Chapter 4

Structural Changes in the Standards Setting Environment

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Throughout history, social institutions evolved in response to changing environments. Those that failed to adapt fell by the wayside; those that took advantage of a changing situation took the lead.[1] This rise and fall of institutions occurs because the conditions for success--or comparative advantage—vary according to circumstances. What works well in one case, will not necessarily succeed in another.[2] Thus, for example, the U.S. economy gained advantage over many European economies during the industrial era because mass production required a large market, which existed in the United States.[3] Today, however, the United States may lose this advantage because market conditions now require small batch, flexible, industrial processes that differ from traditional U.S. processes.[4] Similarly, although the British economy was successful in the nineteenth century, it declined in the twentieth because, unlike the Germans and others,[5] the British failed to anticipate the emergence of new markets and the growing importance of knowledge resources.[6]

Today, a number of structural changes are taking place in the standards setting environment. U.S. standards setting bodies must address these if they are to serve the needs of American industries and the Nation as a whole. To fully appreciate the implications of these changes, one needs to examine these trends and how they might affect the international standards setting arena.

The Emergence of a Global Economy in Which the United States No Longer Plays the Predominate Role

Key among the developments affecting standards setting is the emergence of a global economy in which the United States no longer plays the predominant role.[7] In a global economy, all nations are interdependent. They depend on one another not only for exports and imports, but also to support the international institutional mechanisms that enable such exchange. Standards are critical both to national economic performance as well as the function-

[1] As Andrew Schotter has pointed out:

> Economic and social systems evolve the way species do. To ensure their survival and growth, they must solve a whole set of problems that arise as the systems evolves. Each problem creates the need for some adaptive feature, that is, a social institution. Every evolutionary economic problem requires a social institution to solve it. . . . Those societies that create the proper set of social institutions survive and flourish; those that do not, falter and die. The distressing fact is that what is functional to meet today 'sproblems may be totally inadequate in meeting the tests our society faces tomorrow.

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

[2] As described by Polanyi:

> A nation may be handicapped in its struggle for survival by the fact that its institutions, or some of them, belong to a type that happens to be on the down grade-the gold standards in World War II was an instance of such an antiquated outfit. Countries, on the other hand, which, for reasons of their own are opposed to the *status quo,* would be quick to discover the weaknesses of the existing institutional order and to anticipate the creation of institutions better adapted to their interests.

Karl Polanyi, *The Great Transformation: The Political and Economic Origins of our Time* (Boston, MA: Beacon Press, 1957), p. 28.

[3] See ch. 2.

[4] Piore and Sable estimate, for example, that in the 1970s, roughly 70 percent of all products in the metalworking sector consisted of small batches. See Michael J. Piore and Charles F. Sabel, *The Second Industrial Divide: Possibilities for Prosperity (New* York, NY: Basic Books, 1984), p. 26.

[5] It was during the late 1980s, for example, that the Germans established a number of major research universities, which had an industrial as well as research orientation. Many American universities, such as John Hopkins, began to follow suit. For a discussion, see Edward Shils, "The Order of Learning in the United States from 1865-1920: The Ascendancy of the Universities," *Minerva,* vol. 16, No. 2, summer, 1978.

[6] According to James Beckford, for example:

> Current thinking about the performance of the British economy in the twentieth century is that the process of secular decline relative to some other Western European countries, Japan, and the United States had its origins in the failure to plan adequately for the efficient exploitation of new markets and new resources in the late nineteenth century. The results of a rather rigid adherence to laissez-faire doctrines were evident even before World War I in a relative slowness to appreciate the importance of technical and scientific education, training, business studies and labor relations. . . . At present, the United Kingdom's weakness in industrial productivity is largely responsible for a serious decline in the country's living standards in comparison with those of other advanced industrial societies.

James Beckford, "Great Britain: Voluntarism and Sectional Interests," Robert Wuthrow (cd.),*Between States and Markets: The Voluntary Sector in Comparative Perspective* (Princeton, NJ: Princeton University Press, 1991), p. 33.

[7] For a discussion of U.S. hegemony and the implications for the world economy, see Charles Kindelberger, "Dominance and Leadership in the International Economy: Exploitation, Public Goods, and Free Rides,' *International Studies Quarterly, vol.* 27, pp. 242-254.

ing of the international marketplace. This means standards making bodies—at all jurisdictional levels—have a major role to play. However, greater resources will be needed in the international arena, since, in a global economy, domestic economic performance is increasingly dependent on the international marketplace.

From the U.S. perspective, the beginning of a global economy can be traced back to the end of the 19th century when large, multifunctional corporations emerged, many with branches or subsidiaries abroad. These firms became highly successful. Being the first of their kind, they used their size and complex corporate structures as barriers to late-coming rivals.[8] U.S. multinational firms had an advantage over their European counterparts, who were constrained in their operations by their much smaller domestic markets and, unlike American companies, were unaccustomed to competing on the basis of improved efficiency and cost reductions.[9]

As European and Japanese economies recovered from World War II and managed to overcome the U.S. technological lead, however, this pattern of U.S. economic hegemony shifted significantly, and American multinationals increasingly found themselves competing intensely with their European and Japanese counterparts.[10] Japanese corporations, benefiting from their export-oriented industrial policy, have been particularly successful in their efforts to establish international connections by investing and producing abroad.[11]

The integration of the international economy has been facilitated and fostered by a number of developments. These include:[12]

- the growing similarity of countries, both with respect to taste as well as to infrastructure, distribution channels, and marketing approaches;
- the emergence of a global capital market as witnessed by large flows of funds between countries;
- declining tariff barriers and the establishment of regional trading agreements;
- shifting opportunities for competitive advantage due to technology restructuring;
- the integrating role of advanced information and communication technologies;
- slow and uneven world economic growth that has fanned the flames of international competitiveness; and
- the emergence of new global competitors, principally from East Asia.

Together, these developments have given rise to a global economy in which patterns of international trade now primarily reflect patterns of international production. Specialization takes place on the basis of parts and specialized components, rather than on the exchange of finished products as in the past. Thus, interfirm and intrafirm trade is steadily replacing interindustry trade.[13] Today, for example, Japan provides approximately 40 percent of U.S. component parts in electronics and automobiles.[14]

Patterns of direct investment abroad also highlight this trend towards global economic integration

[8] Alfred D. Chandler, Jr., 'The Evolution of Modem Global Competition,'' Michael E. Porter (cd.), *Competition in Global Industries* (Boston, MA: Harvard Business School Press, 1986), pp. 408-409.

9 As Chandler has pointed out:

> In Europe, the lack of antitrust legislation meant that market power was achieved and maintained in the domestic market far more by contractual cooperation than through functional and strategic differences. In those British industries where a single firm did not dominate, federations of relatively small, usually family enterprises, normally in the form of holding companies, maintained agreement as to price, output and marketing territories.

Ibid.

> Because of the dominant position of American firms, the term "multinational corporation" originally was, according to Robert Gilpin, "a euphemism for the foreign expansion of American giant oligopolistic corp." The strength of the U.S. economic position was reflected by the fact that, in 1981, more than two-fifths of the world's direct foreign investment was accounted for by the United States, with the bulk of it being invested in advanced manufacturing. Moreover, foreign investment and the activities of American multinationals were increasingly critical to the U.S. economy in that, in the early 1970s, a sizable number of American corporations held more than $500 billion of their assets and gained more than one-half of their earnings abroad. Robert Gilpin, *The Political Economy of International Relations* (Princeton, NJ: Princeton University Press, 1987), p. 238.

10 Chandler, op. cit., footnote 8, p. 240.

11 Chandler, op. cit., footnote 8, p. 5.

12 Michael Porter (cd,), *Competition i„ Global Industries* (Boston, MA: Harvard Business School Press, 1986), pp. 2-3.

13 Gilpin, op. cit., footnote 9 p. 238. See also Jack N. Behrman, *Industrial Policies: International Restructuring and Transnationals* (Lexington, MA: Lexington Books, 1984).

14 Porter, op. cit., footnote 12, p. 225.

and interdependence. Between 1960 and 1988, for example, direct investment abroad by all firms in all nations increased by over 10 percent, to over $1.1 trillion.[15]

This trend is especially pronounced in the United States, where foreign direct investment increased during the same period faster than the world average—from $9.9 to $328.9 billion, or 18 percent per year. Moreover, foreign direct investment accounted for 3.4 percent of Gross National Product (GNP) in 1987, as compared to 1.8 percent a decade earlier.[16]

To date, the United States has not done well in this changing economic environment. The impact of foreign competition can be seen, for example, by examining the combined data on U.S. share of world imports and exports, with figures on the proportion of U.S.-made goods in domestic consumption. From these data, it is clear that the United States has lost world market share, for example, in merchandise. The situation is the same, moreover, in the case of microelectronics [17] (see table 4-l). As a recent OTA study concludes: "At least in the most important sectors, U.S. companies are not holding their own against foreign competition. ' '[18]

How the United States fares in this global economy depends not only on trade but also on standards, many of which will be established by other countries or in the international standards setting arena.[19] The role of standards in this equation for success is on the rise. In 1977, for examples, it was estimated that, for the year 1977, $69 billion of U.S. exports were subject to standards activity. No comparable figure is available today. However, it is estimated that of $83 billion in exports of manufactured goods to the European Economic Community (EEC) in 1990, some $48 billion is, or will, be subject to EEC product safety standards alone.[20]

Table 4-1—U.S. Share of World Imports and Exports

Year	Percent of imports	Percent of exports
1970	12.9	13.8
1973	12.4	12.4
1975	11.7	12.7
1977	13.6	10.8
1978	13.8	11.1
1979	13.1	11.1
1980	12.5	11.1
1981	13.4	11.9
1982	13.4	11.6
1983	14.4	11.1
1984	17.2	11.5
1985	17.9	11.1
1986	17.5	10.3

SOURCE: United Nations, Department of International and Social Affairs, 1985/86 *Statistic/ Yearbook,* 35th issue (New York, NY: United Nations, 1988).

The growth of imports also enhances the value of international standards. In 1990, 7.3 percent of Gross Domestic Product (GDP) and 38 percent of manufacturing were dependent on imports.[21] Imported products, many of which are component parts, must conform to standards that meet the needs of both foreign producers as well as manufacturers in the United States. Moreover, standards will need

15 U.S. Congress, Office of Technology Assessment *Competing Economies: America, Europe, and the Pacific Rim,* OTA-ITE-498 (Washington, DC: U.S. Government Printing Office, October1991), p. 26.

16 Ibid.

17 As OTA points Out:

> In microelectronics, Japanese manufacturers dominate world markets and technology developments in many products, starting with DRAM chips in early 1980s. Japanese manufacturers have challenged the American leaders in computers throughout the market, from laptop PCs to supercomputers, and few believe that they have reached their limit. After having pioneerescientific work in superconductivity. . ., Americans and Europeans have watched Japanese companies take solid steps to incorporating superconducting materials in commercial products. Andin high-resolution television, American companies have been mostly spectators in a game that involves European companies and governments struggling to catchup to the Japanese.

U.S. Congress, Office of Technology Assessment,*Competing Economies: America, Europe, and the Pacific Rim, OTA-ITE-498* (Washington DC: Government Printing Office, October 1991), pp. 123-124. The President's Council on Competitiveness drew a similar conclusion in its report, *Gaining New Ground: Technology Priorities for America's Future,* (Washington, DC: U.S. Government PrintingOffice, March 1991).

18 According to OTA "at least in the most important sectors U.S. Companies are not holding their own against foreign competition. In particular, American companies are beleaguered by Japanese competition." OTA op. cit., footnote 17, p. 5.

19 The number of participants involved in standards development within ISO is estimated to have increased from 50,000 in 1972 to 1(X),000 today. And the number of standards approved has increased from 2,000 in 1972 to 7,500 by 1985. Stanley H. Besen and Garth Saloner, "The Economics of Telecommunication Standards," R. Crandell and K. Flamm, *Technology and Government Policy in Computers and Telecommunications* (Washington, DC: Brookings Institute, 1989), p. 26.

20 This figure was provided by the Department of Commerce.

21 OTA op. cit., footnote17, p. 94.

to be made available to producers in a timely and efficient manner.

Failure to understand the implications of international standards can have serious consequences for U.S. industry. The U.S. machine tool industry is a case in point. For years, the industry was able to thrive without regard to international standards. Industry practices became de facto standards because the U.S. market for machine tools was so large. In a global market, where there is intense foreign competition, this is no longer possible. Not being involved in the development of international standards or experienced in producing products to foreign specifications, the U.S. industry has lost its competitive edge.[22] The Japanese, on the other hand, have gained considerable ground in the international market, in part by more effectively using standards to improve productivity and add value to their products.[23] Concerned about the fate of the machine tool industry, President Bush recently agreed to approve a 2-year voluntary restraint agreement on machine tools, which limits imports from Taiwan and Japan, to allow time for the industry to become revitalized.[24]

Although considerably more future standards work will take place in the international arena, it is not clear that the United States will have an effective presence there. The United States has been slow to appreciate the growing importance of international standards. Some say, for example, that U.S. standards bodies lost a tremendous opportunity in the early post-World War II years, when European standards institutions were still in a state of disarray.[25] Europeans, themselves, complain about the failure of the United States to make a real commitment to international standards. Some even suggest that U.S. involvement in the past was counterproductive. Americans, they say, were playing for much lower stakes than the Europeans, since standards implementation in the United States is voluntary, but compulsory in Europe. To the Europeans, therefore, U.S. participation sometimes appears perfunctory, if not at times obstructionist.[26]

The United States may also have considerably less influence than in the past to determine the character of international standards institutions.[27] The United States was able to play the dominate role in defining the post-World War H international economic order because of factors, many of which no longer exist, such as American economic and military preeminence, the threat of a common

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22 As the Chief Executive Officer of Cincinnati Milacrom described the situation to members of his industry, "Your competitors are global, your suppliers, your standards, your designs, your issues, your policies, your strategies—they all must become global. Technology is not a provincial field any more. [Industry must implement] radical measures.' "Cincinnati Milacrom hairman Issues Stern Warning to U.S. Manufacturers," New *Technology Week, Nov. 18, 1991,* p. 4.

23 Michael L. Dertourzos et al., *Made in America: Regaining the Productive Edge* (Cambridge, MA: MIT Press, 1989), pp. 241-242.

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

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

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

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

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

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

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

Gilpin, op. cit. footnote 9, p. 5.

enemy, as well as relatively steady economic growth.[28] To affect standards processes in an international environment in which economic and political resources are now both better balanced and dispersed, the United States must exert greater effort and resources, as well as negotiate and compromise, more than ever before.

Rallying sufficient resources for this task will be difficult. The potential for market failures at the international level is high, since many American companies, especially in the small business community, do not recognize the implications of international standards in a global economy. By the time they realize the potential consequences, damage to the national economy may already be done. A key factor in determining outcomes in standards development bodies is the amount of resources and skills that participants contribute.[29] American participants must pay their own way, but participants from other countries are generally supported, at least in part, by their national governments.

The costs of international standards development and the expense of participating in the process is also a limiting factor. It has been estimated, for example, that the development of a major international telecommunications standard may require perhaps 1,000 person-years of experience, 20 person-years of actual effort, and $3 million.[30] Distributing standards information across national boundaries, when it requires cultural, political and language translation, is also costly.

If sufficient resources are brought to bear in the international arena, the payoff would likely be great. U.S. companies, which are no longer dominant in the market, and hence unable to set de facto standards, will benefit from a standards setting process where influence is not based solely on market power.[31] Equally important, signatories of the General Agreement on Tarriff and Trade (GATT) Standards Code[32] have pledged to adopt international standards, where they exist. Thus, if the United States supports the timely development of standards in international standards bodies, it may preclude the Europeans and others from using regional standards to restrict trade.

Increased Competitiveness and Greater State Involvement in Promoting National Economies

Even as the international marketplace becomes more integrated, the political and ideological framework that governed the post-war international order is coming apart. A revival of 19th century mercantalist philosophy and practice has been filling the gap. Acutely aware of the growing linkages between national economic well being and performance in the international marketplace, many governments are adopting policies to assure that their industries compete successfully. Standards and standards processes provide useful mechanisms to advance national industrial policies. Thus, they must be viewed in the context of an increasingly competitive, global environment.

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28 As described by Gilpin:

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

Gilpin, op. cit., footnote 9, p.344.

29 See Martin B.H. Weiss and Marvin Sirbu, "Technological Choice in Voluntary Standards Committees: An Emperial Analysis," *Economics of Innovation and New Technology,* vol. 1, No. 1/2, 1988), pp. 111-132.

30 Odo J. Struger, "Impact of International and Foreign Standards on a Company's Operations," presentation Aug. 20, 1991, p. 6.

31 See for discussion, Joseph Farrell and Garth Saloner, "Competition% Compatibility, and Standards: The Economics of Horses, Penguins and Lemmings," H. Landis Gabel (cd.), *Product Standardization and Competitive Strategy (North* Holland: Elsevier Science Publishers, 1987), pp. 1-21; See also, William Lehr, "The Case of Two Data Transport Standards: IEEE's 908.6 Metropolitan Area Network (MAN) versus the ANSi X3's Fiber Distributed Data Interface (FDDI), paper presented to the nineteenth annual Telecommunications Policy Research Conference, Session on the Economics of Networks and Standardization, Solomon Island, MD, Sept. 30, 1991.

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

Standards for Industrial Policy

Mercantilism--the policy of state intervention in the economy—has a long history, which can be traced in Europe back to the development of national markets. Using their sovereign authority to establish national markets, European monarchs sought to control their impacts through regulation.[33] Although the policy of mercantilism was disavowed in England during the industrial revolution,[34] it remained entrenched on the continent, providing the successful blueprint for German industrialization at the end of the 19th century .35 Even in the United States, mercantilism continued to find a receptive audience throughout the first half of the nineteenth century.[36]

The decline of mercantilism after the Second World War was due, in part, to widespread disillusionment with the statist approach, which was carried to extreme in Fascist Italy and Nazi Germany. Equally important was the influential role played by the United States in reconstructing the post-war international economy based on the principles of trade liberalization and a stabilized monetary order supported by fixed exchange rates.[37]

The two pillars on which this system was based were the Bretton Woods monetary system, established at the Bretton Woods Conference in 1944, and the General Agreement on Tariffs and Trade (GATT) adopted in 1948.[38] The post-win international economic system was successful, so long as it was considered mutually beneficial.[39] Strains in the system became apparent, however, in the early 1970s, when the dollar started to diverge significantly from other currencies.[40] In August 1971, President Richard M. Nixon unilaterally suspended convertibility of the dollar and established a surcharge on U.S. imports, which was designed to force the reevaluation of European and Japanese currencies.[41] In 1973, the United States abandoned the Bretton Woods monetary system when it shifted to flexible exchange rates.

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33 & described by Polayni:

> Deliberate action of the state in the fifteenth and sixteenth centuries foisted the mercantile system on the fiercely protectionist towns and principalities. Mercantilism destroyed the outworn particularism of local and intermunicipal trading by breaking down the barriers separating these two types of noncompetitive commerce and thus clearing the way for a national market. . . . The "freeing" of trade performed by mercantilism merely liberated trade from particularism, but at the same time extended the scope of regulation. The economic system was submerged in general social relations: markets were merely an accessory feature of an institutional setting controlled and regulated more than ever by social authority.

Polanyi, op. cit., footnote 2, pp. 65-67.

34 The end of mercantilism in England is usually associated with the passage of the Reform Act of 1832, and the Poor Law Amendment of 1834.

35 For the classic account of use of state power to establish capitalism in Imperial Germany, see Thorstein Veblen, *Imperial Germany and the Industrial Revolution (New* York, NY: Viking Press, 1939).

36 See, for example, Forrest McDonald, who notes:

> That period [when the Constitution was adopted] was one of transition from ancient zero-sum conceptions of economic activity to modern growth-oriented conceptions. Precapitalism and anticapitalistic values, attitudes, and institutions, rooted in the feudal past, were far from dead in America, and those of mercantilism—a system in which economic activity was regulated by the state as a means of aggrandizing the international power and prestige of the state-were in full bloom. The new values, looking to free trade, entrepreneurship, and a market economy, were, with few exceptions, little more than a gleam in the eyes of a few advanced thinkers. The establishment of the Constitution thus was a benchmark in the evolution of systems of political economy, for it made possible-not inevitable—the transformation from the old order to the new.

Forrest McDonald, "The Constitution and Hamiltonian Capitalism," Robert A. GoldWin and William A. Schambra (eds.), *How Capitalistic Is the Constitution* (Washington, DC: American Enterprise Institute, 1984), p. 50.

37 See John Gerard Ruggie, "International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic order," *International Organizations,* vol. 36, pp. 379-415.

38 GATT was designed to achieve "freer and fairer trade' by providing an agreed on set of universal rules for conducting commercial policy. These incorporated three basic principles: 1) nondiscrimination, multilateralism, and the application of the Most Favored Nation Principle to all signatories; 2) expansion of trade through the reduction of trade barriers; and 3) unconditional reciprocity among all signatories. See, Marina v. N. Whitman, "Sustaining the International Economic System: Issues for U.S. Policy," *Essays in International Finance, No. 121.*, Department of Economics, Princeton University, p. 28.

39 It was hoped that the system would be flexible enough so that nations could pursue their domestic policies while still operating by the rules Of the game. Ruggie, op. cit., footnote 37.

40 Gilpin, op. cit., footnote 9, pp.140-142.

41 The unilateral act was greatly resented by the other members of the Bretton Woods accord, They complained that the United States preferred to abandon the system, rather than have its freedom of action curtailed. From the American point of view, as defined by a former government official, "the growing economic and political strength of Europe and Japan made the Bretton Woods system obsolete." As cited in, Robert O. Keohane, "The International Politics of Inflation," Leon N. Lindberg and Charles S. Maier (eds.), *The Politics of Inflation and Economic Stagnation: Theoretical Approaches and International Case Studies* (Washington DC: Brookings Institute, 1985), p. 97.

At the same time, protectionism was also on the rise.Az **Exceptions and escape** clauses were built into the GATT, and nations began to resort to them at an increasing rate.[43] Even when GATT's efforts to reduce tariff barriers were successful, they were often countered by the growing popularity and use of barter agreements and nontariff trade barriers.[44] Thus, the ratio of managed to total trade increased from 40 to 48 percent between 1974 and 1980. This percentage would be even greater had intrafirm trade between multinational corporations been considered.[45]

Retreating further from the post-war international economic system, many governments adopted industrial policies to improve their economy's comparative advantages. Japan's remarkable success, and that of several newly industrializing countries, rekindled an interest in mercantilism. Economic activity became increasingly politicized as the positive effect that government intervention on behalf of a nation's economy became apparent. When other nations, following Japan's lead, began competing aggressively for the same value-added, high-technology market, international trade became a zero-sum game.

The result is a highly competitive, global economy, in which multinational corporations are aided in their competitive endeavors by increasingly protectionist and interventionist policies of their home governments. Whereas in the past protectionist policies generally were intended to protect an infant or declining industry, today they are calculated to enhance or create a comparative advantage--especially in high technology, high value-added industries.[46] To the extent that governments can alter industry advantages, one can no longer view comparative advantage in the classic, economic sense, which calls for free trade.[47] Furthermore, these competitive policies are self-reinforcing. Because many countries are focusing their industrial policies to support the same sectors, there tends to be overproduction in these areas and, hence, increased pressure for protectionist policies.[48]

This atmosphere is not conducive to global solutions. When cooperation between nations is deemed appropriate, it increasingly takes the form of regionalism. Thus, in addition to the European Common Market, there now exists a Pacific trading area, a North American Trading Area, and-if all goes well with the Enterprise for the Americas Initiative-perhaps even an Hemisperhic Free Trade Zone.[49] However, unlike the European Community, which originated within the context of the post-war

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42 Ernest H. Preeg, 'f'& *American Challenge in World Trade: U.S. Interests in the GATT Multilateral Trading System* (Washington, DC: The Center For Strategic Studies, 1989).

43 As OTA points Out:

> There is an increasing tendency for nations to negotiate quotas bilaterally or among trading blocs or customs unions. GATT has recorded over 200 quota arrangements that restrict industrialized counties' imports in products such as textile and apparel, steel, motor vehicles, semiconductors, machine tools, footwear, and consumer electronics. These arrangements include the proliferation of voluntary restrain agreements (VRA)S that restrict trade between two nations. An example is the VRA between Japan and the United States in which Japan agreed to limit its exports of motor vehicles to the United States, from 1.76 million units in 1981 to 1.94 million units in 1985.

OTA op. cit., footnote 17, p. 121.

44 As the Council of Economic Advisers described the situation in its 1985 *Economic Report Of the President*, the world *is* moving *away* from *rather than* toward, comprehensive free trade. In major industrialized countries, for example, the proportion of total manufacturing subject to nontariff restrictions rose to about 30 percent in 1983, up from 20 percent just three years earlier.'Council on Economic Advisers, op. cit., footnote 17, p. 114. See also Gilpin, who notes:

> Thus by the late 1970s, several broad changes had begun to erode the GATT system of trade liberalization. As tariff barriers within the GATT have fallen, nontariffbarriers inmost countries have risen. Barter ocountertrade has grown rapidly, especially with respect to the less developed countries; the U.S. Commerce Department estimates that between 1976 and 1983, barter increased from approximately 2-3 to 25-30 percent of world trade.

Gilpin, op. cit., footnote 9, p. 195.

45 Gilpin, op. cit., footnote 9, p.207.

46 Gilpin, op. cit., footnote 9, p.261.

47 Gilpin, op. cit., footnote 9, p.277.

48 Behrman, op. cit., footnote 13, p.11.

49 ''Bush Hails Possibility of a Hemispheric Free Trade Zone During South Americas Trip' *International Reporter*, Dec. 5, 1990, p. 1824.

international system and was motivated by political as well as economic goals,[50] regional trading pacts today appear to be operating more defensively.

Standards developments must be viewed in this context. If the GATT cannot sustain an international economic order based on free trade principles, standards will be used, increasingly, as nontariff trade barriers and also as part of national, or regional, industrial policies. This is now happening both in Europe and Japan.[51]

Standards as Industrial Policy

The Japanese were the frost to use standards as a key component of industrial policy and the frost to be chastised for using them as nontariff trade barriers.[52] Because Japan had a small domestic market, and was late in the process of industrialization, the Japanese Standards System (JSS) originally focused on improving economic efficiency and gaining the benefits of technology transfer.[53] Later, standards were used to control product quality, and thereby promote trade. More recently, Japanese standards have been designed to address issues relating to "environmental safety, consumer protection, economy of natural resources, and energy. ''54 The Japanese have a rigorous procedure for testing and certifying these standards, which has been a source of dispute between the United States and Japan. Responding to U.S. complaints that these certification procedures were serving as nontariff trade barriers, the Japanese agreed, in May 1983, to accept the results of testing organizations located outside Japan.[55]

Standards also play a central role in the European plans for unification and industrial development. Although the creation of a single European market is still incomplete, there has been considerable progress made in this direction. Despite high tension, and a number of compromises, the recent European summit at Maastricht makes clear that Europe is on track towards creating a grand European Market.[56] If successful, the Europeans have much to gain. By most accounts, the removal of trade barriers will lead to increased productivity and growth due to heightened competition, the benefits of increased economies, and increased investment.[57] If European firms become more competitive, their exports will also increase.

Europeans may also gain in the area of standards development. With a market the size of the EEC, Europeans will likely have much greater economic and political leverage to promote their standards in the international arena. This may be the case in the future if the development of standards at the international level fails to keep pace with the European standardization process.

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50 For a discussion of the early history and logic behind the establishment of the European Community, see Emile Benoit, *Europe at Sixes and Sevens (WestPort,* CT: Greenwood Press, 1961). See also Ernst Haas *The Uniting of Europe: Political, Social, and Economic Forces* (Stanford, CA: Stanford University Press, 1968).

51 See, for example, Rhonda Crane, *The Politics of International Standards: France and the Color TV War* (Norwood, NJ: Ablex Publishing, 1979), for a discussion of how the French used standards to protect their color TV market. Some also claim that European enthusiasm for Open System Interconnection Standards (0S1) reflected their eagerness to prevent further consolidation of IBM's control of network standards through SNA, its proprietary network model. See for a discussion, Larry DeBoever, "Trek Toward Connection" *Computerworld, Nov. 16, 1987,* pp. S1-S13.

52 Donald J. Lecraw, ''Japanese Standards: A Barrier to Trade?'' H. Landis Gabel (cd.) op, cit., footnote 31, pp. 29-4.6. As the author points out, the most notorious case was that of the Japanese standard for baseball bats, which prevented the United States from exporting baseball bats to Japan. The problems was eventually resolved through the settlement court of the GATT

53 As Lecraw points OUt:

> At the start of Japan's industrialization process in the late 1800s, its industrial firms were small and inefficient, and lacked a modem technology base. To meet these problems, the Japanese government actively promoted industry rationalization, simplification of product variety, and interchangeability and compatibility between products. On the one hand, this strategy enabled Japanese firms to achieve the efficiency of high volumes even though they were relatively small, and on the other, it facilitated the transfer of technology from abroad since the same product or process could be used by all firms within an industry and by firms across industrial sectors.

Ibid., p 31.

54 Japanese Standards Association, ''Industrial Standardization System in Japan,'' JSA, Tokyo, 1978, p.1.

55 Ibid., p. 37. The Japanese first came under pressure to eliminate non-tariff trade barriers, including those relating to standards, during the Tokyo round of the GATT.

56 A major agreement was the decision to create a single European Bank and a single European currency by the end of 1999. See for a discussion of the issues, William Brozdiak, "National Destinies on the Line as EC Summit Convenes," *The Washington Post,* Dec. 8, 1991, A33; and "EC Nations Reach Accord on Landmark Unity Pacts,' *The Washington Post,* Dec. 11, 1991, pp. Al, A30.

57 While estimates of the magnitude of growth differ, few question that there will be growth. See for discussions Richard Baldwin, "The Growth Effects of 1992, " *Economic Policy,* October 1988, pp. 248-81; and Merton J. Peck, "Industrial Organization and the Gain from Europe 1992," in William C. Brainard and George L. Perry (eds.), *Brookings Papers on Economic Activity 2 (Washington DC:* Brookings Institution 1989).

How the European standardization process develops will have a major impact on the U.S. economy, because Europe as a whole constitutes the United States' largest trading partner.[58] If American industries have access to the European market, they stand to benefit from integration. In a growing, single market, there will not only be gains in trade; American firms will also have lower costs, since they will be able to deal with a single set of standards and a more unified administration.

On the other hand, if third-country access to the European market is hindered, American firms will suffer. This might happen, for example, if the European Community were (as the Japanese did previously) to adopt its own, independent testing/certification procedures. To compete in the European market, U.S. companies might then have to retool their products to meet European specifications, and/or undergo complex and costly certification and testing procedures. The new testing and certification system, which was adopted as part of the ''new approach,' could be especially problematic for American firms.[59] In accordance with this procedure, manufacturers can meet Community standards requirements either by having their products tested in an independent laboratory--or ' 'notified body' '-or by self certification, which involves testing their own products or having them tested by an outside laboratory. The problem for American companies is that, as of now, U.S. laboratories are not accredited in the European Community, and shipping products overseas for testing is costly and often impractical. Final decisions about testing will be made by the recently established European Organization for Testing and Certification. (EOTC) According to the Europeans, negotiations would be greatly simplified if they could deal with a single U.S. negotiating entity.

Europeans have sought to assure the United States they have no plans to create a ''Fortress Europe."[60] They point out that, under Community rules, the European standards bodies-CEN, CENELEC, and ETSI—are obliged to use international standards when they are, or will soon be, available. Moreover, under pressure from the United States, the European standards bodies now allow U.S. interested parties to review European standards before they are implemented.[61]

The Europeans, however, have a schedule to meet; they are unlikely to slow the process of European harmonization for lack of international standards. To reconcile their own interests with those of countries outside the European Community, they propose to reorganize international standards bodies to hasten the development of international standards. Moreover, they call on the United States to make a greater commitment to the development and *implementation* of international standards. They point out that, whereas 85 percent of all CEN and CENELEC standards are identical to international standards, only 22 percent of U.S. national standards are identical or technically equivalent.[62]

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58 The most important countries in terms of U.S. trade are Germany, the United Kingdom, France, and Italy, all of whom are among the top 10 in volume of total trade with the United States. The bulk of U.S. foreign direct investment is also located in Europe. OTA op. cit., footnote 17.

59 John Burgess, "Competing in a Diverse Market: U.S. Firms Seek Unity on Product Standards in Europe," *Washington Post,* pp. Al, A6; See also, Karen A. Frenkel, "The Politics of Standards," Communication *of the ACM*, July 1990, pp. 40-52; and Elizabeth Horwitt, "Finding Foreign Fingers in Standards Pie," *Computer World,* July 16, 1990, p. *56.*

60 See ISO Memo *to Executive* Board Members, "EC Commission Reaffirms Support for International Standards," June 3, 1991. As Prof. Helmut Reihlen, V. President 1S0, points out, "West Europe knows full well that it would only endanger its exports ifit hindered imports. . . it is not a question of one region making the other dance to its tune. The fact is that a great need for international standards has arisen in one region. An eager new market has been created so to speak.'

61 Karen Fitzgerald, "Global Standards, *ZEEE Spectrum,* June 1990, pp. 4446.

62 See EC Communique Study Group Issue Paper on International Standardization. Jan. 6, 1992, provided in response to the June 21, 1991 Joint Communique resulting from the U.S.-EC meeting between EC Commission Vice President Martin Bangemann and Secretary of Commerce Robert Mosbacher.

As Professor Helmut Reihlen points out:

> EC 1992, among other developments, including perhaps GATT's planned Code of Good Practice for standardizing bodies, has triggered a critical appraisal in the U.S. regarding its involvement in international standards work. The recognition is gaining ground that the U.S. can no longer sit back in the assurance that American Standards are *de facto international* standards, because of their extensive use. The response to this challenge can surely not be that the U.S. standard ". . needs legal protection. The track record of the United States in the implementation of international standards has been open to criticism; initial figures from the United States stated that fewer than 30 of the more than 38,700 privately developed standards in the United States today were ISO/IEC standards, though results of the American National Standards Institute sample study have since indicated that 22 percent of ISO/IEC standards are "identical or technically equivalent to U.S. standards. "

Concerned about assuring U.S. access to the European standardization process, Secretary of Commerce Robert Mosbacher initiated discussions in 1991 with EC Commission Vice President Martin Bangemann to work out some of the issues. On June 21st, the United States and EC governments and their respective standards developers agreed that the private sector should suggest ways to improve international standards to meet industry needs. A study group was formed to produce a joint report for Secretary Mosbacher and EC Commission Vice President Bangemann by the end of 1992.

Various private-sector standards groups have also been carrying on dialogues with European standards developers. The X3 committee, which is responsible for many information technology standards, has taken their concerns to the international standards committee, the JTCI.[63] ANSI has also been active, coordinating semiannual meetings with CEN and CENELEC, where their member organizations can share information with their European counterparts and discuss problems and issues.[64]

The Europeans and the United States differ in how to improve the situation. The Europeans stress the need for organizational reform to expedite the international standards process.[65] In contrast, the U.S. private-sector organizations call for more transparency in standards development and greater information exchange. And, whereas the Europeans look for a solution at the international level, the United States focuses more on a bilateral, U.S.-EEC exchange.

The U.S. response reflects the belief of many in the U.S. private sector that the United States is adequately represented in the international standards arena, and that its commitment to the international system is sufficiently strong.[66] To illustrate this point, they cite the number of leadership positions held, and the percentage of standards developed, by U.S. participants compared to France, the United Kingdom, Germany, Sweden, the Netherlands, and Japan (see figure 4-l). However, in the light of European unification, country-by-country comparisons are not the best measure; more telling is a comparison of the U.S. contribution to international standards with that of the European Community as a whole (see figures 4-2 and 4-3).

This private-sector view also ignores the point, which the Europeans are quick to make, that commitment to international standards is reflected not only by participation in the process, but also by a willingness to commit to the implementation of international standards. The United States has a problem in this regard insofar as the implementation of standards in the United States is—and will likely continue to be-voluntary.

Many in the private-sector also contend that the international system works well as it now exists, and does not require reorganization. They point to the increased productivity of the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), and note that both organizations have already undertaken a number of steps to shorten the standards development process.[67] However, these criteria of success maybe inappropriate. If the United States is concerned about the preemption of EEC standards, then the better measure for judging the effectiveness of international standards bodies is not whether they produce standards more rapidly, but whether these standards organizations will have developed the standards that the Europeans need by the time they are required. To address this problem, Europeans have raised the possibility of establishing a priority for developing international standards.

Standards as Marketing Devices

International standards developments will not only affect U.S. trade prospects in Europe, they will also affect U.S. competitiveness in the global market. Building on the relationships between standards and competitiveness, many industrialized nations use standards as marketing devices to sell their products in Eastern Europe and to the developing

63 The Joint Technical Committee (JTCI) is a information technology standards committee that resulted from a merger between an ISO and an IEC technical committee.

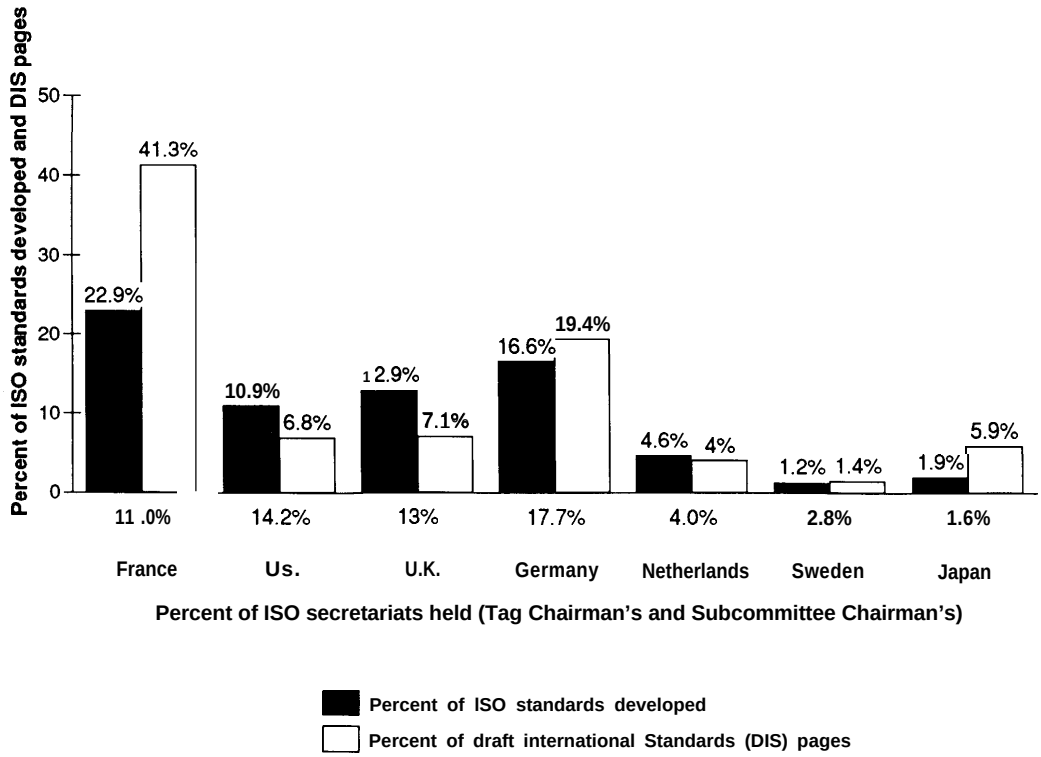
64 For a discussion of these activities, see American National Standards Institute (ANSI), *U.S. Voluntary Standardization* System: Meeting *the Global Challenge (New* York, NY: nd)

65 European draft response to Mosbacher/Bangemann communique.

66 This point represents that of several members of ANSI. OTA interviews suggest that the private sector is not, however, completely united on this point. Some would even argue the opposite,

67 See, for example, ANSI'S comments on OTA draft.

Figure 4-1—International Standards (ISO): Activity Level



SOURCE: American National Standards Institute (ANSI), 1990.

countries of the world.[68] Therefore, many of their foreign aid programs focus on standards.[69] They recognize that if they can influence the choice of standards in the developing world, trade will likely follow. This is because there are significant benefits to being the 'first' to get a standard accepted. When one standard starts to take hold, more and more companies "jump on the bandwagon' to adopt it.[70] And once a standard is in place, trading relationships can become locked in.

This kind of an arrangement is also advantageous for developing countries. They welcome help in setting up a national standards program, because they too see standards as a mechanism for building their economies. Standards will not only help them create a national market, they also provide an excellent and unobtrusive source of technology transfer, and reduce the importation of inferior products.

To stimulate trade, the EEC and Germany have provided financial support totaling $16 million to help establish an electronic component test laboratory in India. The laboratory also receives technical support from the German Agency for Technical Cooperation. In addition, specialist training in standardization is provided in Germany, the United Kingdom, the Netherlands, and Ireland. The European Commission has, moreover, conducted a study of the Association of South East Asian Nations (ASEAN) standardization base, and provided a grant of $6 million for an initial effort to implement its recommendations. Closer to home, the European

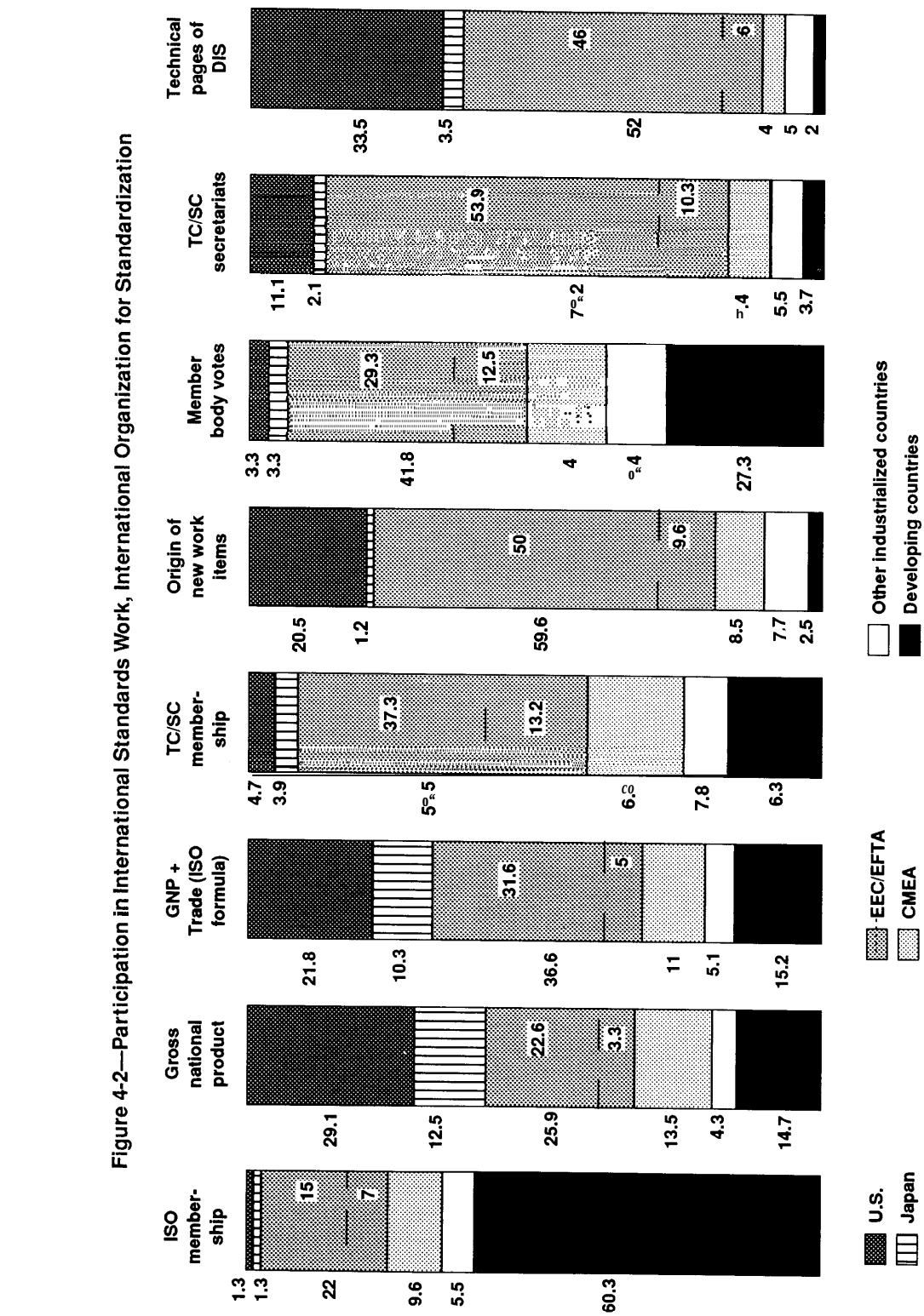
6S For a discussion of the benefits perceived to be derived from a unified market, see Paulo Cecchini, with Michael Catinat and Alexis Jacquemin, *The European Challenge: 1992: The Benefits of a Single Market* (Aldershot, UK: Wildwood House Press, 1988).

69 As described in the EEC Commission communication, *Cooperation in Science and Technology with Third Countries* (June 1990):

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

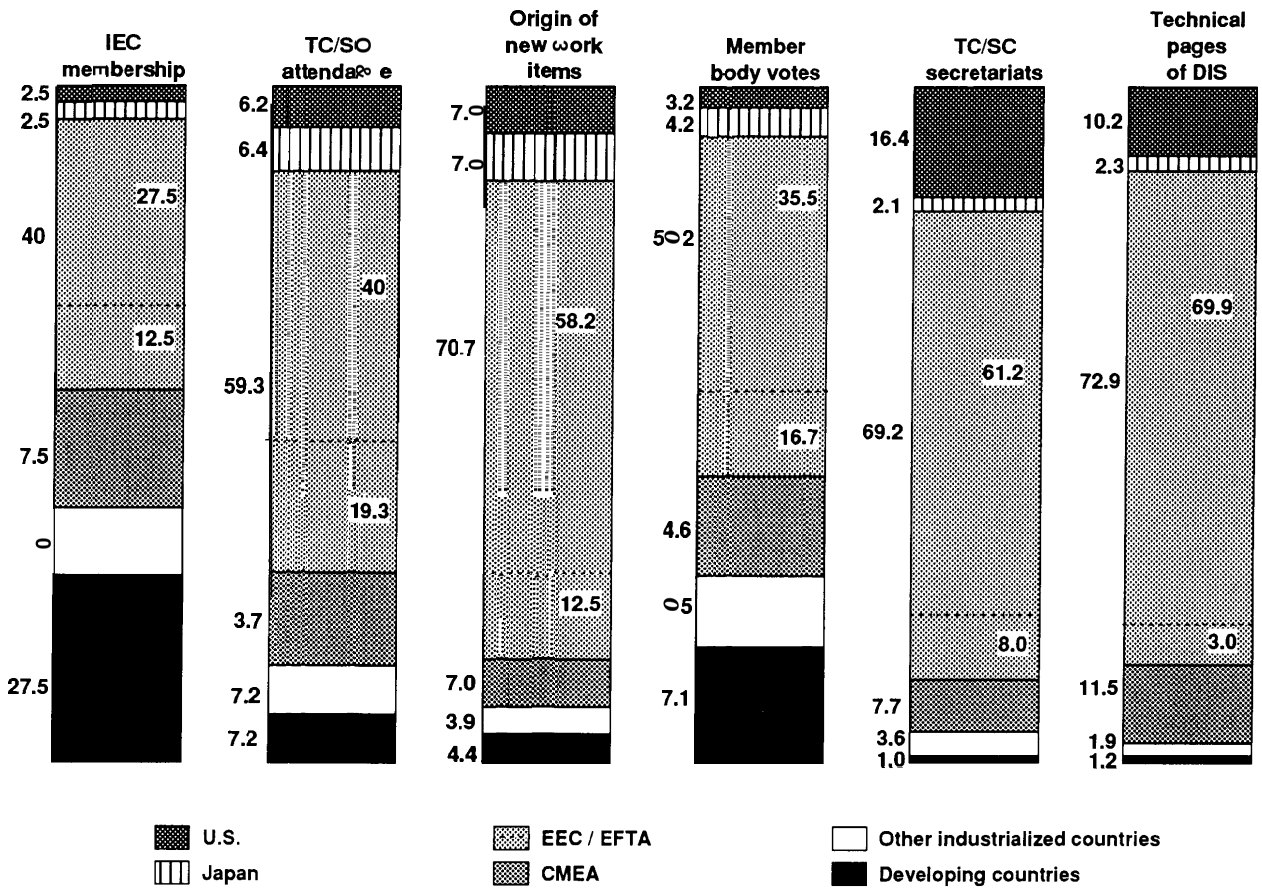
70 See, for a discussion of how the bandwagon effect impacts trade, Farrell and Saloner, Op. cit., footnote 31.

Figure 4-2—Participation in International Standards Work, International Organization for Standardization



KEY: DIS=Draft International Standards; EEC=European Economic Community; EFTA=European Free Trade Association ; SC=Subcommittee Chairman; TC=Tag Chairman.
SOURCE: International Organization for Standardization (ISO), 1988.

Figure 4-3—Participation in International Standards Work, International Electrotechnical Commission



nd Community; EFTA=European Free Trade IEC=International ec ec ss TC=Tag Chairman;

bc

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Commission has provided Mexico $1.5 million in consultation and training in standardization, testing, and quality system certification. Also, the European Committee for Standardization (CEN), the German Institute for Standards (DIN) and the Spanish Standards Institute (AENOR) have each offered to provide a resident standards expert in Mexico. An AENOR senior staff person has completed a 4-week study of Mexico's standardization needs for the European Community .71

The Japanese are pursuing similar programs. The Japanese Five-Year Plan for Industrial Standards, for example, calls attention to the role that such technical cooperation can play.[72] In pursuit of this strategy, the Ministry of International Trade & Industry has sent technical experts to five countries to assist them in the development of their standards programs.[73] In the Philippines, for example, the Japan International Cooperation Agency sponsored a 13-person team, conducted a 500-person-day study of the Philippines national standardization system, and provided a $23.1 million grant to establish three regional labs.[74] Each year, the Japanese Government pays for 32 people from developing countries to come to Japan for technical training in standardization at courses and seminars ranging in duration from 4 weeks to 3 months.[75]

The United States has no equivalent programs. Most U.S. foreign aid programs are dissociated from trade issues. In the fall of 1989, a law was enacted directing the U.S. Department of Commerce to accept invitations from developing countries to provide technical assistance in developing standards programs except in the case of Saudi Arabia.[76] However, funding, which was to come from the private sector, has not been adequate. As of the spring of 1989, only $85,000 had been raised. According to one source, German industry raised $5 million for a similar effort in the course of 20 days.[77]

Failure to compete in this arena could make it difficult for the United States to fully benefit from the global economy and the future growth in world trade. The developing world will be a major world market, a fact that the United States cannot afford to ignore. Future trading opportunities are great. In the area of telecommunications alone, for example, estimates are that India will spend more than $40 billion over the next 10 years. Already the Association of South East Asian Nations is the United States' fourth largest trading partner.[78]

Rise of the Multinationals and Other Translational Groups

Nation states are not the only forces in motion that are recasting the world economic order. Multinational corporations play an increasingly important role, acting, at times, in ways that may be contrary to the interests of the nations of their origin.[79] Multinational corporations will be particularly influential in the area of international standards setting. Because their organizational structures span the world market, they can participate in a variety of national and regional standards activities. Given their size and independent status, the behavior and the goals they pursue will not only affect the choice of international standards; they will also influence the course of national standards processes themselves.

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71 Bob Toth, Toth Associates, personal communication.

72 According to the plan:

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

As cited in Robert Toth, "Promoting U.S. Competitiveness by Promoting U.S. Standards." Unpublished paper, n.d.

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

74 Robert Toth, Toth Associates, personal communication.

75 Japanese Industrial Standards Committee, *JIS Yearbook 1991.*

76 Dymally Amendment *to the* NIST appropriation Bill, 1989.

77 Hayes, op. cit., footnote [73]"

78 Bob TO@ Toth Associates, personal communication.

79 AS Robert Reich notes:

> Today corporate decisions about production and location are driven by the dictates of global competition, not by national allegiance. . . . Nor do trade flows between nations accurately keep score of which companies are gaining the lead. For the past two decades, U.S. businesses have maintained their shares of world markets even as America has lost its lead.

Robert B. Reich, "Who is Them?" *Harvard Business Review* (March-April 1991, p. 77.

The enhanced role of multinational corporations results from their changed character. In the past, most multinational corporations tried to exploit comparative advantage by producing or selling in a single country. In today's global environment, they seek a comparative advantage by integrating their activities on a worldwide basis.[80] To compete globally, firms must allocate all their activities among a number of countries to gain the optimum advantage.[81] Thus, depending on the particular case, it might be best for a firm to disperse its production facilities-such as design modification, fabrication, and assembly—to foreign countries, and to focus its own domestic production on the fabrication of key components .82 Or, alternatively, a firm might decide to manufacture a product domestically, but transfer abroad such downstream activities as distribution, sales, marketing, and service.[83] Vertically integrating all of these activities, multinational corporations generally take the form of large, international oligopolies. [84]

U.S. multinationals are already playing an independent role in European standards development. Not wanting to be excluded from Europe 1992, many U.S. multinationals have set up subsidiaries within the European Community. As European companies, they can be full members of European standards organizations. Thus, IBM, for example, now participates in European Telecommunications Standards Institute (ETSI) through each of its six European subsidiaries. Although IBM and other U.S. multinationals located in Europe gain through such participation, the United States economy as a whole may not.

If U.S. companies-large and small-are to have access to the European market, the United States must provide greater support for international standards organizations. However, in the current situation, this support comes from the private sector alone. If large multinational firms, who once provided the support for international standards development, now hedge their bets by participating in regional standards organizations, there will likely be fewer resources at the international level. Under such circumstances small companies who cannot afford to setup regional subsidiaries will be greatly disadvantaged.

In some cases, the conflict may be more direct. U.S. multinationals located abroad may pursue policies in Europe contrary to those in the United States. Such a situation is increasingly likely. Today, global managers must make decisions on the basis of profit margins, not nationality. Global companies can afford to be footloose. For example, warning the State of Nebraska when faced with the possibility of anew tax code, Charles Harper, head of ConAgra, a giant food-processing and commodity trading company, recently pointed out:

> The bonds of loyalty could slip over the weekend. Some Friday night, we turn out the lights-click, click, click—back up the trucks and be gone by Monday morning.[85]

Examples of such conflicts already exist in the case of standards. In spring 1991, for example, ETSI issued a draft policy involving patented standards. This policy would have required patent holders to license the standard only to EC producers or to producers in countries that adopt the EC standards. Such a policy would not only have prevented U.S. firms from using the patent on an equal basis; it would also be a strong inducement for other countries to adopt EC standards. American companies as well as ANSI opposed such policies. When asked about the EEC'S intentions, commission staff point out that the most ardent supporter of this policy within the commission is none other than the British subsidiary of Motorola.[86] Such incidents not only hurt U.S. industry; they also confuse Europeans,

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80 Porter, op. cit., footnote 12, p. 19.

81 Ibid., p. 23.

82 Ibid., p. 45.

83 As Michael Porter has said:

> In global competition, a country must be viewed as a platform and not as a place where all of a firm's activities are performed.

Ibid.

84 As Gilpin has pointed out, the ke, factors accounting for the expansion and success of this vertical form of multinational enterprise are similar to those that led to the domination of the Nation's economy by large oligopolistic corporations. Gilpin, op. cit., footnote. 9, p. 241.

85 As cited in Robert Reich, "Who is Them?" op. cit., footnote 79, p. 78.

86 Interview, EC Commission staff. This position is understandable from Motorola's point of view. The European Community requires that all Community procurements be based on European standards. Motorola hopes to capture the European market for cellular digital radio. If its standard is adopted, its competition will be excluded in a situation where the winner takes all.

making them question whether the United States has a hidden agenda.[87]

The policies pursued by multinationals abroad may also have an impact on the United States policymaking process. Many in the environmental community fear, for example, that the Uruguay Round of the GATT allows large corporations to make key environmental decisions, not on the basis of environmental criteria, but rather according to criteria such as economic growth, profit maximization, and deregulation.[88] Some even believe that multinationals have a conspiratorial bent, insofar as they avoid dissident groups by circumventing the traditional policymaking process and working through the Office of the U.S. Trade Representative. For this reason, these groups have begun to redefine themselves as translational organizations. They now encourage their members to bypass domestic decisionmakers, going directly to international standards organizations. If transnational environmental and consumer groups join multinationals to set policy internationally, the U.S. Government will have a diminished voice.

Multinational corporations may also generate greater tensions within domestic standards development bodies, especially ANSI. ANSI has always had a difficult time balancing the multiple interests that constitute its membership. Juggling these interests will likely be even more difficult in the future, when some companies are confined to working through ANSI and others have the advantage of working through regional and other national standards making bodies. Reportedly, a number of large companies have left ANSI within the past few years, and ANSI has had to be especially diligent to prevent the departure of others.[89]

Trend Towards and Information-based, Knowledge Society

The United States and other advanced industrial countries are rapidly evolving into information-based, knowledge societies, where the creation, use, and communication of information plays a central role. In the economy, information now serves as a primary resource, an important factor of production. It is becoming, moreover, a prerequisite to the development and allocation of other resources. As such, it is treated less and less as a free good, and more and more as a commodity to be bought and sold in the marketplace. And, as the economic value of information increases, so too will the economic rewards of those who have the greatest access to it. This trend will greatly affect standards developments. Standards embody information, and like any other information commodity, their future availability and use will depend increasingly on market forces.

This trend towards an information-based economy results in part from the development and widespread deployment of information and communication technologies. The emergence of these technologies has increased the speed at which information can be communicated; increased the quality of information that can be collected, stored, manipulated, and transmitted; increased access to information; and enhanced our ability to use information to account for past actions and to predict future events.

These technologies provide numerous ways of improving efficiency, increasing productivity, and thus engendering growth. Information is, for example, reusable and, unlike capital resources such as steel and iron, it requires very few physical resources for its production and distribution.[90] Moreover, information can now be used not only to substitute

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87 Particularly confusing to the Europeans is the fact that USTR has seemed to support Motorola in this position. Some explain this, saying that many of Motorola's executives were once employed by the USTR. Ibid.

88 Interviews Patricia Bauman, Bauman Foundation Fran Weber, Audubon Society, and Mare Ritchie, Institute for Agriculture and Trade Policy. See for one discussion, Steven Shrybman, *International Trade and the Environment* (Toronto, Ontario: Canadian Environmental Law Association October 1989) . For a European Perspective, see *Gatt, Agriculture, and Environment: Towards a Positive Approach,* report of a conference organized by the Center for Agriculture and Environment, held in the Netherlands, on Sept. 14-15, 1990.

89 ANSI memo to bored of directors.

90 See Harlan Cleveland, "The Twilight of Hierarchy: Speculations on the Global Information Society," Bruce R. Guile (cd.) *Information Technologies and Social Transformation (Washington* DC: National Academy Press, 1985), p. 56.

more efficiently for labor; it can also be used to improve the overall efficiency of the productive process itself. As productive processes become increasingly complex, the largest reserve of economic opportunities will be in organizing and coordinating productive activity through the process of information handling.[91]

This growing importance of information to the economy is evident from the continued growth of the information sector of the economy, a trend that has been paralleled in other advanced industrialized societies. In fact, it was to highlight such changes that terms such as the "information society' and the "information age' were first employed.[92] The most recent analysis estimates that the information sector constitutes 34 percent of GNP, and accounts for about 41.23 percent of the national labor force.[93]

The changing economic role of information can also be seen by examining how information technologies are being used by business and industry. Businesses are now applying computer technology to almost all of their activities: from recruiting to laying off workers, from ordering raw materials to manufacturing products, from analyzing markets to performing strategic planning, and from inventing new technologies to designing applications for their use. These technologies, moreover, are being applied not just to traditional tasks; the diffusion of new technologies is also being used to reconfigure the nature of the business process itself.[94]

Because of its new economic and managerial importance, information is becoming much more commercially valuable. Businesses have always been willing to pay for information such as market research and economic forecasts. Today, however, they are not only buying more; they are willing to pay much higher prices for it. For example, American business firms might pay $800 per year for a monthly professional information service, or perhaps $15,000 for a market research report shared by others in the industry.[95]

The new technologies provide new ways and opportunities to meet these burgeoning information needs. They allow information to be processed in a variety of new ways, adding value to it from the point at which it is created or composed to the point at which it is assimilated or used. As the opportunities for creating new information products and services have increased, so too has the number of commercial providers. Taking advantage of the increased demand for information, the new technologies have spawned a rapidly growing industry. This industry is relatively young, having developed hand in hand with the new technologies. More than half of the companies that comprise it were formed since 1970. Nevertheless, it is one of the fastest growing industries in the economy.[96]

Given its increased value, information will most likely be exchanged less freely. This shift will create tensions and problems in a society such as ours where information serves critical social and political purposes as well as economic ones. Consideration must be given, and perhaps new decisions made,

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91 Charles Johnshur, "Information Resources and Economic Productivity," *Information Economics and policy 1* (North Holland: Elsevier Science Publishers, 1983), pp. 13-35.

92 Fritz Machlup was one of the first to note these changes; and to measure the information sector in his pioneering work, now a classic, The Production *and Distribution of Knowledge in the United States,* Others have followed this tradition, By far, one of the most ambitious efforts to date has been the innovative work of Marc Uri Porat for the Office of Telecommunications in the Department of Commerce. In 1967, according to Porat, information activities accounted for 45.2 percent of the GNP 25.1 percent in the "primary information" sector (which produces information goods and services as final output) and 21.1 percent in a "secondary information" sector (the bureaucracies of non-information enterprises).

93 Michael Roger Ruben and Mary Taylaor Huber, The Knowledge *Industry in the* United States: *1960-1980.* This volume updates work done by Fritz Machlup. In their breakdown of the information sector of the economy, Rubin and Huber note that, leaving education aside, the contribution of knowledge production to GNP increased from 17.9 percent in 1967 to 24.5 percent in 1980. The contribution of education, on the other hand, fell from 16.6 percent to 12.0 percent during the same period, a decline that accounts for the fact that knowledge production's overall contribution remained relatively stable at about one-third of GNP.

94 See Eric K, Clemons and W. Warren McFarlan, "Telecom: Hook Up or Lose @~" *Harvard Business* Review, July-August 1986, pp. 91-97; see also Peter G.W. Keen, *Competing in Time: Using Telecommunications for Competitive Advantage* (Cambridge, MA: Ballinger Publishing CO., 1986); Donald A. Marchand and Forest W. Horton, Jr., *Infotrends: Profiting From Your Information Resources (New* York, NY: John Wiley and Sons, 1986); and James J. Cash, Jr., F. Warren McFarlan, and James L. McKenney, *Corporate Information Systems Management: The Issues Facing Senior Executives* (Homewood, IL: Irwin, 1988).

95 Christopher Burns, Inc. Th, Economics *of Information,* contract report prepared for the Office of Technology Assessment, U.S. Congress, 1985.

96 Ibid.

about intellectual property rights and the rules governing information dissemination, [97]

These tensions are also becoming increasingly apparent in the standards world. Standards share many characteristics of information, and standards developers are similar to publishers in a number of ways. Many are dependent on information sales for their existence. And, like the new breed of information providers, they have much to gain in an information-based economy, where the value of their product is greatly enhanced. Like information providers, moreover, they can use information and communication technologies to distribute and add value to their products. These opportunities, however, also create conflicts, since standards are developed both voluntarily and by committees. Equally, if not more, important, standards are public goods, whose purpose is to be shared.

The case of "Project Bruno" illustrates this conflict. Pressed to speed up the delivery of standards, the International Telecommunications Union (ITU) began a program to put standards "online." ITU staff estimated that the project would take 8 years. In October 1991, the ITU commissioned an experiment, asking a group of volunteers, led by Carl Malamud, to put International Telephone and Telegraph Consultative Committee (CCITT) and International Radio Consultative Committee (CCIR) standards (including the 19,000 page Blue Book) on the Internet-a world-wide communication network comprised of over three million users (see box 4-A). The experiment was open ended in terms of time. Within a few weeks, these standards were listed on 22 computer servers around the world, where they could be accessed by Internet users. The project was extraordinarily successful, so much so, in fact, that after 90 days Pekka Tarjanne, Secretary General of the ITU, abruptly called it to a halt.[98] Tarjanne explained the termination of the project saying, 'We know what can and cannot be done. " Reportedly, however, "politics," financial concerns, and concerns about intellectual property rights played a major part in the ITU'S decision.[99]

Competition among standards organizations to sell of standards will also be more intense. Domestic standards bodies will be competing, not only with one another for an increasingly lucrative market; they will also be facing standards developers from other countries who, taking advantage of communications and information technologies, will be able to compete on a global scale. Although increased competition may, in some cases, help to lower the costs of standards, it will also create problems. Standards tend to be underfunded, since they are quasipublic goods. If competition is too intense, the limited resources available for developing standards will be spread too thin. Competition will also be detrimental, if standards bodies become so preoccupied with sales that they fail to meet the needs of their clients and the Nation.

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97 For a general discussion of these issues see, U.S. Congress, Office of Technology Assessment, *Intellectual Property Rights* in *an Age of Electronics and Information* OTA-CIT-302 (Washington DC: U.S. Government Printing Office, April 1986).

98 personal communication Carl Malamud and correspondence between Carl Malmud and Secretary General Tarjanne. See also, Carl Malamud, "Are Secrets Standards? Even ANSI Secrets," *CommunicationsWeek*, Oct. 7, 1991 and Sharon Fisher, "ITU Standards Program to End," *CommunicationsWeek*, Dec. 23.1991, pp 3,39.

99 As interpreted by Malamud:

> The reason for this abrupt reversal in policy is a lesson in bureaucratic politics. Tarjanne wanted to make the ITU more relevant to the world, and what better way than making its work available to an internetwork of 4 million people, growing at 15 percent to 20 percent per month? The bureaucracy fought this move every step of the way. They felt threatened., If we gave away the standards, there would be fewer jobs at the ITU. There would be less control over distribution and more pressure to start responding to the realities of engineering in the rest of the world.

Carl Malamud, "ITU Decision Turns Back the Clock. *CommunicationsWeek*, Dec. 23, 1991, pp. 3,39.

Box 4-A—ITU Standards Available Via Global Network

Thanks to a major state-of-the-art project undertaken by the Digital Resources **Institute at the** University of Colorado, thousands of CCITT and CCIR standards are now being provided through the worldwide open network-of-networks known as the Internet.

How To Get the Standards

- **Direct Internet access.** Anonymous FTP via the Internet to: (bruno.cs.colorado.edu);IP address is (128.138.243.151)
- **E-Mail message.** Send an E-Mail message to: (infosrv@bruno.cs.colorado.edu)

Follow the instructions in the attached annex for either FPT or E-Mail access

Notes

1. You can also send mail to (infoserve@bruno.cs.colorado.edu) and put the word HELP in the body of the message. You will get back instructions.
2. There is no charge for this experimental service.
3. Additional servers will be operational at several other locations throughout the world over the coming months. The standards of other organizations are expected to be available on servers. Advanced search routines are being developed.
4. Questions may be directed to Carl Malamud at the University of Colorado (carl@malamud.com) or Tony Rutkowski at the ITU (amr@cernvax.cern.ch), tel: +41 227305207. E-Mail is preferred

Who Is Bruno?

The server being used at the Digital Resource Institute at the University of Colorado is named after Giordano Bruno.

Giordano Bruno (1548-1600) was a member of the Dominican order. The Dominicans had kept alive the Greek secrets of memory, first perfected by the poet Simonides of Ceos (c.556-468? B.C.). Before the printing press, mnemonic methods for remembering verse or other forms of knowledge were the only ways to pass that information on.

Bruno, after mastering the Dominican secrets, revealed them to the rest of the world in his classic, *Shaddow of Ideas (1582).* A noted advocate of free thought, Bruno was accused by the Inquisition in 1592 of various acts of heresy, including making bad jokes about God. He was convicted and burned at the stake in 1600.

SOURCE: *Friends of Bruno Newsletter, No.* **l-B, Oct. 21, 1991, via e-mail.**