personal safety - Protective clothing and equipment - Head protection
TC 106/SC 8	Dentistry - Dental implants
TC 107	Metallic and other inorganic coatings
TC 107/SC 3	Metallic and other inorganic coatings -Electrodeposited coatings and related finishes
TC 108/SC 5	Mechanical vibration and shock - Condition monitoring and diagnostics of machines
TC 110/SC 1	Industrial trucks – General terminology
TC 112	Vacuum technology
TC 112/SC 1	Vacuum technology - Vacuum flanges and fittings
TC 113/SC 5	Measurement of liquid flow in open channels - Flow measuring instruments and equipment
TC 113/SC 8	Measurement of liquid flow in open channels - Hydrometric determinations – Ground water
TC 115/SC 3	Pumps – Installation and application
TC 121/SC 6	Anaesthetic and respiratory equipment - Medical gas systems
TC 131/SC 1	Fluid power systems – Terminology, classification and symbols
TC 131/SC 9	Fluid power systems – Installations and systems
TC 135/SC 8	Non-destructive testing - Infrared thermography for non-destructive testing
TC 145/SC 3	Graphic symbols for use on equipment
TC 146/SC 5	Air quality - Meteorology
TC 150/SC 5	Implants for surgery - Osteosynthesis
TC 150/SC 6	Implants for surgery - Active implantable medical devices
TC 160/SC 2	Glass in buildings -Use considerations
TC 164/SC 5	Mechanical testing of metals - Fatigue testing
TC 166	Ceramic ware, glassware and glass ceramic ware in contact with food
TC 171/SC 2	Micrographics and Optical Memories for Document and Image Recording, Storage and Use - Applications
TC 185	Safety devices for protection against excessive pressure
TC 198	Sterilization of health care products
TC 201/SC 1	Surface chemical analysis - Terminology
TC 201/SC 2	Surface chemical analysis - General procedures

ISO TC or SC	Title of Committee
TC 201/SC 5	Surface chemical analysis - Auger electron spectroscopy
TC 202/SC 1	Microbeam analysis - Terminology
TC 202/SC 3	Microbeam analysis - Analytical electron microscopy
TC 204	Transport information and control systems
TC 205	Building environment design
TC 207/SC 4	Environmental management – Environmental performance evaluation
TC 209	Cleanrooms and associated controlled environments
TC 210	General aspects for health care products
TC 212	Clinical laboratory testing and invitro diagnostic test systems
TC 214	Elevating work platforms
TC 215	Health informatics

Source: ANSI files.

Table 8
ISO TC and SC Secretariats Relinquished by the United States Since January, 1988

ISO/TC or SC	Title of Committee
JTC 1/SC 18	Information technology - Text and office systems
JTC 1/SC 21	Information retrieval, transfer and management for open systems interconnection (OSI)
TC 2/SC 8	Fasteners - Retaining rings
TC 10/SC 3	Graphical symbols and identification for process measurement and control (joint committee ISO/TC 10/SC 3 and IEC/TC 65/WG 5)
TC 22/SC 20	Road vehicles – Identification of vehicles
TC 45/SC 4	Rubber and rubber products – Miscellaneous products
TC 61/SC5	Plastics – Physical-chemical properties
TC 67/SC 9	Materials, equipment and offshore structures for petroleum and natural gas industries - Wellhead equipment and pipeline valves
TC 102/SC 3	Iron ores – Physical testing
TC 131/SC 6	Fluid power systems – Fluids
TC 131/SC 7	Fluid power systems – Sealing devices
TC 144/SC 1	Air distribution and air diffusion – Aerodynamic testing and rating of air terminal devices
TC 153	Valves
TC 159/SC 3	Ergonomics – Anthropometry and biomechanics
TC 161	Control and safety devices for non-industrial gas-fired appliances and systems
TC 185/SC 3	Safety valves and bursting disc devices in combination
TC 200	Solid wastes

Source: ANSI files.

Table 9
IEC TC and SC Secretariats Assumed by the USNC Since December, 1986

IEC TC or SC	Title of Committee
SC 15C	Specifications
SC 31L	Electrical Apparatus for the Detection of Flammable Gases
SC 37B	Specific Components for Surge Arresters And Surge Protective Devices
TC 47	Semiconductor Devices
SC 47D	Mechanical Standardization of Semiconductor Devices
SC 61F	Safety of Hand-held Motor-operated Electric Tools
SC 62A	Common Aspects of Electrical Equipment Used in Medical Practice
SC 65D	Analyzing Equipment
TC 69	Electric Road Vehicles and Electric Industrial Trucks
TC 86	Fibre Optics
SC 86C	Fibre Optic Systems and Active Devices
TC 93	Design Automation
TC 98	Electrical Insulation Systems (EIS)

Source: United States National Committee (USNC). 1999. *Secretariats of IEC TCs and SCs*. New York.

Table 10
IEC TC and SC Secretariats Relinquished by the United States Since December, 1986

IEC TC or SC	Title of Committee
TC 4	Hydraulic Turbines
TC 5	Steam Turbines
TC 25	Quantities and units and their letter symbols
SC 46B	Waveguides and their accessories
SC 59A	Electric dishwashers
SC 61B	Safety of microwave ovens
TC 85	Measuring equipment for electrical and electromagnetic quantities

Source: United States National Committee (USNC). 1999. *Secretariats of IEC TCs and SCs*. New York.

Table 11
Correlation of ISO and IEC TCs with the Top 5 Manufacturing (Durable and Non-durable Goods) Categories Based on Gross Domestic Product

Note:

· Tables 2 and 4 in the Appendix contain information on titles of ISO and IEC TCs and information on the status of US activity in each TC
of each ISO or IEC committee referenced below.

1. Industrial Machinery and Equipment
Gross Domestic Product by Industry in Current Dollars 1997 (Billions of Dollars): 158.9

Computers and computer peripherals (Includes PCs; PC servers; scanners; printers; network equipment; CD Rom drives; hard drives; laptops; notebooks)	ISO/IEC JTC1 ISO/TC 159 IEC/TC 74
Electrical power systems (Includes process controls and instrumentation; maintenance software; cogeneration systems; digital simulation tools; nuclear, thermal, and hydro power generating equipment; heavy electrical power equipment)	ISO/TC 85; ISO/TC 180 ISO/TC 197; IEC/TC 11 IEC/TC 13; IEC/TC 14 EC/TC 17; IEC/TC 18 IEC/TC 21; IEC/TC 22 IEC/TC 32; IEC/TC 33 IEC/TC 35; IEC/TC 37 IEC/TC 40; IEC/TC 46 IEC/TC 52; IEC/TC 55 IEC/TC 57; IEC/TC 82 IEC/TC 95; IEC/TC 96 IEC/TC 99; IEC/TC 105
Heating and cooling equipment	ISO/TC 86; ISO/TC 116
Pollution control equipment (Includes air emissions control equipment and systems; dust collectors; hazardous and toxic waste management equipment; incineration equipment for medical waste; solid waste recycling equipment; vapor recovery systems)	ISO/TC 142 ISO/TC 144
Oil & gas field machinery (Includes pumps; valves; compressors; drilling equipment; flow and pressure control equipment; floating production platforms; hub-and-spoke collection systems)	ISO/TC 67
Construction equipment	ISO/TC 96; ISO/TC 127 ISO/TC 214
Security and safety equipment (Includes security locks; burglary and fire alarms; optical scanners; card key and magnetic entry devices)	ISO/IEC JTC1; ISO/TC 21 ISO/TC 74; ISO/TC 79 IEC/TC 89
Mining equipment	ISO/TC 82

Pumps, valves, and compressors	ISO/TC 115;ISO/TC 118 ISO/TC 153; ISO/TC 185
Machine tools and metalworking equipment (Includes semiconductor dry etching machines and laser; light or photon beam processing machines; metal molding machines)	ISO/TC 39 ISO/TC 199 IEC/TC 44
General industrial equipment (Includes bearings; fasteners; industrial process heaters; commercial and industrial cleaners; belts; hoses; fittings; lubricants; hand tools)	ISO/TC 1; ISO/TC 2 ISO/TC 4; ISO/TC 5 ISO/TC 11; ISO/TC 14 ISO/TC 28; ISO/TC 29 ISO/TC 41; ISO/TC 58 ISO/TC 60; ISO/TC 91 ISO/TC 100; ISO/TC 109 ISO/TC 111; ISO/TC 112 ISO/TC 117; ISO/TC 118 ISO/TC 131; ISO/TC 192 ISO/TC 220
Materials handling equipment (Includes belt and bucket elevators; containers; conveyors and conveyor belts; cranes and mobile cranes; pallets; ship loading and unloading elevators	ISO/TC 51; ISO/TC 96 ISO/TC 100; ISO/TC 101 ISO/TC 104; ISO/TC 110 ISO/TC 122

2. Chemicals and Allied Products
Gross Domestic Product by Industry in Current Dollars 1997 (Billions of Dollars): 158.8

Top 41 U.S. Exports Included in this Category	Related ISO/IEC Technical Committees
Industrial chemicals (Includes photochemicals; raw materials and intermediaries for the pharmaceutical industry; dyes and pigments; dye carriers; food emulsifiers; preservatives and additives)	ISO/TC 35 ISO/TC 47
Drugs and pharmaceuticals	
Cosmetics and toiletries	ISO/TC 218
Agricultural chemicals	ISO/TC 81; ISO/TC 134

3. Electronic and other electrical equipment
Gross Domestic Product by Industry in Current Dollars (Billions of Dollars): 157.3

Top 41 U.S. Exports Included in this Category	Related ISO/IEC Technical Committees
Electronic components	IEC/TC 7; IEC/TC 23

Top 41 U.S. Exports Included in this Category	Related ISO/IEC Technical Committees
Telecommunications equipment (Includes fixed and mobile radio transmitters and receivers; analog and digital multiplexers; fiber-optic cable; mobile phones)	ISO/IEC JTC1 IEC/TC 74 IEC/TC 102 IEC/TC 103
Airport and ground support equipment	ISO/TC 20; IEC/TC 97
Films, videos, and other recordings	ISO/TC 36; IEC/TC 92 IEC/TC 100

4. Motor Vehicles and other transportation equipment
Gross Domestic Product by Industry in Current Dollars (Billions of Dollars): 136.1

Top 41 U.S. Exports Included in this Category	Related ISO/IEC Technical Committees
Aircraft and associated equipment	ISO/TC 20; IEC/TC 97
Motor vehicle parts and accessories	ISO/TC 22; ISO/TC 31 ISO/TC 70; IEC/TC 69
Autos and light trucks	ISO/TC 22; ISO/TC 110 IEC/TC 69

5. Fabricated metal products
Gross Domestic Product by Industry in Current Dollars (Billions of Dollars): 99.3

Top 41 U.S. Exports Included in this Category	Related ISO/IEC Technical Committees
Security and safety equipment (Includes security locks; burglary and fire alarms; optical scanners; card key and magnetic entry devices)	ISO/IEC JTC1 ISO/TC 21; ISO/TC 74; IEC/TC 79; IEC/TC 89

Sources: 1) Sector Map prepared for December 13-14, 1999 National Standards Strategy meeting.
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