CRS Report for Congress

The Europe 1992 Plan: Science and Technology Issues

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ABSTRACT

The European Community (EC) 1992 Plan is a sweeping and ambitious plan to reduce, eliminate or harmonize barriers now existing between the twelve EC nations. Of important interest to the United States is whether this results in a "Fortress Europe" or in more efficient global markets. Science and technology issues will play a crucial part in this new order. Generally, the 1992 Plan may have an effect on four U.S.-European science and technology areas: cooperative research, non-tariff barriers, research and funding priorities between nations, and in technology development and competitiveness. Individual science policies, technologies and industries which may fall under these four broad areas include: bilateral and multilateral cooperative agreements in scientific research; technological standards; information systems and technologies; telecommunications, (including high definition television); energy policies; the defense technology base of the United States and Europe; and a variety of issues affecting U.S.-EC industrial competitiveness.

THE EUROPE 1992 PLAN: SCIENCE AND TECHNOLOGY ISSUES

SUMMARY

The European Community (EC) 1992 Plan is a sweeping and ambitious plan to reduce, eliminate or harmonize barriers now existing between the twelve EC nations. The 1992 Plan has outlined 285 directives addressing these barriers. These barriers fall into three broad categories--material, technical and fiscal. Reduction, elimination or harmonization of these barriers by December 31, 1992, is intended to create a single deregulated market, the largest in the world.

The prospect of a unified European Community has raised questions about whether this will create a "Fortress Europe", particularly excluding the United States and Japan, or result in economies of scale, more efficient markets and a greater demand of outside goods and services. The effect of the 1992 Plan on current U.S.-EC science and technology issues is also open to debate. Generally, the 1992 Plan may have an impact on four basic areas: cooperative research, as outlined in current bilateral and multilateral agreements in science and basic research between EC nations and United States; non-tariff barriers, particularly standards, which may permit products to be sold in a single global market; EC research and development funding priorities, changes of which under the 1992 Plan might cause a need for a reevaluation of U.S. civilian and military R&D priorities; and in technology development and competitiveness, U.S. policies which encourage development of new products and technologies may be affected by changes in the larger trade practices.

Other individual science policies, technologies and industries may be affected by the 1992 Plan, in addition to specific issues in cooperation in basic research and science, standards, R&D funding priorities, and technology development and competitiveness of U.S. companies. U.S. information technology and telecommunications technologies, including High-Definition Television, will be affected by standards set in the EC, as well as changes in R&D funding priorities in the EC and United States and reevaluation of technology development and competitiveness policies. EC energy policies also might be affected by changes in any or all four of the overall science and technology issues. The defense technology base of the United States and EC differ, and changes in funding priorities for one may affect the policies of the other.

The 1992 Plan is not yet an accomplished fact; only half of the directives have been acted on to date and there are significant disagreements among the members on some important issues. Generalizations of what the 1992 Plan will--or will not--do, and when, may overlook that while the 1992 Plan might ultimately be deleterious in one area of U.S. science and technology policy, it also might create beneficial effects in another area.

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BACKGROUND AND ANALYSIS

Overview

In 1985, a European Community (EC) Commission White Paper outlined 285 directives to eliminate or reduce barriers to promote the greater unification and coordination of the political, social, economic and technological policies of twelve western European nations. This blueprint--the so-called 1992 Plan[1]--categorized three major groups of barriers: material, technical and fiscal. The material barriers consist of controls of goods and people at EC borders. The technical barriers cover national standards, regulations and public-sector procurement. The fiscal barriers are primarily taxes which would be eliminated or harmonized among nations.[2] Elimination, reduction or harmonization of these barriers by December 31, 1992, is intended to create a single, deregulated market, the largest in the world. Notable progress has been made in implementation of the 1992 Plan, but several members remain in disagreement over some significant issues.

The idea of a single, unified Europe is not new; it was part of the creation of the EC in 1958, which called for a common market by 1972 (which was never fully met). However, it is still uncertain as to how "unified" Europe will become, and what will be the consequences for non-EC countries, specifically the United States and Japan. Many are debating whether by definition a unified Europe will be a "Fortress Europe", which will heighten the exclusion of other nations through pan-European barriers. Others argue that the 1992 Plan will create just the opposite effect: that it will result in greater economies of scale, more efficient markets and a greater demand of outside goods and services.[3]

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[1] The unification plan goes by several names: Europe 1992, Program 92, the 1992 Initiative, Pan-Europeanization, and others. For purposes of continuity, it will be referred to as the **1992 Plan** in this paper. For a general overview of the 1992 Plan and the EC, see U.S. Library of Congress. Congressional Research Service. The European Community's 1992 Plan: An Overview of the Proposed "Single" Market, by Glennon J. Harrison. CRS Report No. 88-623-E. Sept. 21, 1988. 33 p.; and U.S. Library of Congress. Congressional Research Service. The European Community: It's Structure and Development, by Martin E. Elling. CRS Report No. 88-1620F. Aug. 31, 1988. 63 p.

[2] Gosch, John. Who Will Win-Or Lose-In the Coming Unified Europe? Electronics. Nov. 1988. p. 81.

[3] Verity, William C. U.S. Business Needs to Prepare Now For Europe's Single Internal Market. Business America. Aug. 1, 1988. p. 2-3.

In U.S.-European science and technology issues, there is also uncertainty over the impact of the 1992 Plan. Generally, the 1992 Plan may have an effect on four basic areas:

Cooperative Research

Current multilateral and bilateral agreements between the United States and EC in basic research and science generally have been quite smooth and effective, reflecting the long-standing close relationship between the respective scientific communities. It is unlikely that the 1992 Plan will have a primary effect on these existing agreements, since there already is significant free movement of people and ideas both among the EC nations and with the United States. A by-product of the 1992 Plan might be more cooperative basic research among U.S. firms located in Europe and their EC counterparts; it may also lead to pressures for individual countries to look to others in Europe for collaboration, at the expense of collaboration outside of Europe.

Non-Tariff Barriers

These barriers, such as quotas, "buy-local" laws, customs and others may also affect the free flow of goods and services between the United States and Europe. A controversial non-tariff barrier which will be directly affected by the 1992 Plan is technical standards. Currently the U.S. Trade Representative acts on behalf of U.S. companies trying to sell goods in Europe, negotiating with each country on a case-by-case basis. Compatible and harmonized technical standards in Europe--outlined in the directives as part of the 1992 Plan--may be the linchpin which allows a variety of U.S. industries (especially in information systems and telecommunications) a uniform market to sell their goods and services. However, a more uniform regional barrier of standards arising out of the 1992 Plan might prevent U.S. industries from taking advantage of the "new Europe."

Research and Development Funding Priorities

The EC nations already are performing large-scale R&D in joint ventures. However, important differences exist between the United States and EC countries regarding the support of civilian vs. military spending and multi-year vs. single year budget cycles in the public sector. U.S. policymakers will have a limited impact on how EC nations will set their funding priorities. However, if the outcome of the 1992 Plan causes a further re-ordering of EC R&D activities, the United States might need to reevaluate its own priorities in both civilian and military R&D as well.

Technology Development and Competitiveness

Technology transfer and development occurs on a government-to-government level, as well as between U.S. and EC firms and their subsidiaries. On a variety of levels the 1992 Plan may change the way products are exchanged and used in the European market, ranging from the person-to-person transfer of technology in commercial laboratories to mergers and acquisitions in the global market. A secondary or tertiary effect of the lowering or elimination of trade barriers may be a reevaluation by the U.S. Government of its current programs to assist U.S. companies to compete in the world marketplace. Ultimately, the reduction and elimination of trade barriers among EC nations will affect the ability of American companies to efficiently produce and effectively compete in EC markets after 1992.

Overall, standards are clearly identified as one area for greater EC harmonization after 1992. Reduction or elimination of trade barriers may have a significant effect on technology transfer and development. Other areas of science and technology policy may be affected, but in more indirect ways. Current trends in cooperative research and science or R&D funding priorities may be accentuated rather than redirected.

In addition to these specific science policies, technologies and industries, there are overarching European programs which will affect how the U.S. will respond to the 1992 Plan. In particular, the EUREKA program, which completes and extends pan-European programs in basic and precompetitive research into areas "closer to the marketing of technological products".[4] These and other programs may provide an existing framework for the ultimate objectives of the 1992 Plan.

It must be cautioned that the 1992 Plan is far from being a fait accompli; at the end of 1988, only half of the 285 directives were in place. As recently as September, 1988, Prime Minister Margaret Thatcher of the United Kingdom tacitly addressed the underlying philosophy of the 1992 Plan, rejecting the idea of a "European conglomerate."[5] In addition, while the ultimate effect of the 1992 Plan on one area of U.S. science and technology policy--such as information technology or standards--may be deleterious, its effect on another area--such as energy or multilateral scientific cooperation--may be positive and beneficial. Therefore, this paper raises some of the more

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[4] Commission of the European Communities. The European Community of Research and Technology. Luxembourg, Office for Official Publications of the European Communities, 1987. p. 67.

[5] Sullivan, Scott. "Genghis Khan" in Belgium; Thatcher Challenges Europe's Vision of 1992. Newsweek, Oct.3, 1988. p. 34.

salient points to be considered for these issues; a more definitive understanding of 1992 may not be possible until we are closer to that date.

COOPERATION IN BASIC RESEARCH AND SCIENCE

The United States is deeply entwined in a complex web of bilateral and multilateral scientific and basic research arrangements with Europe. These arrangements range widely in formality from activities under treaties to "gentlemen's agreements" with specific countries and agencies. For example, the North Atlantic Treaty Organization has had a Science Program for 30 years in which the United States has played a key role.[6] It supports advanced research workshops, advanced studies institutes, conferences, collaborative research, individual visits and exchanges, and special programs. The U.S. also has a formal bilateral science and technology agreement with Italy, as well as less formal memoranda of understanding between the National Science Foundation and specific agencies, in such countries as France and the United Kingdom.[7] Typically, it is said that cooperation between the United States and European countries in basic research and science is quite smooth and effective, reflecting the long-standing close relationships between the scientific communities of each, as well as the relatively similar levels of development of science in Europe and the United States.

In December 1983, a European Community-United States Ministerial Meeting decided to create a "EC-U.S. High Technology Work Group." This group has met eleven times since its establishment, most recently in early December of 1988. The group is to concentrate on examining the current situation in high technology, its future development, and the environmental factors which affect it. It is also to bear in mind the possibilities for joint cooperation in the field of high technology. However, it also was agreed that specific trade problems should be dealt with in the appropriate fora. The December 1988 meeting addressed two main issues: comparable access to government-supported R&D activities (including a possible EC-U.S. bilateral science agreement), and biotechnology. Earlier meetings discussed such issues as high definition television, and the contributions of high technology in the services sectors.[8]

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[6] U.S. Congress. House. Committee on Science, Space and Technology. Science, Technology, and American Diplomacy 1988. Ninth Annual Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law 95-426. Washington, U.S. Govt. Print. Off., 1988. p. 58.

[7] Personal communication with Robert B. Hardy, Deputy Director, Division of International Programs, National Science Foundation, Jan. 3, 1989.

[8] This paragraph is based on a report to the EC-US Ministerial Meeting of Dec. 9, 1988, on the work of the EC-US High Technology Group, and on a summary of the Dec. 8 meeting of the Working Group prepared by the U.S.

At first glance, it would appear that the 1992 Plan will not directly address U.S.-European relationships in science and basic research. There is already virtually free movement of people and ideas among the countries, and to the extent that scientific progress thrives on openness and free movement, the prospect of even more open relationships in the future bodes well for science. And, the primary concerns of the 1992 Plan are the reduction or removal of barriers to trade and movement of goods, services, people, and money. The various implementing directives will have little to do with basic research and science explicitly, although they address the applications of science and research results to economic and social purposes. However, to the extent that the 1992 Plan reflects a greater degree of pan-Europeanization it could lead to pressures on each country to look to others in Europe for collaboration in research, at the expense of current or potential collaboration with the United States or other non-EC nations.[9]

Currently, there is great enthusiasm for international cooperative research in Europe, both under the EUREKA Program and under a variety of EC cooperative research and technology programs. These programs all reflect some degree of cooperation among firms and governments in Europe, generally with only limited government funds and with a focus on pre-competitive as opposed to basic research. Some have suggested that in the face of "Europe 1992," the United States may find it in its own interests to seek to put its bilateral scientific relationships with individual European countries on a more formal basis, in order to hedge against pressures to shift the partners' resources toward more intra-European cooperation. One major question that might be addressed in negotiations around an EC-U.S. bilateral science agreement would be the degree to which symmetrical access--especially by private companies from the other countries--to government-sponsored R&D programs should or could be sought. Such an agreement would have to take account of existing bilateral agreements between the U.S. and individual countries.

Similarly, the changed face of European markets in response to economic integration may have some impact on the distribution of private industrial research spending among the several countries, including the United States.

Office of Science and Technology Policy.

[9] Another form of regional economic integration is the European Free Trade Association, primarily comprised of the other non-EC western European nations. This association, as well as other regional economic and trade associations, may also be affected by the 1992 Plan, particularly if the effect of 1992 is to harmonize or reduce EC barriers at the expense of entry into the region by other nations. In science and technology issues, such questions as how the EC-EFTA relationship will be affected by 1992; how U.S. access to EFTA science and technology through multilateral agreements will be affected, and how overall U.S.-EC-EFTA coordination will be affected may loom larger on the horizon in the next several years.

Presumably, firms will be able to locate both production and research in countries based more on economic advantage and less on political concerns. What is not clear is (1) how firms will actually respond to the new opportunities and challenges of both the 1992 Plan and other forces leading toward globalization of industry, and (2) whether changes in the location of R&D or production might have any effect on the receptivity of various countries to research cooperation with the United States. There is considerable discussion in the press of a trend by American firms to invest now in Europe. This trend could result in a greater proportion of the R&D of such firms being carried out there. At the same time, every affected nation is becoming increasingly aware of the potential of basic research to contribute relatively directly to economic and national security objectives, and the European powers might decide to limit international participation.

Congress may wish to explore with the National Science Foundation, the Office of Science and Technology Policy, the Office of Oceans, Environment, and Science in the Department of State, the Office of the U.S. Trade Representative, the Departments of Commerce and Defense, and other relevant agencies whether they are (1) monitoring the implications of the various EC directives--existing and forthcoming--for U.S. science and scientific relationships, (2) taking those implications into account when formulating international projects, programs, and policies, and (3) ensuring the continued access of U.S. scientists and researchers to European programs on a reciprocal basis with European access to American programs. In view of the new authorities allocated to the Undersecretary of Commerce for Technology, the Congress may also wish to encourage a visible role for this agency in future discussions with the EC on access to R&D and technology transfer, since these responsibilities have been given to the Undersecretary by P.L. 100-519. Congress may also wish to ask the relevant agencies to inform it on an ongoing basis of the discussions held within the High Technology Working Group; discussions which, for example, do not appear to be addressed in the "Title V" report.[10]

STANDARDS

Technological standards--whether a single voltage standard for common wall outlets or a standardized operating system so that computers can "talk" with each other--form the basis by which industrial goods are traded among nations. A common technological standard between nations can facilitate trade and technology transfer. Similarly, the lack of compatible standards among nations can effectively create trade barriers and block the transfer or sale of technology. Multilateral agreements which may open up new markets for certain industries still hinge on how well the product can be adapted, or standardized, in international markets.

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[10] Ibid.

In preparation for 1992 the European Community (EC) is planning to harmonize differing national standards, as well as testing and certification procedures, into a single EC-wide body of uniform standards and regulations. This will allow all products that comply with EC standards to freely circulate within the European Community. In addition to the concern that uniform EC standards could exclude or hinder the entry of U.S. products into the European market is the possibility that imported products from the EC may be more competitive in U.S. markets, due to the economies European companies will experience from harmonized standards. On the other hand, EC standardization could have a beneficial effect on some U.S. exporters, because a U.S. product that met the EC requirements in one Member state would then be free to be marketed throughout the EC.

Most of the EC standards are being developed by non-governmental European standardization bodies, such as the Committee for European Standardization (CEN) and the Committee for European Electrotechnical Standardization (CENELEC). A special effort is being made to quickly develop a body of technical European standards for high-technology goods such as advanced composite materials and telecommunication equipment. In addition, the EC supports a Community Bureau of References (CBR) programme intended to make the results, analyses and measurements in scientific research more uniform throughout the Community.

It is important for U.S. exporters to have input into the European standards development process. However, according to the National Institute of Standards and Technology (NIST), "at the present time, interested parties in the United States do not have the opportunity to review and comment on proposed EC standards and directives during the development phase, i.e., before they are published in final proposed form. This prevents the review and full consideration of U.S. inputs at a time when they might be persuasive."[11]

The role of the Federal Government in promoting U.S. interests in EC standardization activities is limited. The issue of standards is part of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). Under the auspices of the GATT Agreement on Technical Barriers to Trade (the Standards Code), U.S. Government representatives (primarily the U.S. Trade Representative) have conducted bilateral standards discussions with EC officials. However, the EC claims that the Standards Code does not oblige signatories to publish proposed EC standards when they are first notified to EC Member States and their industry associations.

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[11] U.S. Dept. of Commerce. National Bureau of Standards. A Summary of the New European Community Approach to Standards Development. NBSIR 88-3793-1, Aug. 1988. Washington, 1988. p. 4-5.

NIST, through its Office of Standards Code and Information, serves as an information source for industry on standardization developments overseas.[12] NIST runs programs to assist manufacturers and exporters obtain foreign trade-related technical standards and information on regulations and certification. NIST is also trying to urge exporters to become more involved and cognizant of European standards development. Congress may wish to monitor these NIST activities as they relate to Europe 1992 and determine whether additional or expanded programs are warranted.

INFORMATION TECHNOLOGY

Information technology is viewed as a vital component to the future economic competitiveness of all nations. It comprises an increasingly significant share of economic activity, both in terms of manufacturing and in support of the service industries. As a result, leadership in the development of information technology and increased market share are major goals of the EC's 1992 Plan.

The Council of Ministers of the EC established a framework program for research and development (R&D) covering 1987-1991. The program is designed to establish a strategy for science and technology development within the context of an internal European market; set priorities for funding; and encourage cooperative efforts between governments, industry, and universities. The largest segment of the framework program is aimed at developing a homogenous European market and an information and communications society through R&D in information technologies and telecommunications. The research programs are designed to provide the technology base upon which European industry can become competitive and capture a growing share of the world market.

The main objectives of the ESPRIT program (European strategic programme for research and development in information technologies) are: to contribute to providing the European information technology industry with the basic technologies to meet the competitive requirements of the 1990s; to promote European industrial cooperation in precompetitive R&D in information technologies; and to contribute to the development of international standards. Specific projects will focus on microelectronics and peripheral technologies, information processing systems, and information

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[12] See Title IV of the U.S. Trade Agreements Act of 1979 (P.L. 96-39), which directs the Secretary of Commerce to establish a standards information center and a technical standards office for non-agricultural products.

technology application technologies. The emphasis is on "precompetitive" research (between basic research and development of marketable products.)[13]

There is discussion in the United States about whether comparable R&D initiatives focussing on strategic technologies and involving cooperative government-university-industry approaches need to be fostered by the U.S. Government. Concern exists that a Community-wide R&D effort might create new competition for U.S. firms that traditionally have held a leadership position in information technology. Among the questions policymakers are confronting are: Does the U.S. Government need to invest additional resources in information technology R&D? Do R&D programs need to be better coordinated within the government, as well as between government, industry, and academia? Should U.S. research efforts be focussed on "strategic" technologies vital to economic competitiveness? Will U.S. research efforts which are primarily defense-oriented be as effective in supporting economic development as EC research efforts that are designed to develop commercial products? If not, should additional resources be committed for civilian R&D initiatives?

TELECOMMUNICATIONS

Telecommunications networks provide the infrastructure for delivery of a growing array of services and the mechanism for efficient distributed production methods. The growth of a service economy and global marketing are dependent upon the development of increasingly sophisticated communications capabilities and the ability to interconnect internationally. For this reason, telecommunications is another key component of the 1992 Plan.

RACE (Research and development in advanced communications technology for Europe) is designed to ensure compatibility between the different telecommunications systems and services under development in Europe and to establish Community-wide integrated broadband communications, incorporating a wide variety of telecommunications equipment and services. A major goal of this program is to position the EC as a key player is the world telecommunications equipment and services market through the establishment of a strong, internal European market. The program will focus on developing the technology base for integrated broadband communications, performing precompetitive development of integrated broadband communications equipment and services, and formulating common protocols and standards.

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[13] Council Decision of 28 Sept. 1987 concerning the framework programme for Community activities in the field of research and technological development (1987-1991). Official Journal of the European Communities, no. L302/8-9.

The research program represents one element of broader goals for telecommunications in the European Community. The EC is attempting to harmonize the diverse telecommunications regulatory regime that currently exists among the member countries. While some countries (particularly the UK and France) have moved toward a more competitive telecommunications environment, other countries have maintained a strong government-controlled monopoly approach.

In mid-1987 the EC completed a Green Paper on telecommunications that outlined a framework for developing a harmonized Community telecommunications regulatory environment. A subsequent Action Program identified several areas where consensus appears to exist. These include: removal of restrictions on marketing terminal equipment subject to type approval; opening up value-added services to competition; separation of the regulatory and operational activities of the national telecommunications administrations; allowing telecommunications administrations to compete equally in providing enhanced services; setting of tariffs based on common principles and costs; and establishment of Community-wide standards in conjunction with international standards efforts.[14]

Despite general agreement on these goals, questions remain about the ability of the EC to overcome national approaches and establish a harmonized Community-based approach to telecommunications. Although it appears likely that implementation of all the goals of the Green Paper--even those on which consensus appears--may not be realized by 1992, indications are that significant movement in that direction is underway.

While the United States is encouraged by the move toward a more competitive European telecommunications marketplace and the lessening of the monopoly control of the telecommunications authorities, concern also exists about possible negative consequences. In particular, 1992 proposals affecting standards, procurement policies, market integration, and reciprocity may create difficulties for U.S. firms attempting to compete in the European market. A major objective of the 1992 Plan is harmonization of standards, testing, and certification of products, including telecommunications and information technologies. This would allow products certified in one country to be accepted Community-wide. U.S. manufacturers currently cannot participate in this standards-setting process raising concerns that a "European" standard will be established that essentially denies opportunities for non-European firms. Even if market entry were feasible, additional burdens imposed by product certification procedures might make outside firms non-competitive. Additionally, the EC has not indicated that it would be inclined to allow manufacturers self-testing and certification, or that authorization would be given for testing in non-EC laboratories. This raises questions

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[14] Crawford, Morris H. EC '92: The Making of a Common Market in Telecommunications. Program on Information Resources Policy, Center for Information Policy Research, Harvard University. July 1988.

about how the United States can more effectively influence European and international standards setting activities to assist U.S. industry in penetrating foreign markets. EC standards may be significantly higher than U.S. standards, which are based on "no harm to network" criteria for equipment.

Public procurement in Europe has traditionally favored national firms and has been non-competitive. The EC hopes to ultimately open public procurement to Community-wide competition. However, participation by non-EC companies may continue to be substantially limited and possibly based upon reciprocal access by EC firms to foreign public procurement markets. Should non-EC firms continue to be ineligible for government procurement contracts a portion of the European market--particularly in such areas as telecommunications--will remain closed to U.S. firms.[15]

HIGH-DEFINITION TELEVISION

Because 1992 may encourage more European joint research and development projects in information systems and telecommunications technologies, it may also foster greater attention to specific near-term commercial products. Of particular interest to many industrial nations is high-definition television (HDTV). HDTV has great promise for consumer markets--it could provide television programming with some combination of wider screens, better color, more visual detail and improved stereophonic sound. It may have military and industrial applications too.[16] In addition, because advanced television receivers will resemble fast, powerful computers, HDTV may also have an effect on industries such as computers and semiconductors. This latter observation is the basis in the United States for significant opinion that HDTV offers both a window of opportunity for the United States to recover some of its lost consumer electronics manufacturing and a further threat to its computer and semiconductor industries.

Attention in the United States has focused on the Japanese effort to set a new world-wide technical standard for studio production, incompatible with all previous standards, and thereby gain a marketing advantage for consumer equipment derived from its studio standard.[17] The Federal Communications Commission, whose advisory committee's stated aim is preservation of the

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[15] Harrison, Glennon J. The European Community's 1992 Plan: An Overview of the Proposed "Single Market." CRS Report No. 88-623 E. Sept. 21, 1988. p. 28-29.

[16] U.S. Library of Congress. Congressional Research Service. High-Definition Television (HDTV) In the United States--What Does An "Even Playing Field" Look Like (with Policy Options), by David Hack. May 6, 1988. CRS Report No. 88-365 SPR. p. 1.

[17] Ibid., p. 3.

domestic television broadcast industry, has provisionally ruled out some of the broadcast standards options derived from the Japanese studio standard. On the other hand, the U.S. State Department is involved in a controversial commitment to support the Japanese-inspired ATSC[18] studio standard before the relevant international standards body, the Consultative Committee on International Radio (CCIR), of the International Telecommunications Union (ITU).

The Europeans have shown a more coherent response to the perceived Japanese threat than the Americans; it stimulated them to organize themselves. The European broadcasting establishment had long appreciated the picture quality of the Japanese system, promulgated by Nippon Hoso Kyokai (NHK). However, the Europeans only became aware of NHK's strategic commercial objectives when the NHK/ATSC system was put forward in 1986 to the CCIR as the sole candidate for a world standard. Previously, in 1982, a consortium of European broadcasters had negotiated a digital television studio standard, known as 601 (the Japanese and ATSC standards are analog standards.) The 601 standard was endorsed by the CCIR. The European broadcasters intended this studio standard to be the cornerstone for the future development of their television into the 21st Century.[19] When the United States proposed a Japanese-inspired studio standard to the CCIR in 1986, European delegates were at first suspicious, then resolute in opposition. The European Broadcasting Union had developed a system they called MAC, standardized for direct satellite broadcasting (DBS). This system was designed to be highly compatible with the various current European transmission systems, as well as the 601 studio standard, thus allowing an evolutionary approach in phasing in new equipment for both broadcasters and consumers.[20]

European broadcasters realized at the 1986 CCIR meeting that instead of a steady progression towards digital television featuring compatibility with existing networks, the Japanese (with American assistance) were about to intrude another generation of analog television which offered the consumer something totally different at the expense of compatibility. The Europeans have speedily coordinated themselves, with broadcasters and consumer electronics companies hard at work on a defensive strategy. Their strategy involves a EUREKA research program to develop their 601/MAC ideas into an HDTV system to offer as an alternative world standard. The EC likely will

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[18] Ibid., p. 3. (In the United States, a standards organization known as the Advanced Television Systems Committee (ATSC), whose membership includes foreign-owned and foreign-influenced organizations, has developed a studio standard based on the Japanese studio standard.)

[19] Watson-Brown, Adam. Towards the Triumph of the Matte Black Box. InterMedia. v. 16, no. 1, Jan. 1988. p. 21.

[20] Ibid., p. 21.

continue to use broadcasting standards as a way to protect the European market against other HDTV technologies, notably the Japanese.[21]

The 1992 Plan could foster greater cooperation among the European nations in creating a single MAC standard, and this could significantly disadvantage or discourage the Japanese and Americans from competing in the European market. Yet implementation of the 1992 Plan might also illustrate the continued lack of European consensus in reaching a single MAC standard. During the December 1988 meeting of the EC-U.S. High Technology Group in Brussels, a full day was devoted to HDTV. The discussion was focused on recent developments in Europe, the United States and Japan, and issues of international cooperation for development of HDTV. In the United States, it may redirect intense American interest in U.S.-Japanese issues towards greater interest in a U.S.-Japanese-European axis concerning technology transfer, development and competitiveness. Whatever the outcome, the Japanese initiative will still be a milestone. The European system may ultimately offer the compatibility and esthetic benefits too, as a result of the European response.

Congress may consider the following public policy options to encourage revival of a U.S. consumer electronics industry through the opportunity of HDTV: small matching grants or seed money for the commercial development of hardware and software components of "open architecture" video receivers/displays, such as those being developed by the military through the Defense Advanced Research Projects Agency (DARPA); funding of standards development through the National Institute of Standards and Technology (NIST), as well as specific research and development funding for HDTV technology under NISTs Advanced Technology Program; reevaluation of the U.S. policy promoted by the Department of State supporting the Japanese-inspired studio production standard of HDTV as a worldwide (CCIR/ITU) standard; a permanent research and development tax credit; and specific inclusion of HDTV technology in the National Cooperative Research Act (P.L. 98-462).

ENERGY

Energy use in Europe differs from the United States in some important aspects. Generally, the EC has a much higher dependence on energy imports, particularly oil, and they use a significantly higher percentage of their oil for electric power generation. Finally, energy intensity (energy per unit of GDP) is about 40 percent less in the EC than the U.S. due to higher energy costs.

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[21] Rozien, Joseph. Dubrovnik Impasse Puts High-Definition on Hold. IEEE Spectrum. Sept. 1986. p. 32-34; 35-37.

These characteristics are reflected in the 1995 energy goals of the EC.[22] The goals include enhanced energy security through reduced oil use, greater supply flexibility, removing trade barriers to develop greater market integration of energy supply, improving the energy infrastructure of the weaker economic regions within the EC.

The R&D program focuses on three areas.[23] The first is nuclear power where primary attention is being given to safety in reactor operation and design. The second is non-nuclear energy, with concentration on renewable energy resources, energy conservation and expanded use of solid fuels. The last is controlled fusion which is centered on the Joint European Torus project at Culham in England. The EC also is an equal partner with the U.S., Japan and the U.S.S.R. on the design of the International Thermonuclear Experimental Reactor.

The energy program of the EC has had a long history of integration, particularly in R&D, beginning with the first oil price shock in 1973. Economic integration in 1992, however, should bring additional benefits. The removal of trade barriers to the flow of energy supplies may lead to a more uniform pricing system and greater energy security. Energy prices show considerable variation among the EC members. The degree to which greater uniformity and security comes about depends on how effective the 1992 program will be in making energy taxes and regulation more uniform among the member states, and more fully integrating electric utility transmission systems. Settling differences on how the member countries view nuclear power and dealing with the environmental effects of burning coal are likely to be contentious issues in this connection. On the demand side, removal of trade barriers and the creation of uniform standards may improve access to energy efficient technology. If integration effectively deals with these issues, the benefits of a more stable, secure energy supply could significantly enhance the economic competitiveness of the EC.

Current R&D efforts are not likely to change much since there is already considerable collaboration among the EC states. In addition, the International Energy Agency has been promoting collaborative R&D among its member nations--which include the EC countries--since 1974. Since EC energy goals emphasize energy efficiency and nuclear reactor safety, a more concentrated R&D effort could increase the chances of a major European presence in energy demand and nuclear technology markets.

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[22] New Community Energy Policy Objectives for 1995. Energy in Europe, No. 6. Commission of the European Communities, Directorate-General for Energy. Luxembourg, Belgium, Dec. 1986. p. 10.

[23] Energy Research and Development in the European Community. Energy in Europe, No. 2. Commission of the European Communities, Directorate-General for Energy. Luxembourg, Belgium, Aug. 1985. p. 11.

A principal policy concern for the U.S. is whether the U.S. energy R&D program should be changed or expanded to meet any market challenges that may arise from products emerging from a larger EC R&D program. In particular, would an integrated EC develop a nuclear reactor that meets the conditions of inherent safety, standardized design and modularity that are likely to be required for resurgence of the nuclear option in the U.S.? A similar question exists about demand technology, particularly for industrial process such as would be required for development of advanced materials. Congress may also wish to explore the consequences of integration on the international fusion effort. Is it possible that the EC after 1992 may choose to develop a fusion reactor without outside help? Such a choice would affect the U.S. fusion program which is becoming increasingly international. A stronger EC energy research effort may call for the U.S. to try to expand collaborative research with the Europeans through the International Energy Agency, particularly on renewable energy and conservation. Also, a post-1992 EC may intensify European concerns about acid rain leading to the need for the U.S. to expand its clean coal program and search for ways to reduce SO_2 and NO_2 emissions.

OTHER TECHNOLOGIES

The 1992 Plan may also affect other European science policies, technologies and industries (and therefore how the United States might respond), including:

- Semiconductor technology. Several EC nations are supporting JESSI, a consortium of semiconductor chip manufacturers, which was created to challenge the Japanese lead and the U.S. consortium SEMATECH;

- Biotechnology. Currently the EC has a pan-European biomolecular engineering programme (bep) and a biomolecular action program (bap) to perform laboratory research and to train engineers in related fields (e.g., agriculture);

- Advanced Materials. The EURAM (European Research in Advanced Materials) programme is a cooperative research venture in ceramics, composites and high-temperature superconductivity;

- Industrial. The BRITE programme--Basic Research in Industrial Technology for Europe--is intended to coordinate research centers, universities and industry in "traditional" industrial sectors, such as automobiles, chemicals, textiles and construction; and

- Space. Nine of the 13 members of the European Space Agency (ESA) are also members of the EC. ESA coordinates a broad variety of space science and applications programs for Europe, and developed the European launch vehicle Ariane, which is now operated by a

private company, Arianespace. Some suggest using ESA as a model of how to coordinate the objectives of several nations into a single policy.

DEFENSE TECHNOLOGY BASE

For most advanced industrial nations, the ability to draw upon a wide range of resources for their national security is an increasingly important issue. Nations must set priorities--including research and development (R&D) priorities--as part of an overall strategy to ensure the availability of technology, personnel and information for its defense needs. This availability of resources--the "defense technology base"--is crucial for modern warfare. In the United States, the primary goal of the defense technology base program is to "counter Soviet numerical manpower and weapons superiority through the development of superior technology and future weapons systems."[24]

The member nations of the EC also have individual technology base programs, and share with the United States a military commitment to the North Atlantic Treaty Organization (NATO). Yet important differences exist between how the United States establishes its priorities to improve its defense technology base and what are the EC priorities. These include a reduction of defense spending by EC countries, as the United States has increased its defense spending levels; an increase in the amount of funding for EC civilian R&D efforts, particularly in commercial, joint projects; the belief among EC policymakers and leaders that civilian research can perform "double duty" in meeting both civilian and defense needs (versus U.S. policies which separate these two priorities); and EC policies which tend to fund R&D projects--whether military or civilian--in multiyear cycles, while the United States funds R&D within annual budget cycles.

While defense technology policies are not an explicit part of the 1992 Plan, the continued emphasis by EC nations on a joint civilian/defense technology base raises a series of questions. Will 1992 foster greater cooperation in joint R&D projects for technologies which may serve a "double duty?" Can the EC have a more unified, less restricted joint civilian/defense technology base, and still serve the needs of European military security and economic growth? How will this affect EC nations' participation in NATO, including defense weapon technology contributions? Will U.S. suppliers of defense technology for Europe be affected? How will the elimination of border controls affect the multilateral export control system? Will U.S. exporters be able to take advantage of an EC-wide export control zone?

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[24] U.S. Library of Congress. Congressional Research Service. Managing Defense Department Technology Base Programs, by Michael E. Davey. Apr. 21, 1988. CRS Report No. 88-310 SPR. p. 1.

The role of the United States affecting how EC nations will set R&D priorities may be restricted. However, Congress may wish to reassess certain policy considerations, including: R&D funding priorities, particularly the balance between civilian and defense R&D funding; whether multi-year funding cycles should be considered for U.S. R&D projects; whether export controls of scientific information and technology need to be reevaluated; and whether other means of restricting U.S. technology transfer, such as trade policy, will have an impact on how our European allies structure their defense technology base after 1992.

ISSUES IN COMPETITIVENESS

Concern over the ability of American companies to compete in the global marketplace has resulted in, among other things, several laws which are intended to promote research and technology development leading to private sector commercialization of products, processes, and services. The context within which these actions were taken stemmed primarily from competition with Japanese and other Pacific Rim companies. The prospect of the 1992 Plan may change the parameters under which current Federal programs and policies for technological advancement and industrial competitiveness operate. In anticipating issues--problems and opportunities--it may be possible to moderate some of the potential negative effects of this action on U.S. industry.

Aspects of the 1992 Plan which directly affect the availability of the European market to U.S. goods are, of course, pertinent to the competitiveness of American companies (e.g., protectionist measures, preferential government procurement). There are, in addition, several factors of the 1992 Plan which might increase the ability of European firms to compete in the global marketplace and therefore may have possible adverse consequences for U.S. industry. EC action taken in pursuit of the goals of 1992 should, among other things: (1) augment existing cooperative activities between firms by providing new funds and new talent; (2) supplement on-going government-industry cooperation and government assistance to industry; (3) increase mergers, acquisitions, and cooperative ventures by companies across borders; and (4) encourage cooperative ventures between European firms and American companies which want to establish a presence in the EC.

These results could be significant. One of the primary factors in the ability of foreign firms to compete with U.S. industry is their government's support for technology development activities. In numerous cases, governments in these countries actively promote commercial technology advance and application as a component of economic growth strategies. They foster industry-government cooperation and encourage collaboration between industries, companies, and/or technically-trained personnel, while allowing competition to stimulate development for the commercial marketplace. This is in contrast to the United States where technological considerations are not well integrated into economic policy decisions; where responsibility for

technology development, if present, is diffused across agencies; and where cooperation generally has been limited to research.

Recent legislation has moved the U.S. Government toward increased support for cooperative R&D leading to commercialization in the private sector. It is expected that such activities extend the potential for the most effective and efficient use of resources. This is occurring, however, at a time when on-going cooperative efforts in Europe will be augmented and expanded by the 1992 Plan. For example, funding is provided for sectors in trouble, as evidenced by JESSI, the European semiconductor consortium. The EC sponsors programs in science and technology including joint research and cooperative R&D projects (e.g., EUREKA) and coordinates national efforts to avoid duplication. The British are known for their expertise in basic research; the Germans for their product development, the Italians for their product design. If national boundaries do actually "disappear", will the expanded cooperation between countries and companies result in products and processes which meet international market needs to a greater extent than U.S. goods and services?

The results of these cooperative activities, which oftentimes include direct government financial assistance, will be available in the marketplace along with many U.S. products and processes developed without such support. To illustrate, the Airbus, built by a consortium of European firms, now competes with airplanes developed and produced by individual U.S. manufacturers. The expanded opportunities for cooperation in Europe raise several issues which Congress might wish to explore. (1) What might be expected to be the effects on American companies which compete with firms that have government support (direct or indirect)? (2) Are cooperative R&D activities effective? (3) Will this necessitate a change in current Federal programs and policies in light of the nature of the competition, and if so, how might this be accomplished? (4) Are there viable legislative options?

The mergers and acquisition of existing European firms brought about by the 1992 Plan are expected to result in greater competition for American companies, particularly in manufacturing. These couplings often result in large conglomerates; many U.S. manufacturers are small companies. Will any "cross border" companies formed under the 1992 Plan cause additional competitive problems for U.S. manufacturers? What might this mean to smaller, specialized U.S. manufacturing companies? In addition, American manufacturers tend to be particularly vulnerable due to competition from Japan and the other Pacific Rim countries, where improved production processes and quality control make their goods more competitive. This situation may be exacerbated if the 1992 Plan is implemented. Legislative options Congress might consider to enhance technology development in domestic manufacturing a include reviewing: antitrust laws as they pertain to cooperative manufacturing; a permanent tax credit to cover both research and technology development activities; and programs to facilitate the development and use of process technology.

Another area which may be affected by the 1992 Plan is that of technology transfer. Although it is acknowledged that information and technology can not be contained within domestic borders for any length of time, lead time to develop a product or process and to build a market is crucial. However, the environment created by 1992 may accelerate the dissemination process, potentially to the detriment of American firms. Person-to-person interaction is the most effective means to transfer technology, knowledge, and skills. If U.S. based companies find that it is necessary to set up subsidiaries in Europe, this interaction is intensified. It remains to be determined whether or not the flow of technology resulting from U.S. private, and federally-financed, R&D to competing European firms will increase and what potential effects might be expected.

There are also on-going cooperative ventures between American and European companies which facilitate technology transfer. For example, GE sold its consumer electronics division to the French firm Thompson in exchange for its medical devices business. The two organizations agreed to establish a third company to conduct cooperative R&D program, carried out at the David Sarnoff Laboratory. This company will eventually belong solely to Thompson (although the facilities will be donated to Stanford Research Institute). The expertise that the French company will acquire as a result may be magnified if Thompson then transfers technology and information to other EC firms. What might the expansion of cooperative ventures within the EC mean to technology transfer between American firms and their counter parts abroad? What will be the effect of foreign investment by EC companies in U.S. high-technology firms? What might be the effect of this on the ability of companies to protect technology developed domestically through patents and licensing?

FOR ADDITIONAL READING

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APPENDIX I

Community Bureau of References (BCR):

The purpose of BCR is to develop certified standard reference materials for the European community and to explore and solve problems related to applied metrology. Its parent organization is the European Community Commission, one of five organization with the EC. Member nations are those countries belonging the EC (see below).

European Committee for Standardization (CEN):

CEN was founded in 1961 as the European Standards Coordinating Committee. Its purpose is to promote European standardization in order to facilitate the exchange of goods and services among members. CEN produces European Standards and Harmonization Documents in all areas except electric and electronic goods. Members are: Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and West Germany.

European Committee for Electrotechnical Standardization (CENELEC):

CENELEC was founded in 1973 by a merger of the European Committee for the Coordination of Electrotechnical Standards of EEC Member Countries (CENELECOM) and the European Electrical Standards Coordinating Committee. Its purpose is to harmonize the national electrotechnical standards of member countries and to remove trade barriers resulting from differing certification systems. Member nations are: Austria, Belgium, Denmark, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and West Germany.

European Community (EC):

Formed in 1957 by the Treaty of Rome as the European Economic Community (EEC), its current members are: Belgium, Denmark, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, the United Kingdom and West Germany (Portugal and Spain were admitted into the EC in 1986). The EC was created to encourage economic integration, which is generally defined as a process to abolish discrimination between economic units belonging to different national states through harmonized economic policies. The 1992 Plan would go beyond the current economic integration of the EC by creating a true common market in which all non-tariff barriers and other impediments to commerce are eliminated.

European Free Trade Association (EFTA):

After the EC was created, EFTA was formed in 1960 at the Stockholm Convention to include those countries not part of the EC. Current membership is made up of Austria, Finland, Iceland, Norway, Sweden and Switzerland. A free trade association is an entity which eliminates tariffs among the members of the free trade association, but each member may maintain its own external tariffs against non-trade association nations.

European Space Agency (ESA):

ESA was formed in 1975 by the merger of the European Scientific Research Organization and the European Launcher Development Organization. It has thirteen members: Austria, Belgium, Denmark, France, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and West Germany. A major ESA activity has been the development of an independent launch capability using a launch vehicle called Ariane.

General Agreement on Tariffs and Trade (GATT):

Signed in 1947 as an interim agreement, the GATT is now a formal multilateral agreement aimed at expanding and liberalizing world trade. The GATT Rounds are cycles of multilateral trade negotiations, the most recent being the "Uruguay Round", started in 1986 in Punta del Este, Uruguay, and currently being continued in Geneva, Switzerland. By the time the Uruguay Round was initiated, about 90 countries had signed GATT agreements, including the major industrial Western European, North American, South American, and East Asian nations. Several Eastern European nations also have participated in the GATT negotiations.

International Telecommunications Union (ITU):

The ITU was formed in 1947 from an existing organization of European countries concerned about communications services and policies. Now an international organization which is a specialized agency affiliated with the United Nations, it is responsible for coordinating international telecommunications policies and technologies. It has 168 members, including the United States and the EC nations, and its headquarters are in Geneva.

International Telegraph and Telephone Consultative Committee (CCITT):

A permanent organ of the ITU where member nations and recognized operating agents formulate recommendations concerning technical, operational and tariff aspects of international telegraph and telephone telecommunications.

(A second organization within the ITU is the International Radio Consultative Committee (CCIR), which addresses radio transmission policies, services and standards).

North Atlantic Treaty Organization (NATO):

Formed in 1949 by the major Western allies from World War II, NATO is the primary military alliance for western Europe. Its members are: Belgium, Canada, Denmark, France, Greece, Iceland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Turkey, the United Kingdom, the United States and West Germany.

Organization for Economic Cooperation and Development (OECD):

The OECD was formed in 1961 in Paris as a consultative organization whose decisions are not binding on individual members. The OECD initially focused on economic and trade issues, but has since expanded its scope of interest to include science policy, the environment, social problems, informatics and natural resources. The members of the OECD include Austria, Belgium, Canada, Denmark, Finland, France, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States and West Germany.

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