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**Chapter 3**

**European Policies in Perspective**

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## **HISTORICAL PERSPECTIVE: NATO PARTNERSHIP AND NATIONAL INTERESTS**

### *The Spectrum of Alliance Weapons Cooperation*

The central focus of U.S. defense policy toward Western Europe since the end of World War II has been the preservation and strengthening of the NATO Alliance. As this report is being prepared, events of unprecedented magnitude are unfolding in Eastern Europe that will profoundly affect the post-World War II order and U.S. defense relationships with Europe. Within a period of less than a year, the leadership has changed in Poland, Hungary, East Germany, Bulgaria, and Romania, and movement towards democratic reform has escalated. All this has taken place with the toleration and perhaps even encouragement of the Soviet Union. The dismantling of the Berlin wall, a symbol of the 40-year division of Europe into two opposed ideological camps, has opened possibilities that would have seemed quixotic just a short time ago. These include dramatically altered economic and political relationships between East and West Germany, closer economic ties between Eastern and Western Europe and changes in the roles and perhaps membership in NATO and the Warsaw Pact. The meeting in December 1989 between President Bush and President Gorbachev at Malta has accelerated the negotiating schedule for a substantial reduction of U.S. and Soviet forces from central Europe. Events are now proceeding with a rapidity that is taxing the ability of governments to promulgate realistic and supportable policies in the area of international armaments cooperation.

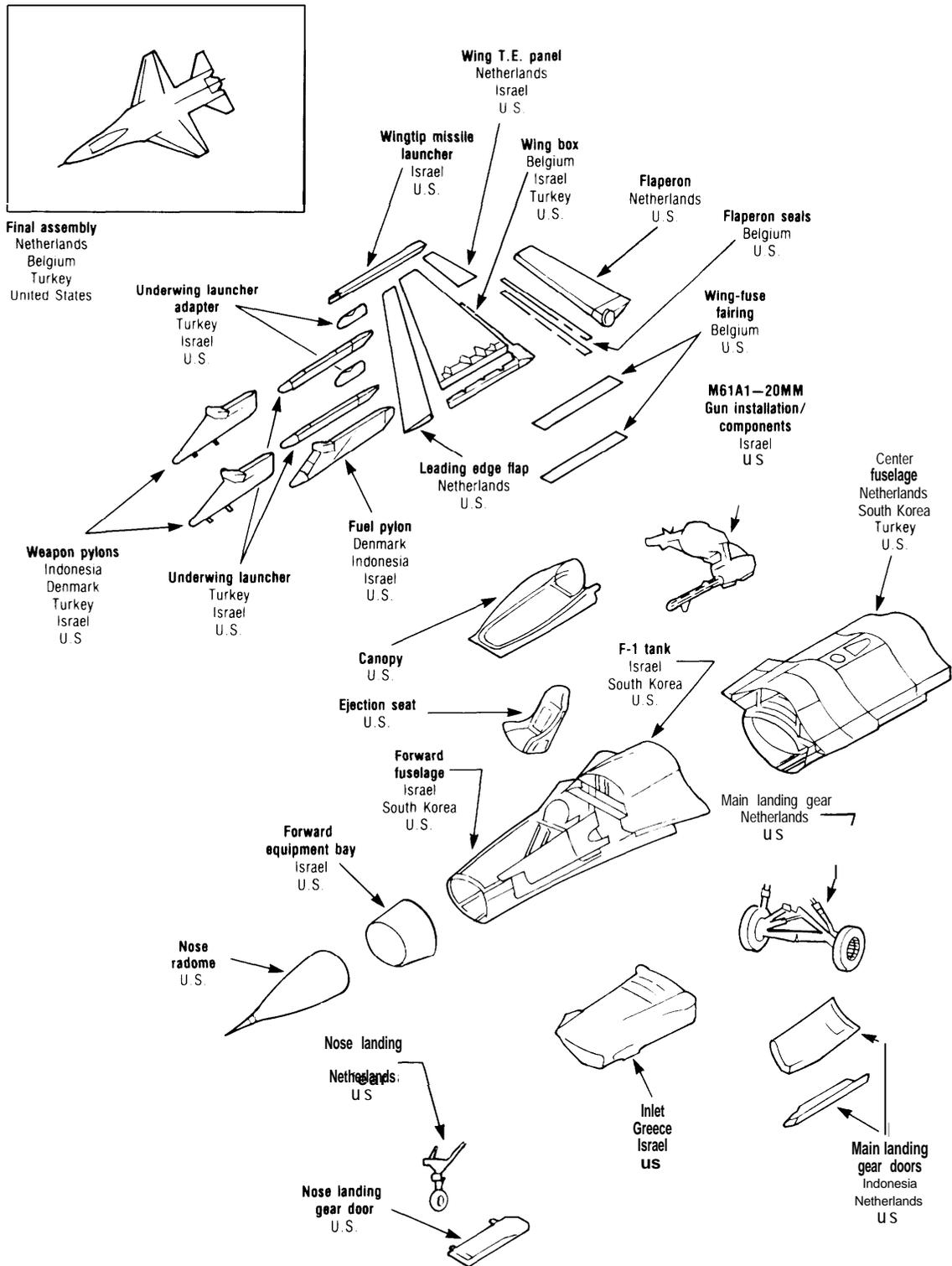
A report such as this, which deals with the design, production, and replacement cycles of weapons systems that are measured in decades, certainly in some respects, will be overtaken by political events. It is premature now to speculate on how the situation in Eastern Europe will affect specific Western armaments decisions. However, as a general guideline, it seems warranted to assume that the political convulsions will be confined to Eastern Europe, and that Western reaction to these events will be

governed to a large extent by economic and social considerations having deep historical roots. Thus, despite the current ferment, extrapolations based on the underlying economic and technological forces that have shaped U.S. weapons relations with Western Europe may yet prove valid for a wide range of political outcomes. Perhaps, and most likely of all, will be an acceleration of the current trend away from transatlantic weapons relations based on alliance considerations to a straightforward commercial basis.

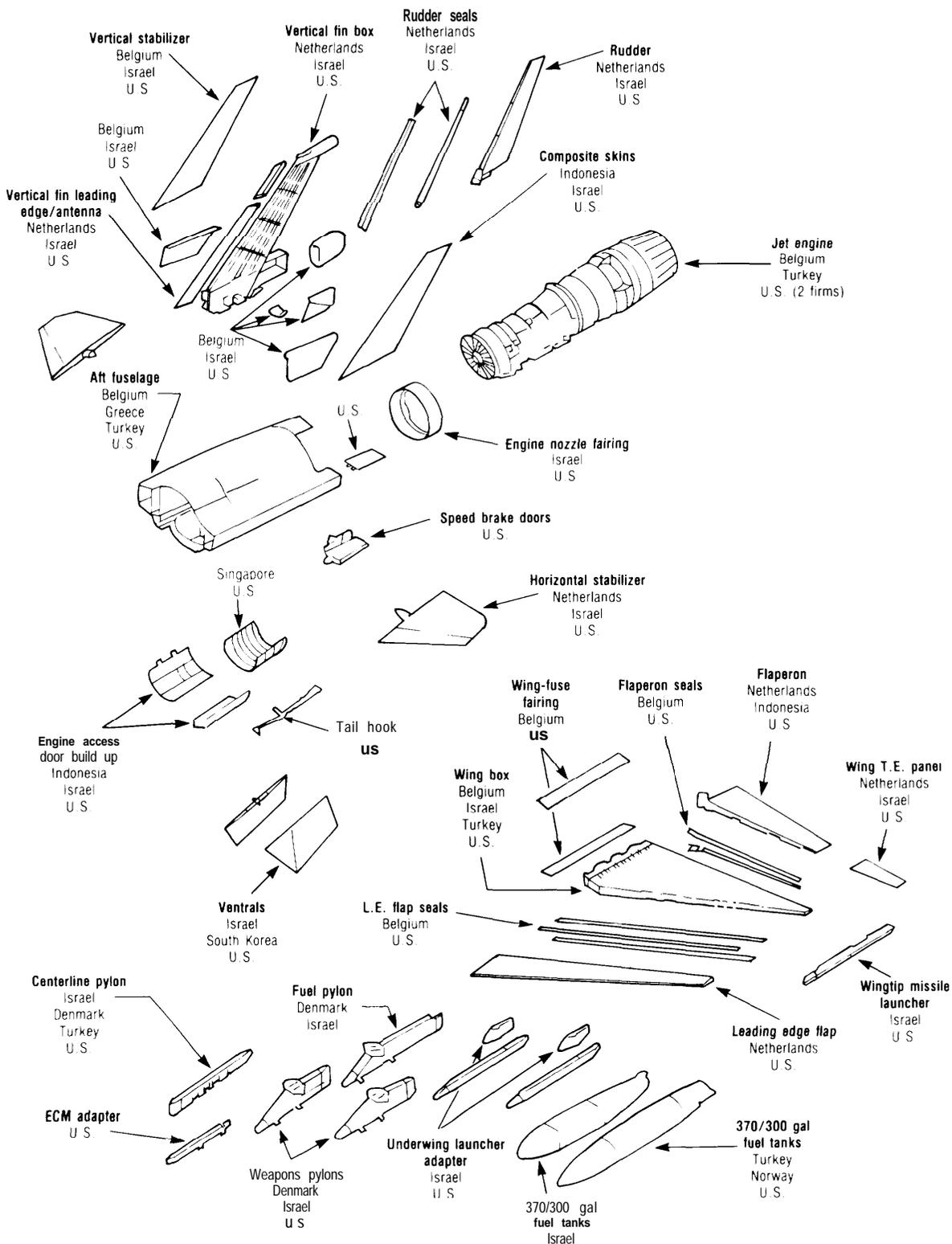
The ways in which members of a military alliance can meet weapons procurement needs range from autarchy, in which each member fulfills its requirements independently, to a variety of cooperative arrangements such as grants; direct sales; sales with offsets; complementary weapons production; licensing; and joint research, development, and production. While these different combinations are usually thought of as taking place within the context of intergovernmental agreements, other forms of collaboration do exist on the private sector level, with little or no direct governmental involvement.

U.S. relations with its European allies in weapons production have generally followed a progression up the collaborative scale. In the immediate post-war era, the United States provided weapons to the Allies on a sale basis through the Military Assistance and Foreign Military Sales programs. Beginning in the late 1950s, as the Europeans recovered their industrial capacities, the demand arose for coproduction of portions of U.S. weapons systems in Europe. Accordingly, the United States shifted from direct military sales to licensing, with the F-104 aircraft and the HAWK air defense system being the first major examples of coproduction. The largest coproduction program within NATO to date has been the F-16 fighter aircraft. This involves a complex multi-nation arrangement of joint production, sales, offsets, and sharing of third country markets—initially valued at \$2.8 billion (see figure 3-1 for the contribution of different nations). During the past decade, the United States has licensed or entered into government-to-government coproduction agreements with 17 countries, including 7 NATO members, with

Figure 3-1-F-16 Coproduction Component Breakdown



SOURCE: General Dynamics.



a total current estimated value of \$24.2 billion.<sup>1</sup> Appendixes B and C give a more detailed view of the modalities of collaboration.

As European scientific and technological capabilities reached U.S. levels, the emphasis has more recently shifted from coproduction to codevelopment, with the major collaborative impetus coming from industry rather than government. This is particularly true within Europe, where a significant proportion of major new weapons systems, such as the European Fighter Aircraft, now involve technology collaboration between two or more countries. U.S. Government interest in expanded transatlantic cooperation in defense technology R&D is evidenced by the 1986 Nunn-Roth-Warner amendment, although results to date indicate this is more difficult to arrange than intra-European collaboration.<sup>2</sup>

### *The Case for Cooperation in Defense Technology*

European and American defense analysts have traditionally agreed about the desirability of increased cooperation in defense technology. The current disarray in the Warsaw Pact leads to a sharply reduced threat perception, while concurrently Western governments are under pressure to provide increased economic assistance to Eastern Europe. Both factors will tend to accelerate the decrease in Western defense spending. Yet, at the same time, the increasing sophistication of weapons systems demands ever higher investments in research and development. The resultant high per unit cost of weapons systems and consequently decreased ability of NATO governments to purchase sufficient numbers to meet projected forces requirements, risks so-called "structural disarmament. Collaboration provides one answer to this dilemma in theory by reducing duplicative R&D and achieving economies of scale through longer production runs. It also provides for a more robust and **cost-effective Alliance** defense through standardization and improved interoperability. This, of course, presents the argument in a somewhat idealized form.

NATO collaborative projects have generally required lengthy negotiations and complex management systems, which increase costs in relation to the number of participating countries. While there is no established, accurate method of matching collaborative costs against savings resulting from elimination of duplication of weapons systems, the assumption that cooperation provides the greater overall benefit has rarely been challenged.

In actual practice, however, the NATO Alliance has fallen far short of this ideal. For political and economic reasons the United States and, to varying degrees, Germany, the United Kingdom, and France, have usually practiced autonomous weapons systems development. The resultant duplication of effort and nonstandardization of even such basic items as fuel and ammunition is widely decried by defense experts and has significantly reduced NATO weapons deployments. Nevertheless, duplication does not appear to be diminishing. A recent survey of U.S. and European weapons systems under development identifies, for example, 16 U.S. and 26 European tactical aircraft, 33 U.S. and 38 European **tactical missiles**, and 18 U.S. and 20 European helicopters.<sup>3</sup>

For the smaller NATO countries, which lack the technological infrastructure to produce entire weapons systems, the options are limited to direct purchase or coproduction arrangements. Coproduction usually results in much higher per unit costs; however, the desire to provide for domestic employment, protect trade balances, and other nondefense considerations usually lead these countries to prefer it to direct purchases.

### *Collaboration and National Interests*

Collaboration in defense technology, as opposed to licensing or coproduction arrangements, should be a more effective form of weapons cooperation between the United States and its NATO allies of roughly equal technological capabilities, since collaboration shares costs and reduces duplication. It is

<sup>1</sup>The totals from fiscal years 1977 through 1988 for the NATO countries are: German y-\$4,309 million; Greece—\$199 million; Italy-\$71 million; Spain-\$578 million; Turkey—\$0.3 million; and U.K.-\$ 1,550 million. Source: Defense Security Assistance Agency.

<sup>2</sup>European reluctance to enter into technology collaboration with the United States is not a new phenomenon. For example, a 1980 study on NATO tactical missile programs indicates that the Europeans will accept elaboration with the United States only if it: a) is based on European participation as an equal partner; b) does not interfere with intra-European cooperation; c) involves increased direct purchase by the United States of European systems, or at least adoption by the United States of such systems through the use of licenses; and d) does not interfere with sales to third countries. Herschel E. Kanter and Joh N. Fry, *Cooperation in Development and Production of NATO Weapons* (Alexandria, VA: Institute for Defense Analyses, December 1980), p. S-9.

<sup>3</sup>"Status of Major U.S., European Defense, Aerospace Programs," *Aviation Week and Space Technology*, vol.132, No.12, Mar.19, 1990, pp. 20-37.

### ***Forms of Collaboration***

During the 1960s and 1970s, when the Foreign Military Sales (FMS) program was at its peak, U.S. industrial strategies for defense exports were simple: companies either manufactured equipment to be sold by the U.S. Government under the FMS program or they supported U.S. Government coproduction and licensed production policies on selected weapons systems. Through FMS programs, U.S. industry set up support teams in foreign countries to assist in installing, training, operating, and maintaining U.S.-origin equipment. In general, U.S. companies assisted foreign companies so that they could in turn support their own governments. These activities rarely led to lasting business relationships. It was in the commercial and space markets where U.S. and foreign companies began to establish a more equal basis for collaboration.

Throughout the 1980s, industry-to-industry collaboration grew in importance. The simplest form of industry-to-industry collaboration is teaming. One company (usually based in the sponsoring country) serves as the lead and prime contractor. The other team members function as subcontractors who participate in the program in a predetermined way. Teaming is standard practice in the U.S. defense marketplace, and is used by prime contractors to lockup critical subcontracting resources during competitive bids. In fact, teaming is so widely used in the United States that defense contractors often find themselves on competing teams for one program and on the same team for another.

Most European companies have not favored program-by-program teaming. Instead, they have sought to establish long-term, management-level relationships with firms with complementary technologies, product lines, or markets, using these associations as a basis to pursue a range of similar market opportunities. This has led to an emphasis in Europe on formal strategic company-to-company agreements or alliances. This concept of banding together to pursue expensive and long-term development programs has become commonplace and a consortium or joint venture is often the formal mechanism.

Whereas a teaming agreement is a prime contractor-subcontractor relationship operating under existing corporate structures, a consortium usually assumes an organizational form of its own, often with a board of directors comprised of the member companies to oversee activities, a lead program manager, and integrated technical and support teams. Consortia can be directed toward multiple business opportunities or a single one. Several have been formed to pursue cooperative programs funded under the Nunn amendment.

A joint venture is a separate corporate entity established by the participating companies and operated as an independent body. Joint ventures represent a greater corporate resource commitment than simple teaming or consortia because the new company must be financed and helped to grow, over an extended period. While a joint-venture company may look to the parent companies for most resources, it can also go outside to acquire goods and services, which may be available on better terms. Joint ventures are almost always set up to pursue broad business areas, but their objectives and structures are flexible. These companies can concentrate on marketing, joint R&D activities or manufacturing, or a combination.

Until recently, banding together was relatively unfamiliar to U.S. industry. However, major U.S. companies are beginning to seek collaboration in key technologies. Much attention has been paid to SEMATECH, the DoD-industry consortium to develop microelectronic manufacturing technologies, although there are some earlier examples, such as the Electric Power Research Institute (EPRI), the Semiconductor Research Cooperative (SRS), the Council on Chemical Research, the University Steel Resources Center, and the Microelectronics and Computer Corp. (MCC). The trend toward collaboration on a national scale has been aided by a relaxed U.S. Government attitude regarding the anti-trust implications of joint ventures in advanced technology and by the obvious success of such ventures in Japan and Europe.

The ultimate joint venture is an acquisition or merger. Since the mid-1980s, an increasing number of U.S. defense and high-technology firms appear to have been acquired by foreign concerns. While Japanese investment in the United States has been closely watched, in fact, U.K. investments in the U.S. defense sector have been greater. As the pace of these acquisitions has increased, foreign ownership has become an increasingly important issue with Congress and with DoD.

On the other hand, U.S. companies have not moved as aggressively to acquire companies in Europe or in the Pacific Rim. This is in part because these governments historically restrict foreign takeovers of their defense and high-technology firms. Although cross-border mergers and acquisitions are becoming more commonplace in

*continued on next page*

### ***Forms of Collaboration—continued***

Europe pursuant to the Single European Act, takeovers by U.S. firms are still viewed with caution. U.S. acquisitions in Japan are even more difficult to achieve.

There are other barriers to foreign acquisitions by U.S. defense firms. For example, in such ventures the long view must be taken in terms of sales and profits, but U.S. companies seldom see individual foreign markets as sufficiently large to warrant tying up capital or taking undue financial risks. Consortia or joint ventures appear to be favored by U.S. companies to achieve a presence in foreign markets.

Depending on goals and market strategies, a company can use a variety of other techniques to facilitate industrial cooperation and increase exports. For mature products, for example, product licensing and cross-licensing techniques are common. In these a foreign firm is provided with a design and/or production package and the authority to produce and sell U.S.-developed products (or vice versa). Revenue sharing and technical assistance agreements are also used.

also the most difficult to arrange, because it impinges directly on the partners' defense, foreign policy, and economic interests. Collaboration is consequently easiest to initiate among nations whose broad interests are most nearly congruent.

U.S. alliance relationships with Europe can be envisioned as encompassing a range of mutual understandings. At the fundamental level, there is the common agreement that Western Europe should not fall under Soviet military domination. The durability of the NATO Alliance attests to the unquestioned transatlantic accord on this basic political purpose. On the next level is the issue of the direct economic costs of supporting the Alliance. Here there is considerably less agreement between the United States and Europe and, indeed, among the Europeans themselves. The "burdensharing" debate over what each member country should contribute has been a chronic problem for NATO, but has not caused a serious transatlantic rift. U.S. urging for increased European defense spending has never been rejected outright, but rather subsumed in promises by European Political leaders as goals to be achieved in the future. Further, some NATO countries, such as the United Kingdom and Turkey, actually do achieve percentages of gross national product (GNP) defense spending that approach that of the United States (see figure 3-2). At the third level is the issue of how overall economic policy relates to defense policy. Here the differences between Europe and the United States are the most pronounced. In this regard, unilateral U.S. economic

sanctions and trade policies have, at times, left the United States entirely isolated within NATO, creating suspicions that have never been fully resolved and creating a continuing residue of mutual suspicion.<sup>4</sup>

Added to the differences in policy comes the issue of the sheer size of defense outlays. U.S. annual spending on defense R&D, for example, equals the entire budget for the Bundeswehr. This disproportion has the effect in the United States of creating a high degree of insularity, while instilling in European governments and industry the feeling that they either must join forces or be swallowed by the U.S. defense industrial effort. It is therefore not surprising that collaborative programs in defense technology, which affect wide and sensitive sectors in each nation's economy, are advancing more rapidly among the Europeans than with the United States, despite the impetus of the Nunn-Roth Amendment. A further understanding of this phenomenon maybe found in comparing how differences in historical experience have shaped perceptions of national interest in the United States and in Europe, especially at the critical intersection of economic and defense policy.

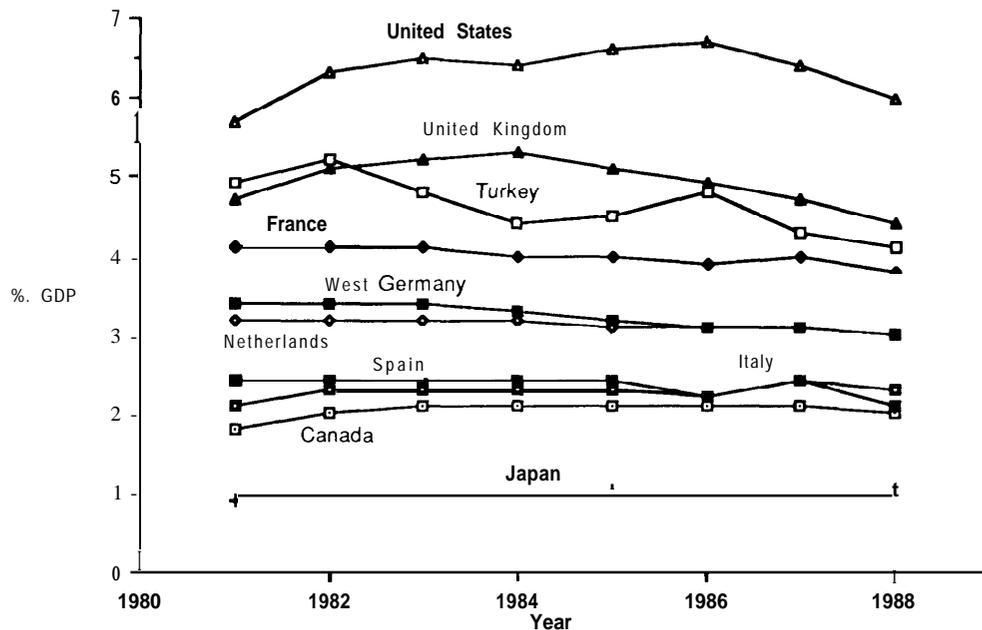
### ***The Post-War Context***

#### **United States**

The United States emerged at the end of World War II as the world's preeminent military and industrial power. The United States was willing and able to give generous assistance, exemplified by the

<sup>4</sup>Examples include the 1979 declaration of U.S. economic sanctions against the Soviet Union following the invasion of Afghanistan, which the Europeans undercut with sales of agricultural and industrial goods, and European commencement of the the Siberian gas pipeline over U.S. objections, including unauthorized re-export of U.S. technology during the 1981-82 Polish crisis. For their part, the Europeans accused the United States of attempting to use sanctions to obtain commercial advantage.

Figure 3-2—Military Expenditures as Percent of Gross Domestic Product (GDP)



SOURCE: Data from Arms Control and Disarmament Agency, 1988.

Marshall Plan, to its European allies and former adversaries in helping to rebuild their war-ravaged economies and provide for their defense. At home, Americans perceived little need for government intervention in the civilian economic sphere beyond regulation and social welfare, and government-industry relations reverted in the United States to the distant and quasi-antagonistic pre-war posture. The major challenge the United States faced was the military threat posed by the Soviet Union, which refused to enter a post-war settlement and appeared to menace Western Europe and other regions. As a consequence, during the next 30 years, the United States fought two major wars and engaged in numerous smaller conflicts to combat the expansionism of the Soviets and their proxies and allies.

As a hegemonic power in the immediate post-World War II decades, the United States did not differentiate its economic and defense policies toward Europe. The United States considered European economic growth and steps toward economic integration both as good in themselves and as bolstering NATO defense capacities. As long as the

U.S. trade and fiscal situation remained reasonably balanced, the economic implications of U.S. defense commitments to Europe were of secondary importance. During this period, the United States sold weapons and weapons systems to its European partners at bargain prices, and readily acceded to European demands for coproduction and offset arrangements that reduced its balance of trade credits. It was not until the early 1980s, when the U.S. current account and manufacturing trade balances went into precipitous decline, that national attention focused on the economic side of the defense equation. Since then, there has been increasing concern that structural weaknesses in the U.S. manufacturing sector will undercut the maintenance of a first-class indigenous defense industry, and that the civilian economy and manufacturing base may be unable to support general governmental defense expenditures at current levels.<sup>5</sup>

The DoD is undertaking programs to support U.S. competitiveness in critical dual-use technologies such as Very High Speed Integrated Circuits and High Definition Television, yet many question

<sup>5</sup>See U.S. Congress, Office of Technology Assessment, *Holding the Edge: Maintaining the Defense Industrial Base*, OTA-ISC-420 (Washington, DC: U.S. Government Printing Office, April 1989); and U.S. Congress, Office of Technology Assessment, *Paying the Bill: Manufacturing & America's Trade Deficit*, OTA-ITE-390 (Washington DC: U.S. Government Printing Office, June 1988), for comprehensive discussions of the defense and civilian sector aspects of these issues.

whether defense R&D can or should continue to serve as a spur to the civilian economy. The need for increased U.S. export performance is universally accepted, but export control legislation considered disadvantageous to U.S. industry is allowed to remain on the books. The need to trim fiscal and current account deficits is likewise accepted, but the United States has not reduced significantly its foreign military commitments, including an estimated \$150 billion annual outlay for NATO.<sup>6</sup> At present no consensus has formed to adjust national policies to current economic or political conditions.

## Europe

World War II left the European industrial base in ruins. The European imperial powers, France and the United Kingdom, were stripped of their colonies. Germany, the major continental power, lost its eastern provinces and the remainder was divided between East and West. Collectively and individually there was neither the will nor the ability to project international political influence. Europe gladly accepted U.S. military protection and turned its full attention to the restoration of its economy. Government assistance and protection in the process of economic restoration were considered essential. Many industries were nationalized or otherwise established close ties to government. The Europeans recognized that intra-European cooperation was required for full economic recovery. The post-World War II history of Europe reveals a steady progression of economic cooperation from the European Coal and Steel Community, to the European Economic Community, to preparations for integration in 1992 under the Single Europe Act. European defense concerns remain substantially confined to the European continent.

The European approach to weapons procurement has been strongly influenced by economic considerations since the inception of NATO in 1949. Matters of domestic employment, export markets, civilian research and technology, and balance of payments have usually taken precedence over strictly defense concerns. The Europeans have been willing to pay a considerable premium in lessened defense capacity, or absorb higher costs, for the benefits of domestic production on the rationale that, as democracies, they would lose public support for defense efforts resulting in a net loss of employment. Thus,

beginning in the late 1950s, the Europeans have opted for coproduction arrangements rather than weapons purchases from the United States, have demanded offsets for what purchases they do make, and have initiated duplicative and competing weapons programs when they achieved the requisite technological capacity.

In distinction to the traditional U.S. attitude that European progress in the civilian economy and defense sectors is equally desirable and valuable, European attitudes vis-à-vis the United States have been more nuanced. In European eyes, the United States is seen as a strategic ally, but also as a formidable economic competitor whose dominance in NATO, if not opposed, could lead to permanent European technological inferiority. Even while the technology gap rapidly narrows, the Europeans still perceive that the United States will retain its competitive advantage in defense production due to the economies of scale afforded by its huge domestic market. This perception is the driving force behind the integration of national defense programs and the creation of intra-European strategic alliances in defense production. The Europeans are bolstered in this effort by their experience in government-sponsored cooperation with the Airbus and commercial space programs, which have made wide inroads into markets hitherto dominated by U.S. industry. The present situation requires that the Europeans balance carefully their economic and defense relationships with the United States, being sufficiently cooperative to deprive the United States of an excuse for a reduction of support for NATO, while at the same time pursuing common economic policies that are specifically designed to compete with U.S. interests.

## NATO

At the founding of NATO, it was immediately apparent that economic and social conditions in Western Europe made it impossible to match the formidable Soviet advantage in conventional weapons. Defense policy and strategy thus centered on the threat of U.S. nuclear retaliation to deter a Soviet attack on NATO. The credibility of the U.S. strategic nuclear deterrent came under question when the Soviets achieved strategic nuclear parity. The NATO solution was the doctrine of "Flexible Response."

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<sup>6</sup>See U.S. Congress, *House Armed Services Committee, Report of the Defense Burdensharing Panel, August 1988*, p.12.

The question of how much conventional defense is enough has been a continual matter of contention between the United States and the Europeans. The United States has consistently urged that NATO provide a conventional defense sufficient to deter a Soviet conventional attack while underlining the threat of nuclear escalation. The United States stations large numbers of forces in Europe for this purpose. The NATO Allies have not been very responsive to U.S. pressure because of the increased cost to them of conventional defense, and for strategic reasons. The Europeans argue that their patterns of defense spending, which was initially constrained by economic weakness, are now set and it is politically impossible for governments to raise them, absent a significant change in public perception of the Soviet threat. The Europeans have also questioned the strategic desirability of a conventional force equally matched to the Warsaw Pact, which may tend to de-link the U.S. strategic deterrent. Current political developments in Eastern Europe and the Soviet Union, and conventional force reduction agreements, may rapidly alter these basic perceptions. But for the present at least, the Allies appear to value the presence of the U.S. force in Europe more in terms of a guarantee of U.S. strategic linkage than for its war-fighting potential.

In theory, NATO headquarters should serve as the locus of cooperation to ensure that the forces of member countries are appropriately equipped, including standardization and interoperability of weapons systems, to perform assigned defensive tasks. NATO has developed an extensive coordinative mechanism for this purpose, headed by the Conference of National Armaments Directors (CNAD). However, NATO Headquarters has only the power to make recommendations to member governments and, in practice, has been only marginally successful in obtaining compliance. The chief reason is that the Allies have been reluctant to have an overly effective standardization program, which they fear would be based on generally cheaper and more effective U.S. weapons systems.

The Europeans have therefore preferred first to hold weapons coordination and standardization discussions among themselves, before facing the United States at the CNAD. These consultations take place within the Eurogroup, which is formally associated with NATO, and perhaps now more importantly in the Independent European Program Group (IEPG) (discussed below) which is independent of NATO.

The Europeans have denied a U.S. request to monitor meetings of the IEPG, noting that Europeans are not privy to DoD procurement deliberations. (Figure 3-3 shows the membership of the principal organizations involved in international defense collaboration.)

Proliferation of nonstandardized weapons has been decried by a succession of both U.S. and European NATO commanders, and according to some war-game scenarios, the factor of weapons standardization could make the difference between victory and defeat for NATO. However, these admonitions have not been sufficiently convincing to change current NATO practice.

### **Asymmetries in U.S. and European Perspectives**

It is remarkable, in view of the global changes that have occurred since the end of World War II and onset of the Cold War, how little the perceptions of national interest have altered on both sides of the Atlantic. Concern about the long-term health of the U.S. economy has risen in the past decade, and more recently there has been a greatly reduced perception of the Soviet threat, but U.S. governmental expenditure, organization, and policy still largely reflect Cold War perspectives. While Americans are generally taxed at lower rates than their European counterparts, the great preponderance of discretionary Federal spending is devoted to defense. The Europeans pay less, in total and per capita, for defense and more for social welfare and the civilian economy. U.S. Federal R&D spending is centered in the military sector, European governmental R&D is civilian oriented.

The United States views NATO cohesion as the linchpin of its relations towards Europe, while the Europeans seem more apt to subordinate defense concerns to matters of economic stability and growth. The United States has an extensive apparatus for the licensing and control of militarily sensitive technology and is relatively light on governmental export promotion mechanisms, while the reverse is true in Europe. The United States has a tendency to see the Third World as a political arena for competing ideologies, the Europeans see it as a source of raw materials and an export market. These asymmetries are evident in the overall statistics: with a combined population and GNP that now exceeds that of the United States, Europe's defense spending is less than 50 percent, its procurement budget is 40

### ***Defense Collaboration in NATO Europe***

Since its inception in the mid- 1960s, NATO armaments cooperation focused largely on the activities of the Conference of National Armaments Directors (CNAD), a senior body reporting to the North Atlantic Council, NATO's top political organization (see app. A). Until the mid-1980s, international collaboration in defense technology and NATO armaments cooperation were essentially congruent.

About 200 groups, subgroups, ad-hoc groups, information exchange groups, cadre groups, and working parties are organized under CNAD, with each addressing some aspect of collaboration in defense equipment. Each group is supported by one or more U.S. delegates. The work of CNAD groups ranges from attempts to harmonize national acquisition policies, to prefeasibility (or concept formulation) studies on new weapons, to applications of advanced technologies to future military needs.

The CNAD is criticized for being too complex. Because CNAD bodies face such complicated issues, however, it is not surprising that such a structure has resulted. But CNAD's complexity discourages DoD officials from pursuing cooperative activities in NATO. They prefer, instead, to use smaller and more manageable fora. However, unlike other NATO bodies, CNAD decisions do not require unanimity. If they agree on a course of action, any two or more nations can proceed with NATO's blessing. The fact that no single nation can veto a cooperative program is an often overlooked strength of the CNAD. Once an agreement to cooperate is reached in principle, participating nations negotiate agreements, sign contracts, and get programs underway — all outside NATO. Government-to-government collaborative programs funded under the Nunn amendment have also developed this way. As noted in app. B, the first of these proposals was presented at a special CNAD meeting in 1986.

Other mechanisms are used to promote transatlantic collaborative programs as well, including the so-called Four-Power meetings between the United States, the United Kingdom, West Germany, and France. The National Armament Directors from these four nations meet at least twice yearly (as do their deputies) to discuss a range of topics, often in preparation for introduction into NATO. The military departments also have four-power and bilateral meetings at the level of the Service National Representative, generally the top-level uniformed R&D official from each nation. Firm agreements on collaborative programs can result from these meetings, which often serve to coordinate positions for upcoming NATO meetings.

percent, and its defense R&D expenditure is less than **20** percent of that of the United States

Despite markedly different transatlantic perceptions of global interest, NATO has been until now a singularly stable and successful enterprise. Since its founding, it has suffered only one major setback, the withdrawal of France from NATO's integrated military structure in 1967. The Alliance nations have generally prospered, although some more than others. Open ruptures in NATO have been skillfully avoided, perhaps primarily because the emphasis on deterrence rather than war-fighting capacity allowed great flexibility in deciding acceptable levels of contributions by the member states to mutual defense. Yet the underlying tensions among the Alliance partners remains, and economic, political, and technological developments over the past years and months auger some realignment of U.S. defense relationships with Europe. The recent wave of democratic movements in Eastern Europe appears likely to accelerate the process.

### ***The Forces for Change***

#### **Western Europe Achieves Economic Parity With the United States**

During the past two decades most traces of former European economic and industrial dependence on the United States have disappeared. The balance of trade now favors the Europeans, and other economic indicators such as per capita incomes, levels of European investment in the United States, numbers of patents issued, etc., all point to the fact that the era of U.S. supremacy has passed. The forthcoming economic integration of Europe in 1992 under the Single European Act promises to expand further European economic prowess vis-à-vis the United States.

These developments have exacerbated the issue of "burdensharing," i.e., the appropriate level of U.S. support for NATO relative to European contributions. In the United States there is considerable and growing sentiment for a reduction of U.S. forces stationed in Europe, particularly if the Europeans do not raise the level of their defense expenditures. On

Figure 3-3-Organizations of Allied Defense Collaboration

	North Atlantic Treaty Organization	Conference of National Armaments Directors		European Economic Community	Western European Union	Independent European Programme Group
	NATO	CNAD	Euro Group	EEC	WEU	IEPG
<b>Nation</b>						
Belgium	√	√	√	√	√	√
Denmark	√	√	√	√	√	√
France	√			√	√	√
West Germany	√	√	√	√	√	√
Greece	√	√	√	√		√
Iceland	√					
Italy	√	√	√	√	√	√
Luxembourg	√	√	√	√		√
Netherlands	√	√	√	√	√	√
Norway	√	√	√			√
Portugal	√	√	√	√		√
Spare	√		√	√		√
Turkey	√	√	√	√		√
U.K.	√	√	√	√	√	√
U.S.	√	√				
Canada	√	√				
<b>Functions</b>	<ul style="list-style-type: none"> <li>•Western Europe's link to U.S.</li> <li>•Coordinates Allied military forces</li> </ul>	<ul style="list-style-type: none"> <li>•Part of NATO</li> <li>•Structure for military R&amp;D and production</li> </ul>	<ul style="list-style-type: none"> <li>•Harmonize operational concepts, weapons production &amp; logistics</li> </ul>	<ul style="list-style-type: none"> <li>•Common economic market</li> <li>•NO explicit defense role</li> <li>•Defense role through dual-use and R&amp;D programs</li> </ul>	<ul style="list-style-type: none"> <li>•Inner group of European nations</li> <li>•Focus on cooperation in defense production</li> <li>•Works within NATO</li> </ul>	<ul style="list-style-type: none"> <li>•Central arms organization for European nations</li> <li>•Negotiates collectively with U.S. on defense Industrial activities</li> <li>•Exploits European technological resources</li> <li>•Eliminates cross-national barriers</li> <li>•Sponsors EUCLID defense R&amp;D program</li> </ul>

SOURCE: Office of Technology Assessment, 1990.

### **Defense Collaboration in Non-NATO Europe**

Cooperation with non-NATO European countries is concentrated on Sweden and Switzerland. Coproduction agreements with Sweden permitted the Swedes to manufacture U.S.-designed equipment after WWII. Subsequently, the United States has purchased a few Swedish-designed and built weapons. Recently under the Foreign Weapons Evaluation program, Swedish equipment has fared well, although only nominal procurements have taken place to date. U.S./Swiss cooperation remains at a low level, but the recent Swiss decision to purchase F/A-18 fighters may generate increased cooperation. The Austrians have shown interest in working with the United States, and the U.S. Army has purchased some Austrian wheeled vehicles, and has included Austrian firms in competitions for some Army developments. More recently, the Finns have been working with DoD and the State Department to develop a mechanism for cooperation with the United States.

the European side there is concern about the **willingness** and ability of the United States to maintain its current level of support for NATO. As one European observer put it: "How long can we expect 260 million Americans to defend 320 million Europeans from 280 million Soviets?"

The burdensharing issue and the economic tensions it expresses have a depressing effect on the prospects for transatlantic weapons collaboration, as governments and private industry become wary of making heavy investments in joint projects that may be abruptly canceled by limitations on funding. The past year has witnessed a significant number of cancellations or national withdrawals on economic grounds from cooperative NATO projects involving the United States.<sup>8</sup>

### **Perceived Decline of the Soviet Threat**

With the accession of Soviet President Gorbachev and the Soviet withdrawal from Afghanistan, Western perceptions of the Warsaw Pact threat to NATO have undergone rapid evolution. The election of democratic governments in Poland, Hungary, Czech-

**oslovakia**, East Germany, Bulgaria, and the economic and political turmoil in the Soviet Union itself have contributed to the assessment that the Soviet threat is eroding. Gorbachev's announcement of cuts in the Soviet defense budget, unilateral force reductions, and apparently more flexible positions regarding nuclear, conventional, and chemical weapons negotiations have added further credibility to the notion of a more peaceful Soviet orientation. The U.S./Soviet summit scheduled for 1990 appears likely to result in agreement for the reduction of substantial mutual reduction of forces in Europe.

While Gorbachev's initiatives have been warmly greeted on both sides of the Atlantic, there is the possibility of a substantial split of U.S. and European views concerning their ultimate significance. At this writing the Europeans appear somewhat more ready than the United States to accept Soviet reforms as irreversible and proceed with economic assistance to Eastern Europe and increased trade with the Soviets. The United States is not prepared to overlook continued Soviet military aid to Nicaragua, Afghanistan, and other areas of regional conflict. A serious rift in the Alliance could develop if, for example, there is a failure in arms control negotiations or in the event of a Soviet-backed military crack-down in Eastern Europe or the Baltic states.

From the European viewpoint, balanced U. S./Soviet arms control agreements and force reductions are highly desirable politically, but may entail some undesirable economic consequences. Apart from the reduction of direct U.S. payments for the support of its forces in Europe (West Germany alone receives approximately \$6 billion annually for this purpose) the Europeans worry about the effect on their domestic markets of U.S. defense production overcapacity. There also may be some concern about U.S. or Soviet "free sales" in Third World markets of weapons withdrawn from Europe under arms control agreements.

Perestroika and the events in Eastern Europe in late 1989 appear to have sharply accelerated declines in NATO defense spending. Managing coordinated and equitable reductions may prove a difficult and

<sup>7</sup>Jean-Pierre Bechter, Secretary of the Defense Committee of the French Parliament. Quoted in Cook and Gilmore, *Toward a European Pillar* (Washington, DC: Center for Strategic and International Studies, November 1988), p. 5.

<sup>8</sup>These include U.S. and British withdrawal from the modular stand-off weapon (MSOW), West German withdrawal from the advanced short-range air-to-air missile (ASRAAM), West German withdrawal from the NATO Multifunction Information Distribution System, and British, French, and Italian withdrawal from the NATO Frigate Replacement for the 1990s (NFR-90). "Tight Budgets, Design Conflicts Undercut NATO Weapons Projects," *Aviation Week and Space Technology*, Sept. 25, 1989, vol. 11, No. 39, pp. 18-19.

contentious issue within the Alliance. In December, 1989, the United States announced a 2 percent reduction in defense spending, while at the same time West Germany indicated plans for a 20 percent reduction in the Bundeswehr.

### High Technology and Global Industrialization

The past several decades have witnessed a steep rise in international trade and a world-wide revolution in manufacturing processes. The computer and associated electronics have become major factors in practically all aspects of production, with a versatility that blurs the distinction between civilian and military applications. Moreover, these technologies have spread from the United States to Europe, Japan, and the newly industrialized countries in Asia. Most of the dynamism in computers and electronics has been due to vigorous growth in the civilian market. Thus, in contrast to the immediate post-war era, the military sector has now lost much of its dominance as the focus of high-tech innovation, and in many areas is becoming a net importer of civilian R&D. At the same time, manufacturing is losing some of its national character, with research and development for a given product taking place in one set of countries, manufacturing of components in others, and final assembly and marketing in still others. These factors are forcing a change in U.S. and European thinking about weapons production.

The question of how to maintain the requisite degree of national defense sovereignty in the face of these trends is acutely felt in the United States and Europe, but the reactions to these developments have been different. In the United States, governmental efforts remain centered on military programs to keep the United States abreast of leading edge dual-use technologies. There are also a wide variety of proposals to strengthen the U.S. defense technology base through improved DoD acquisition and R&D management, but significantly there is no consensus on how to stop or even slow the erosion of the civilian R&D base. Europe, on the other hand, has taken up this challenge in the mid-1980s by spurring intra-European civilian R&D collaboration

through such programs as BRITE, EUREKA, ESPRIT and RACE,<sup>9</sup> which to some extent mirror DoD's programs. There is also a move toward improved intra-European weapons production collaboration through the IEPG, and a reorganization of European defense industries.<sup>10</sup>

## CURRENT EUROPEAN PERSPECTIVES ON THE DEFENSE MARKET

### *Overcapacity and Transatlantic Competition*

Real defense spending in NATO Europe has declined for the past 5 years and, without a sharp reversal in current Soviet behavior, the outlook for U.S. and European defense procurement spending remains bleak. European weapons suppliers and ministries of defense have felt the pinch of constrained budgets and are grappling with the economic and defense implications of increasing weapons production overcapacity. Compounding the problem is the question of export sales to third countries. European weapons manufacturers are much more dependent than their U.S. counterparts on exports (64 percent v. 24 percent of total production) and had until the past several years enjoyed a healthy \$20 billion per year surplus in third-country weapons sales. However, rampant Third World debt, the ending of the Iran-Iraq war, and declining OPEC surpluses have served to constrain this market as well.

European governments and industry perceive that U.S. producers will be similarly affected by the market decline, and their anxiety has increased about the intentions of U.S. industry to penetrate the European domestic market and compete more vigorously in the Third World. Europe has long felt that U.S. producers wield formidable competitive advantages in terms of scale: the total European procurement market amounts to only 40 percent of the U.S. domestic market, and the United States enjoys a five-to-one advantage in direct defense R&D spending.

<sup>9</sup>Basic Research into Industry Technology for Europe (BRITE) was initiated in 1985 to foster cooperation in a broad range of precompetitive advanced technologies with good industrial potential. European Research Coordinating Agency (EUREKA) covers the same ground as BRITE, but was launched by France in 1985 specifically to counter the U.S. invitation for European cooperation on SDI research. European Strategic Program for Research in Information Technology (ESPRIT) started in 1985 and is concerned solely with precompetitive information technologies. Research and Development in Advanced Communications for Europe (RACE) started in 1986 to lay the foundation for a Europe-wide fiber optic communications system.

<sup>10</sup>The General Accounting Office is presently studying this matter for the House Armed Services Committee. See U. S. Congress, General Accounting Office, "EC 92 and the Defense Trade and Cooperation" (in process).

Europe is also worried about the indirect threat to their defense markets posed by Japan. The Japanese are well positioned to buy into or acquire European civilian electronics firms and use these as a base to replace traditional European-owned and -operated defense suppliers.

In this sharply competitive environment, the Europeans place a very high priority on retaining access to the U.S. defense market. Despite some recent successes, such as the \$4 billion sale by France and Belgium of the RITA (Mobil Subscriber Equipment) battlefield communications system to the U.S. Army, the NATO Allies believe that the time for large government-to-government sales has passed. Thus, the approach now favored is transatlantic industrial teaming, which permits European firms to enter the U.S. market on a subcontractor basis, and the direct acquisition of U.S. defense suppliers. These private sector activities have been strongly encouraged by the Reagan and Bush administrations' free trade policies, which Congress has been reluctant to challenge.

DoD lacks systematic and timely information on foreign subcontractor sales as well as on foreign ownership of U.S.-based contractors and subcontractors, hence the full extent of European penetration of the U.S. defense industrial base is uncertain. However, there appears to be a dramatic increase in foreign takeovers of U.S. defense suppliers in the past decade. According to one study, 11 defense firms were acquired by foreign concerns in 1983, while in just the first half of 1988 alone there were 37 such acquisitions.<sup>11</sup> The 1988 Exon-Florio Amendment gave the president the power to block such takeovers on national security grounds. In the first test of the amendment, the president declined in February 1989 to exercise this authority to block acquisition of the last major U.S. supplier of silicon wafers by a West German firm. The amendment has been used recently to attempt to force the Chinese to sell back to a U.S. company an electronics firm they bought in mid-1989.

### ***The Quest for Integration***

***T***The European response to the U.S. and Japanese challenges in the civilian and defense spheres has been an accelerated trend toward economic and industrial integration to protect the domestic market.

The efforts of European governments have focused on the creation of supra-national alliances in the civilian sector under the Single European Act, and in the defense sector through the Independent European Programme Group. While the economic and market impact of these developments will not be obvious in the immediate future, the European defense industry is already undergoing substantial consolidation through mergers, acquisitions and other forms of alliance.

### **European Community 1992**

Under the Single European Act which is scheduled to come into force in 1992, the nations of Western Europe are pledged to abolish all internal duties and tariffs, harmonize national health and safety standards, and otherwise eliminate barriers to the free movement of goods, services, and persons within the European Community (EC). The resulting free market of 320 million Europeans could become the largest single trading bloc in the world.

The implications of EC 1992 for the defense market are unclear. While the Treaty of Rome specifically excludes defense trade from the purview of the European Economic Commission, Article 30 of the Treaty gives the Commission general responsibility to "maintain the technological and industrial conditions necessary for . . . security." This basic ambiguity is being widely debated in Europe. The French Government, for example, which looks toward a greater political voice for the EC, argues for a broad interpretation of Article 30, while the U.K. is opposed because it wants the EC focused entirely on economic matters.

Another point of contention is Article 223 of the Treaty of Rome, which permits member nations to list those items of defense procurement to be excluded from EC trading rules on grounds of national interest. Here the argument is whether it is legitimate to exclude such items as food and medical supplies for the military that are indistinguishable from civilian commodities.

The impact of EC 1992 on international defense trade is yet another area of uncertainty. U.S. defense trade with Europe to the present has proceeded on the basis of zero tariffs in both directions.<sup>12</sup> However, in a 1988 proposal, the EC had put forward the definition of such trade to include only complete

<sup>11</sup>Cited by Thomas Olmstead, "Selling Off America," *Foreign Policy*, September 1989, p. 129.

<sup>12</sup>Not all European countries have imported all U.S. defense equipment duty free.

### *Defense Collaboration in Israel and the Middle East*

The tempo of defense cooperation between the United States and Israel is quite fast. The two countries have signed a bilateral trade MoU (Memorandum of Understanding), and U.S./Israel government-to-government cooperation in defense technology has expanded in the past 4 to 5 years. More than 30 Data Exchange Agreements are in effect between the nations, covering areas of military tactics, technology and weapons. Both coproduction and codevelopment programs are underway. The United States has acquired and deployed several Israeli-designed systems.

The United States and Israel also cooperate in industrial programs, partly as a result of U.S. guarantees for Israel's security. Israel has historically been a major benefactor from the U.S. Security Assistance Program and has received the largest share of Military Assistance Programs and Foreign Military Sales credits. Nearly all Israeli security assistance funds have flowed back into U.S. companies, which in turn, have produced sophisticated weapons and systems for the Israeli Defense Force.

With the bilateral trade MoU has come a greater attempt by Israeli industry to sell directly to DoD, with uneven results. Israeli companies have demonstrated growing knowledge of the U.S. market and DoD's procurement system. In selected cases Israeli battle-proven weapons and expertise in advanced technologies have been acquired by the United States.

Since the Camp David Accords were signed in 1978, the United States has assisted Egypt in developing its armed forces and defense industrial base. A few data exchange agreements are in place and a number of co-production efforts have begun.

The United States has sold major defense systems to Saudi Arabia under the Foreign Military Sales program, including AWACS and F-16s. These sales and subsequent support have been profitable for U.S. defense companies. U.S. industry lost significant sales in 1987 when the Saudis signed a major defense equipment deal with the United Kingdom. The U.K. program, named Al Yamamah, was viewed by some observers as a reaction to the refusal by Congress to approve the sale of additional F-15s to the Saudis.

systems such as tanks, airplanes, etc. The United States vigorously protested this, since U.S. defense exports to Europe consist now almost entirely of subsystems, which would be subject to tariffs under the proposed EC definition.

Another EC 1992 issue that may affect international defense trade is the treatment of foreign-owned subsidiaries. The EC asserts that these subsidiaries will be treated as European-owned firms only if high value-added activities (research, design, engineering, etc.) are performed in Europe. The intention here is to block the establishment of so-called "screwdriver" plants in which imported high-tech components are merely assembled.

Over and above these specific issues, it is certain that EC 1992 will have a major impact on how weapons are produced and traded in Europe if simply because nearly all European defense producers also have large civilian sector operations.

#### **The Independent European Programme Group (IEPG)**

The IEPG was established in 1976 as an off-shoot of the NATO-affiliated Eurogroup of European

defense industries for the purpose of bringing France into its deliberations. The IEPG was of minor significance until the issuance of the Vredeling Report in 1986, which called for much greater European collaboration in weapons production. This led in the subsequent endorsement by European defense ministers of an Action Plan listing as the major goals:

- establishment of an open European market for defense procurements, including sharing of national procurement plans and defining areas for European-wide competition;
- "Juste Retour," ensuring that intra-European national defense imports and exports roughly match through a system of recording cross-border contracts;
- technology transfer policies that promote the dissemination of government-supported defense R&D to all IEPG member nations;
- assistance to Less Developed Defense Industry (LDDI) members (i.e., Greece, Portugal, and Turkey); and
- creation of a common fund for defense R&D to be allocated by the IEPG.

To what extent these goals will be realized is questionable. First, unlike the EC, the IEPG has no legal status. The Action Plan represents little more than a loose set of intentions, albeit with official sanction, and there is by no means a full consensus on its implementation. German industry, for example, expresses strong reservations about the “Juste Retour” and LDDI goals, which may result in a substantial displacement of employment from Germany to other countries. Second, and perhaps more important, is the question of how the IEPG will affect defense relations with the United States. There is great ambiguity here, and what is said about the intentions of the IEPG depends on who the audience is. In Europe it is widely understood that the impetus behind the Vredeling Report and the Action Plan was the fear of domination of the European weapons market by U.S. producers. However, in explaining the IEPG for U.S. consumption, the emphasis is on how the creation of a “European Pillar” in defense production will make the Europeans stronger and better NATO allies. Increasing economic unity arising out of EC 1992 may create need for a central procurement agency, which is being studied in the IEPG.

One of the difficulties facing the IEPG is how to differentiate its common fund for defense R&D, known as EUCLID,<sup>13</sup> from other European cooperative civilian research programs covering dual-use technologies. EUCLID has been off to a slow start compared to other cooperative efforts. Estimated allocations to EUCLID amount to only \$140 million, compared to \$5.4 billion for European Research Coordinating Agency (EUREKA) programs. One European source indicated to OTA that EUCLID was created primarily to tap Bundeswehr R&D funds, since West German law prohibits contributions of these funds for civilian projects.

### European Industrial Integration

The European defense industry is rapidly positioning itself to face tougher competition in leaner times. On the national level, there is a continuing concentration of defense producers through mergers and acquisitions. In the key aerospace and defense

electronics sectors, the trend is for each major producer nation to remain with one or two large firms: British Aerospace/Westland/GEC in the United Kingdom; Daimler-Benz/MBB/Siemens in Germany, Aerospatiale/Dassault/Thomson CSF in France. On a smaller scale, intra-European strategic alliances of these major firms are being created through such mechanisms as stock swaps and joint acquisitions as, for example, the recent successful GEC/Siemens acquisition of Plessey.

### *Current Policies of Key European Governments*

The only nations of Europe that possess the research and industrial capacity to produce competitively a wide variety of major weapons systems are the United Kingdom, France, and West Germany. Other European nations may possess a world-class capability, but are restricted in scope, such as Italy for naval guns and helicopters and the Netherlands for optics and electronics.

#### The United Kingdom

The United Kingdom has consistently outpaced the other European states in defense spending and support for defense R&D. Stung by some costly failures, such as the Nimrod airborne early warning system and under tight national defense budgets, the United Kingdom has in recent years sought to raise efficiency by privatizing government-owned defense industries and research laboratories. While the United Kingdom traditionally has been the strongest European proponent of transatlantic defense cooperation (e.g., Trident, Harrier) a perceptible shift toward a more European orientation has taken place during the past 5 years. The 1985-86 furor over the Sikorsky bid for Westland Helicopters was dramatic evidence of the sensitivities underlying the issue of U.S. defense influence. United Kingdom defense exports have been a bright spot in an otherwise lack-lustre industrial picture, and may have been behind the United Kingdom's strong support to reactivate the IEPG. Another motivation may have been to deflect French attempts to upgrade the influence of the EC in defense and political affairs.

<sup>13</sup>European Community Long-term Initiative for Defense. At an IEPG meeting in Lisbon in early 1988, priority research fields for the EUCLID program were listed as radar technology, microelectronics and semiconductors, composite materials, avionics, artificial intelligence, opto-electronics, simulators, underwater listening devices, stealth and space surveillance. See Michael Guerin, “EUCLID Defense Cooperation Seen Essential,” *Defense & Armament Heracles*, Paris, September 1989, pp. 041.

## France

French defense policy has long been oriented toward autarchy in domestic procurements and a strong export effort. France has also been most sensitive to U.S. defense influence in Europe, and tends to suspect ulterior commercial motivations for U.S. defense initiatives. The French devised the EUREKA civilian research program in direct response to U.S. efforts to obtain European cooperation for the Emerging Technologies and SDI programs, on the grounds that a U.S. motivation was to stunt the development of European R&D. Increased French activism in European defense affairs during this decade may be partially influenced by the objective of stemming West German neutralism, and perhaps more importantly by commercial interest.

The previous go-it-alone policy, typified by the Rafale fighter designed specifically for Third World export, has not been a success, and France is therefore positioning itself to obtain a larger slice of the NATO defense market. The French strategy in this regard may be to use the levers of the IEPG and EC 1992 to displace U.S. defense sales to the smaller NATO countries, the last significant European market in which U.S. defense technology predominates. For success in this strategy, the French will have to team with the United Kingdom or West Germany, and may already be worried about a growing U.K./German defense production nexus.

## West Germany

Although West German industry has achieved a dominant industrial position in Europe, governmental support for defense R&D has been relatively small. For historical reasons, the Germans have been reluctant to develop a large independent armaments industry and engage in direct defense exports. They therefore prefer a teaming approach (e.g., the Tornado fighter) which provides the benefits of high-tech domestic employment and a share of export sales, without the political disadvantage of being a

### *Defense Collaboration With Canada*

Canada is treated differently by DoD from the rest of the NATO Allies. The United States and Canada have shared a long history of defense and economic cooperation codified in more than 200 agreements. As part of the North American industrial base, Canadian companies can compete for U.S. programs that fall under U.S. Mobilization Base restrictions. The 1987 U.S./Canadian free-trade agreement resulted in the creation of the North American Defense Industrial Base Organization with abroad charter to promote and administer joint peacetime Industrial Preparedness Programs. The existence since the 1940s of a bilateral defense trade agreement has also emphasized Canada's special position in defense cooperation with the United States.

In some mission areas, e.g., North America air defense, the two nations have established close government-to-government ties. U.S. companies find it easy to cooperate with their Canadian counterparts. However, Canada's outlays for defense R&D and its overall defense industrial base are small compared to those of the United States, the major NATO countries, and Japan. Accordingly, Canadian/U.S. defense cooperation is small in relation to overall U.S./Allied defense collaboration.

prime contractor. This low-profile attitude may now be changing. With the merger of Daimler/Benz with MBB, the Germans will have a prime defense contractor of formidable proportions, although it still will be heavily weighted towards the civil sector. German international industrial strategy appears founded on teaming German firms with a solid civilian R&D base with foreign firms specializing in defense R&D. Thus, the acquisition by commercially oriented Siemens/GEC of the defense-based Plessey firm seems to be a logical result of this strategy.