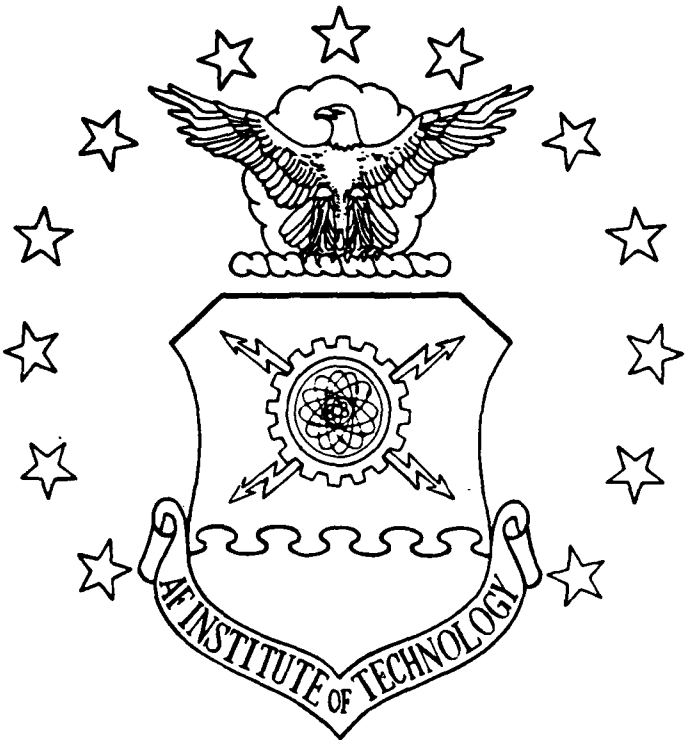

INTERNATIONAL ARMAMENTS COOPERATION: A CASE STUDY OF THE MODULAR STANDOFF WEAPONS

THESIS

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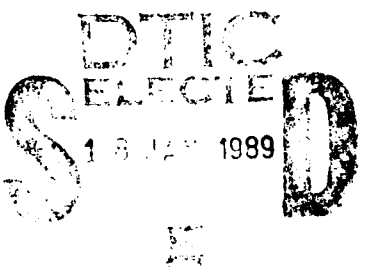

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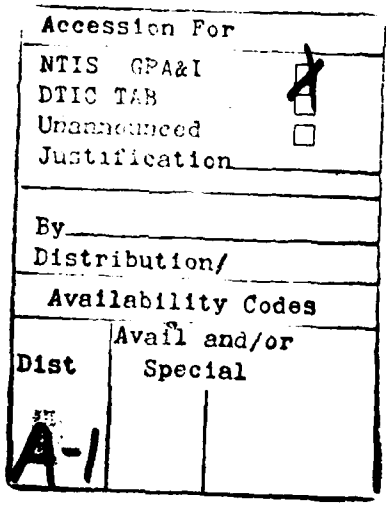

AFIT/GLM/LSM/88S-4

INTERNATIONAL ARMAMENTS COOPERATION: A CASE STUDY OF THE MODULAR STANDOFF WEAPONS

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

in Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Logistics Management

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September 1988

Acknowledgments

First, I would like to thank my biggest supporter, best friend and confidant, my wife [redacted] for her help and patience throughout the thesis process. As with everything else in my life, I couldn't have done it without her. Secondly, I would like to thank my children, [redacted] for lending moral support and occasionally letting me use the computer for what they probably considered a less important activity than achieving high score on their favorite games. I would also like to thank all the people who cooperated in my research effort for the valuable information and advice offered. Finally, I would like to thank my thesis advisor, Dr. Craig M. Brandt, for his continued guidance, encouragement, and support.

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Abstract

The purpose of this research was to examine various aspects of NATO armaments cooperation. The study examined the *ongoing Modular Standoff Weapon* System (MSOW) program within the context of a broader study of overall NATO cooperation. The MSOW program currently involves five nations in an effort to build a family of long range air-launched ground attack missiles.

The objective of the study was to determine the benefits and drawbacks of NATO armaments cooperation, as well as the military, economic, and political factors that influence it. Further, the study attempted to determine whether MSOW's benefits, drawbacks, and influential factors paralleled those of overall NATO cooperation and whether the MSOW program was projected to yield a weapon system worth the additional effort required in a joint program.

This research indicated that NATO armaments cooperation is worthwhile. Because of the European nations' significant experience base, intra-European cooperative projects have a higher probability of success than do U.S.-European efforts. Despite current U.S.-European difficulties, NATO cooperation is supported by high ranking members of Congress and the Department of Defense.

Armaments cooperation historically has increased the cost and duration of weapon system procurement as compared to single nation programs. Despite these drawbacks, the cooperative process is considered essential to future NATO procurement. This research determined that cooperation is believed to reduce costs for each nation because the higher costs are shared by the partners. Cooperation also reduces inefficient duplication of research and development (R&D) within the Alliance. However, armaments cooperation is complicated by political, military, and economic factors.

MSOW's benefits, drawbacks, and influential factors were found to be essentially the same as those of overall NATO armaments cooperation. The program is expected to produce a weapon system that will satisfy most requirements and represent a significant leap in capability. On the other hand, the program was complicated by incorporating divergent requirements from several previous cooperative R&D programs into MSOW. Equitably distributing the costs and workshares for the program among the partners will prove difficult as well.

Recommendations included a listing of suggested improvements from the personnel interviewed. The researcher's recommendations included stabilizing funding for NATO cooperative programs, beginning with simpler programs, and ensuring that the knowledge and experience gained in each international program be documented and used to train personnel new to international cooperation.

INTERNATIONAL ARMAMENTS COOPERATION: A CASE STUDY OF THE MODULAR STANDOFF WEAPONS

I. Introduction

General Issue

> NATO countries should spend less time debating digits and rationalizing ratios, and more time asking: How can they improve the Alliance's fighting capability by rationalizing equipment, standardizing hardware, and acquiring truly interoperable systems [90:72].

Thus the debate over the myriad political, military, and economic implications of international armaments cooperation has raged since the founding of the North Atlantic Treaty Organization (NATO) in 1949. Armaments cooperation is the sharing of the costs and responsibilities for any or all of the following by two or more nations or organizations: research, development, production, and follow-on support of military weapons, weapon systems, or equipment. However, armaments cooperation generally refers to codevelopment, the sharing of research and development (R&D) costs and responsibilities, and/or coproduction, the sharing of production costs and responsibilities (51:9).

Ambassador David M. Abshire, former U.S. Permanent Representative on the North Atlantic Council, summarized

the primary benefits of NATO armaments cooperation when he wrote:

> Shared R&D means lower development costs for each participating nation, and the larger market for the ultimate product means longer production runs and lower unit costs.... Benefits of standardization continue long after the initial fielding of the weapon system: Repair parts and replacement components can be purchased on a larger scale; training of personnel to operate and maintain the systems can proceed in a more efficient, cost effective manner; logistics systems are simplified.... Finally, on the battlefield, there is the priceless advantage of working with and sharing the logistics support of Allies [2:70].

Despite a growing consensus on the importance of armaments cooperation, only limited progress has been made and significant barriers remain. As a result of the lack of a coordinated defense posture and the numerical and qualitative gains made by the Warsaw Pact, NATO's ability to deter Warsaw Pact aggression and to defend Western Europe, if necessary, has been questioned (11:26-27).

Many civilian and military experts believe NATO's future viability as a defensive alliance may depend significantly on the success of NATO armaments cooperation; therefore, the success of Alliance collaboration has become paramount. Former U.S. Under Secretary of Defense for Research and Engineering, Dr. Richard D. DeLauer, stated:

> NATO's efforts to counter this threat have suffered from a lack of focus as individual countries pursue programs that, while satisfying domestic objectives, have not led to an effective NATO coalition force. The Alliance needs agreed upon

> NATO military requirements, agreed NATO tactics and bilateral and multinational codevelopment and coproduction programs. Such cooperative efforts will lead to a more efficient utilization of the limited resources available to the NATO countries [43:45].

The NATO Rationalization, Standardization, and Interoperability (RSI) program created in the 1970s represents an attempt to fill that Alliance-wide void. The RSI program was the culmination of numerous attempts to formalize and structure NATO's vital armaments cooperation efforts (42:1-4). In the United States, Senators Sam Nunn (D-GA) and Dan Quayle (R-IN) spearheaded legislative efforts to direct participation in NATO collaboration. Senator Nunn, chairman of the Senate Armed Services Committee, has vigorously supported alliance armaments cooperation since the early 1970s. In 1985, Senator Quayle introduced legislation that significantly reduced bureaucratic restrictions that hindered U.S. participation in armaments cooperation in the past (58:11).

Specific Problem

The focus of this research is on both overall NATO armaments cooperation and one cooperative program, the modular standoff weapons (MSOW) currently under joint consideration between the U.S., the United Kingdom, West Germany, Spain, and Italy. MSOW will be studied based upon the findings of the broader examination of overall NATO armaments cooperation. The research will determine how the

principles of NATO armaments cooperation are being applied; whether U.S. objectives are being met; and whether the MSOW program is projected to yield the benefits necessary to justify joint development and procurement of modular standoff weapons.

Background

During the decades following World War II the Warsaw Pact gained, then increased, a numerical superiority in conventional forces and reached a rough parity in nuclear forces vis-a-vis NATO. As this shift in the balance of power unfolded, NATO's lack of cohesive long-term planning became glaringly evident (56:30-31).

A major area of concern was the inability of the Alliance to cooperate in the development and production of weapons. NATO forces lacked the commonality of weapons and equipment that would enable them to share logistical support and develop standardized procedures and tactics. Further, successful cooperation would have provided economic benefits to participating NATO members. Industries would have benefited from the sharing of advanced technologies and production of weapon systems. The participating nations would also have been able to supply their military forces with more cost-effective weapons through the sharing of R&D and production costs during the acquisition process (70:49). Instead, the

Alliance's failure in armaments cooperation has compounded and perpetuated allied differences.

While Western Europe slowly developed a fragmented, relatively inefficient defense industry, the Soviet Union and her Warsaw Pact allies outproduced NATO at least two to one in virtually every major weapon system (100:55) and made significant strides in overcoming NATO's technological advantage. Warsaw Pact military and industrial homogeneity was and is enforced by the Soviet Union (36:302; 34:79). Conversely, NATO is forced to deal with the complicated political and economic issues that confront independent, sovereign nations with diverse goals and capabilities. This diversity, along with political and economic protectionism, has hindered both intra-European cooperation and cooperation among Western European nations and the United States as well (30:1-3; 32:1; 100:56).

Essentially, the history of NATO armaments procurement can be divided into two eras: first, from 1948 until the mid-1970s; and second, from the mid-1970s until the present. The first era was marked by the complete domination of NATO procurement by the American defense industry. During the immediate post-World War II years, the U.S. supplied many NATO allies, whose industries had been devastated by the war, with surplus U.S. military equipment for their forces. By the early 1960s the Western European allies' economies had recovered sufficiently for the U.S. to ask them to begin sharing the full cost of

military equipment (24). American defense contractors continued their domination of the Western European market through the next decade. American industry enjoyed a sizeable technological lead and economies of scale in production due to extended production runs compared with those of the European defense industry. This gave U.S. contractors a decided price advantage.

However, the Western European nations gradually developed their military-industrial production capabilities. The formation of numerous European multinational consortia greatly improved capabilities and competitiveness, but only when they successfully overcame national barriers such as protectionism and highly divergent industrial capabilities.

Beginning in the mid-1970s, the pace of progress on the international political level quickened. Several European political action groups were formed to ensure the success of joint industrial projects. Also, the U.S. government became increasingly involved in the drive for international armaments cooperation within the Alliance. By 1985, the funds necessary to participate in key cooperative projects were "fenced off" by legislation introduced by Senator Nunn to ensure continuity in U.S. participation in those projects (70:45).

The MSOW program was one of the key projects singled out by Congress and the Department of Defense (DOD) under the new funding arrangement. Interest in the concept of a

modular standoff weapon began in the 1970s. France and Canada joined the MSOW partnership when the Memorandum of Understanding (MOU) was signed in July 1987. However, both countries have since withdrawn from the program due to cost-share and work-share problems, leaving the five previously mentioned current participants.

The MSOW concept involves, at present, three variants of an air-launched missile designed to be launched before the aircraft reaches enemy defensive positions. This would enable the aircraft to carry out attacks without exposing itself to enemy fire (103:33-35).

The three variants of the MSOW would include "short-range and long-range versions to attack stationary targets and a short-range version to attack mobile targets such as tanks" (13:3). The airframe and engines for each version would be identical. Further, each version would have a modular payload bay capable of accepting a number of various warheads and sub-munitions designed to perform a wide variety of attack missions (103:36).

Scope of the Research

Because of the greater emphasis in and success of international armaments cooperation since the mid-1970s, this research will concentrate on the most current European and American efforts. The MSOW project will be examined within the framework of existing policy and thought.

Although joint procurement with other U.S. allies--Japan or Australia, for example--might be relevant to the study of international armaments cooperation, this research will be limited to examination of NATO projects and policy. When reading this thesis, the reader may assume that all references to international cooperation refer to cooperation between NATO allies unless otherwise specified.

Definition of Terms

The following terms are used extensively throughout this research effort. They are presented here to clarify their meaning within the scope of this research:

1) Rationalization: any action that increases the effectiveness of allied forces through more efficient or effective use of defense resources committed to the alliance [42:1-1].

2) Standardization: the process by which member nations of NATO achieve the closest practicable cooperation among forces, the most efficient use of research, development and production resources, and agree to adopt on the widest possible basis the use of: a) common or compatible operational, administrative, and logistics procedures; b) common or compatible technical procedures and criteria; c) common, compatible or interchangeable supplies, components, weapons, or equipment; and d) common or compatible tactical doctrine with corresponding organizational compatibility [42:1-2].

3) Interoperability: the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use services so exchanged to enable them to operate effectively together [42:1-2].

4) Codevelopment: Development of a system by two or more nations in which the costs of development as well as the design effort are shared [51:14].

5) Cooperative Research and Development: Any method by which governments cooperate to make better use of their collective research and development (R&D) resources to include technical information exchange, harmonizing of requirements, codevelopment, interdependent research and development, and agreement on standards [51:14-15].

6) Coproduction: Any program whereby a government, international organization, or designated commercial producer acquires the technical information and know-how to manufacture or assemble defense equipment or components developed by another country [51:15].

A 1981 Rand Corporation study described the variations of coproduction as follows:

> 1) Fully integrated coproduction, in which each participating country purchases the same system and produces parts of each other's units (e.g., joint U.S. and European production of the F-16 for use in both U.S. and European air forces); 2) Foreign production, under license, of a U.S. design (e.g., Japanese, Canadian, and European production of the F-104, originally designed and produced for the U.S. Air Force); and 3) U.S. production, under license, of a foreign design (e.g., U.S. production of the French-German Roland air defense missile system) [88:2].

Sequence of Presentation

Chapter II presents the methodology of this research, which is a combination of the historical and survey methods. This chapter also reviews the basic procedures, advantages, and disadvantages of both the historical and survey methods.

Chapter III presents historical and background data pertaining to both NATO armaments cooperation in general and the MSOW program in particular. The chapter is divided into four sections: History, U.S. View, European View, and MSOW Program.

Chapter IV presents an analysis of data gathered through personal interviews of government, military, and industry personnel from six of the original seven nations involved in the MSOW program. The military, economic, and political factors that affect NATO collaboration are examined from the diverse perspectives of the respondents. Problems in the arena of international armaments cooperation are examined, along with the solutions to these problems proposed by the respondents. How these factors, problems, and proposed solutions relate to the MSOW program is a primary focus of the analysis.

Finally, Chapter V presents recommendations derived from the analysis of data and review of literature. These recommendations involve specific ways the United States and its NATO partners might more effectively and efficiently manage the procurement of arms. Improved management of the procurement process through efficient, productive armaments cooperation will enable the Alliance to make better use of its limited resources and, thus, provide a more viable deterrent to Warsaw Pact aggression.

II. Methodology

Overview

The research effort was divided into two primary areas of investigation. The first area was an overview and historical background of NATO armaments cooperation. The second area was a specific case study of the MSOW program within the context of the general principles derived from the overview. Both areas of investigation were accomplished through a review of applicable literature and government documents, and through personal interviews with political, military, and industry personnel involved in NATO armaments cooperation and, in many cases, directly involved with the MSOW program.

Methodology Justification

There were three methods available to conduct this research. The first was the historical method, which consists of "defining the problem, gathering the data, and evaluating and synthesizing the data into an accurate account of the subject investigated" (22:261). The second method available was the survey method, specifically personal interviewing. According to Emory, personal interviewing is "a two-way conversation initiated by an interviewer to obtain information from a respondent"

(50:160). The third method available was a combination of the first two.

Because it is most precise when examining past events, the historical method was deemed inadequate to thoroughly investigate the dynamic, ongoing process of NATO armaments cooperation. Personal interviewing would have been limited in its scope without the overview provided by the historical research. Therefore, the two methods were used concurrently, with the historical method providing the background from which a detailed case study could be drawn using the personal interview (survey) method. This combination of methods provided a historical perspective from which to analyze current policies and objectives; an overview of political, economic, and military issues to explore; and the project-specific answers to those political, economic, and military issues.

Conducting personal interviews ensures detailed response from those generalists and experts chosen as respondents. This method provides great depth of information and also allows for exploration of areas not recognized by the researcher as important until discussed by a respondent. However, because of time and funding constraints, conducting personal interviews limits the number of respondents in the research compared to the number who could have been surveyed using a questionnaire. Interviewing also provides data that are difficult to analyze because they are subject to personal interpretation

(102:289-290). While the historical method has been criticized for its lack of rigor and failure to strictly adhere to the principles of the scientific method (37), it does provide an accurate, comprehensive overview and historical background from which to base the case study of the MSOW program.

Interview Format

Interviews were conducted on a structured basis using an interview guide (Appendix B). However, the interviewer was not restricted to asking only the questions in the guide. Interviews were conducted in-person whenever possible (See Appendix A for a list of interviews).

The interviewer began each interview by explaining the research effort to the respondent and explaining why the respondent was chosen to be interviewed. The interviews varied according to the political, military, or industrial affiliation of each respondent. All respondents were asked what responsibilities they and their organizations (or countries) had in NATO armaments cooperation. If the respondent was directly involved in the MSOW program, he was also asked what part he and his organization (country) played in the program specifically. After the interviewer had established the respondent's responsibilities, questions were asked to obtain the respondent's views on the success of NATO armaments cooperation, the role of the United States in the process, and the benefits and

drawbacks of international armaments cooperation. Finally, each respondent was asked what he or she perceived to be the major problems currently hindering progress in NATO armaments cooperation and what solutions he or she could offer for those problems.

Problem Identification

Major problems in NATO armaments cooperation were identified in two ways. First, problems that plagued past NATO cooperative efforts were identified through the historical research. Second, problems were identified through responses generated by the interviews. To eliminate nonrecurring problems or individual bias, a problem was deemed a major problem only if substantiated by two or more respondents or sources as current and as having significant impact on ongoing NATO cooperative programs.

Development of Solutions

Once the major problems of NATO armaments cooperation were identified, proposed solutions to these problems were developed. The research solutions considered were derived from those solutions proposed by respondents during interviews and from the solutions proposed in the literature reviewed for past and ongoing international cooperative programs. Solutions proposed for international programs in general were examined for their applicability to the MSOW program, and solutions proposed directly for

the MSOW program were examined for their general applicability. Recommendations were based on and made for both general and program-specific application.

III. Literature Review

Overview

This chapter provides a review of the significant literature on both NATO armaments cooperation projects in general and the MSOW program in particular. The purpose of this review is twofold: to establish the historical perspective, breadth, significance of and difficulties associated with armaments cooperation as it has evolved within NATO; and to provide a comprehensive overview of the MSOW program.

The chapter will first present an overview of U.S.-European differences relevant to armaments cooperation. Next, a historical synopsis of NATO armaments cooperation will be presented. This section will include information on both intra-European collaboration and transatlantic cooperation between the U.S. and its NATO allies. The various perspectives of U.S. proponents and opponents of NATO armaments cooperation will then be examined in detail and the European viewpoint will be reviewed. Finally, a look at the history of NATO standoff missile (SOM) research and development will be presented. The MSOW program is hoped to be the culmination of the NATO SOM efforts. This final section will also include a review of MSOW program characteristics, goals, and setbacks.

It must be noted that the European NATO members may be divided into two or more categories based on the extent of their industrial and technological capabilities. Francis M. Cevasco, Assistant Deputy Under Secretary of Defense for NATO/Europe, and Dennis E. Kloske, Special Advisor to the Deputy Secretary of Defense, categorize Portugal, Turkey and Greece as the least industrialized of NATO's "Southern Flank" members (32:1; 48:26). Rich and others include Denmark, Luxembourg, and Norway with Portugal, Turkey, and Greece as the "smaller and less industrialized NATO powers" (88:9). Because of their technological and industrial shortcomings, the inclusion of these nations in cooperative programs often creates additional management complications as the division of cost and work shares and technology transfer decisions are made. However, the fact that several of these nations are currently participating successfully in the NATO F-16 program, for example, proves that the difficulties created by allowing these nations to participate can be overcome.

The Setting: U.S.-European Differences

There are many military, political, economic, and industrial differences between the U.S. and its European allies which must be acknowledged and understood to fully comprehend the intricacies of NATO armaments cooperation.

Economic Factors. Rich and others state that the U.S. and NATO Europe are "roughly comparable" economically. The 13 NATO European nations produced a combined Gross National Product (GNP) 1.4 percent less than the U.S. GNP according to a 1980 study. However, the U.S. outspent the same 13 NATO European nations almost 2:1 in defense expenditures (87:4; 88:8-9). Further, the U.S. spends approximately 11 percent of its defense budget on research and development (R&D), while most NATO European nations spend only four to five percent of their defense budgets on R&D (49:64; 90:76). Finally, the European nations typically set their defense budgets for at least five years. Once their five-year budgets are enacted, they are adhered to more strictly than the U.S. adheres to its Five-Year Defense Plan. The U.S. Congress reviews the defense budget annually and frequently makes changes (25:28-29). While the European budgetary process results in more stability (19:12), the U.S. process is seen as more flexible. This flexibility is considered an asset in providing funds for international cooperation by U.S. supporters of armaments cooperation (33:656; 40:26; 48:23).

Military Requirements. The U.S. has military commitments around the world. The NATO European nations have much more limited commitments, with their primary focus being on defense of Western Europe. The difference in scope of commitments has implications in such areas of

consideration as size of defense forces and defense budgets, diversity of operating environments for defense equipment, and logistics support.

Industrial Factors. The decided advantage in size of military forces and defense budget gives U.S. defense industries a significant edge in production economies of scale and availability of advanced technology over European industries (3:23; 34:76-77). Europe's defense industries are built along national lines and are therefore smaller in production scale and more fragmented than U.S. firms (23:18). According to a Rand Corporation study, the average total annual output for the Western European defense industry from 1967 to 1976 was just one-third the output of the U.S. defense industry (88:11).

Additionally, because of the limits of their national military equipment requirements, many European defense industries are more dependent on the sale of equipment to foreign governments than are U.S. industries. European industries often need foreign sales to extend production runs, making production more economical and thus reducing their cost per unit (88:73). European nations are also compensating for inadequate domestic production requirements by cooperating more frequently among themselves in the development and production of defense equipment.

Industry-labor and industry-government relationships differ greatly between the U.S. and Europe. In Europe, long-term work force stability is a primary goal that figures into negotiations for most cooperative programs. The U.S. defense industry uses work force flexibility--overtime, layoffs, rehires, and hiring of temporary workers--to compensate for fluctuations in production requirements. In Europe, these practices are avoided. European nations typically face much higher unemployment than does the U.S., so work force stability is very important (82:1). European nations have restrictive policies governing layoffs and the hiring of temporary workers, while European workers typically dislike overtime and prefer shorter work weeks and longer vacations than their U.S. counterparts. Further, European industries remain more craftsman-oriented and less automated than do U.S. firms (41:4-10; 87:5).

Finally, because of the large number of U.S. companies in the defense equipment market and the limited number of European companies, industry-government ties in Europe are much closer than those in the U.S. Many European defense firms have been nationalized, although that trend seems to be reversing and competition for defense contracts is gaining favor in some European nations (42:4-5 to 4-7). Previously, governments often preselected firms to work on projects. In the U.S., the DOD is required by law to compete nearly all contracts.

The close ties between European governments and their national defense industries remain despite ongoing changes. Abshire explained the difference in U.S. and European government-industry relationships when he wrote:

> In Europe, most nations have one or a few industrial organizations to which they must turn for defense products of any given type. This naturally leads to close ties between government and industry as each partner has a critical need that can be satisfied only by the other .... By law, the United States government must treat each member of its industrial community equally; one result is a more formal and more distant relationship that differs greatly from the closer government-industry collaboration often found in Europe [3:24].

Defense Equipment Acquisition. Being more competition-oriented is just one aspect that makes the U.S. acquisition system different from the typical European system. In Rand Corporation studies, Rich and others and Mark A. Lorell point out that European acquisitions of major weapon systems--especially intra-European cooperative efforts--have taken longer than similar U.S. development and production efforts (72:74-76; 88:31,34). However, European development and production programs tend to be more stable. Once reviewed and accepted by their parliaments, European programs are typically funded for three to five years and left to be managed by defense department experts. In the U.S., Congress annually examines major programs along with the DOD budget. As a

result program cancellations, restarts, and stretch-outs occur more frequently in the U.S. (41:4-6,4-13; 88:37).

Government-industry relationship differences also contribute to differences in acquisition policies. U.S. program managers are generally afforded more authority than their European counterparts. U.S. contracting officers follow the guidance of the Federal Acquisition Regulations, which the Europeans consider too extensive, detailed, and burdensome. Because of their closer, less adversarial relationship with defense industries, European acquisition managers follow much more general and less restrictive guidelines. For example, European program offices tend to rely on a best-effort approach, while U.S. contractors are expected to follow a detailed timetable (25:29-30; 88:36).

Goals in Armaments Cooperation. Perhaps the most significant differences between the U.S. and its European allies are the goals each seeks to achieve in pursuing armaments cooperation.

Many experts in the U.S. believe that the predominant armament cooperation goals of most European nations are political and economic in nature. DeLauer and Wade contend that employment considerations often outweigh military requirements when European governments and industries participate in collaborative programs. Rich and others add the following as European objectives:

> ... industry capitalization, technology transfer... improved political relationships... standardization, and cost recovery of domestic spending through taxes [87:9].

On the other hand, U.S. goals tend to be presented as confined more to the necessities of improving NATO military capabilities through more efficient and effective utilization of defense resources. Although he was writing specifically about collaboration in the development of large aircraft, Lorell provided a succinct summation of general U.S. and European armaments cooperation objectives:

> U.S. objectives may be summarized as follows:
>
> - Enhance NATO military capabilities by increasing NATO equipment rationalization, standaradization, and interoperability.
>
> - Promote the more efficient use of R&D funds and resources through consolidation and the rational division of tasks in order to reduce R&D redundancies.
>
> - Strengthen transatlantic NATO links [72:72].
>
> The major European states have collaborated with each other in the past for quite different reasons. These include three basic categories of objectives:
>
> - Maintain diversified and broadly based national R&D aerospace capabilities with restricted national defense budgets.
>
> -- Reduce R&D costs for each participant to below the level of a national program.

-- Maintain or expand national employment levels and skills.

-- Acquire new technologies.

-- Encourage program stability.

- Advance regional political objectives.

-- Contribute to the formation of a Franco-German block.

-- Facilitate British entry into the Common Market.

-- Promote European solidarity.

- Counter U.S. aerospace competition.

-- Pool European industry for the development of aircraft to encourage European governments to buy European.

-- Combine European resources in development, production, and marketing to strengthen European sales worldwide [72:71-72].

History of NATO Armaments Cooperation

As was stated in Chapter I, NATO members have recognized the need to cooperate in the production and employment of defense equipment from the inception of the Alliance (See Appendix C for a list of milestones in NATO armaments cooperation). Lorell noted:

> Beginning with its establishment in 1949, NATO authorities advocated rationalized defense production and weapons standardization within the Alliance. This effort aimed at rapidly building up and pooling the armaments production resources of war-ravaged Western Europe to meet the Soviet military threat more effectively [72:9].

However, the pathway from recognition to fulfillment of the need is strewn with a series of expensive, frustrating failures interspersed with occasional triumphs. Along the way, NATO's conventional posture vis-a-vis the Warsaw Pact has declined from superiority or at least parity to almost overwhelming and unquestionably dangerous numerical inferiority.

With Western Europe's industrial base devastated during World War II, the U.S. continued its role as the "arsenal of democracy" by supplying surplus arms to NATO allies. Later, as the Western European economy recovered, the allies were asked to pay at least in part for their military procurements from the U.S. During this time from the end of World War II until the late 1960s, the European defense industry slowly rebuilt. Occasionally major weapon systems were built by intra-European consortia. More often, however, major weapon systems were bought directly from the U.S. or were coproduced under license from U.S. defense firms. A lack of overall direction in the development and production of defense equipment led to a fragmentation of the European defense industry into inefficient national concerns which produced equipment without benefit of the economies of scale enjoyed by U.S. firms (49:61; 34:76-77). Dr. V. Garber, then Deputy Under Secretary of Defense for International Programs and Technology, wrote:

> This period was also marked by unquestionable U.S. superiority in virtually all fields of military technology and industry, as well as dominance in the export of arms [56:30].

During this period, much of NATO's achievements towards interoperability were merely a result of the extensive use of U.S. designed weapons. Garber noted that the development of European defense industries, especially in the 1970s and 1980s, solved some problems but created others:

> The economic and technological trends of this era were marked by Europe coming into its own in military and dual use technology.... Ironically, this led to new problems for the Alliance. This new European capability caused a desire to move toward European manufacture of weapons of their own design rather than adoption of U.S. arms. The resulting lack of interoperability, standardization and production efficiency reflected negatively on NATO's ability to engage in coalition defense [56:31].

Europeans have gained some success and invaluable experience in the realm of armaments cooperation. Intra-European projects like the Roland and Milan missiles, the Breguet Atlantique long-range maritime patrol aircraft, the Transall C-160 military transport aircraft, the Jaguar, Alpha Jet, and Tornado fighter aircraft, and the Lynx, Gazelle, and Puma helicopters have not all been truly successful, but all have provided learning experiences which make intra-European cooperation more likely to be effective in the future.

Several Western European organizations have been formed primarily to promote defense industrial cooperation. The Western European Union (WEU) was created in 1954 with the addition of Italy and the Federal Republic of Germany to the Western Union Defense Organization, which had been formed just after World War II. The WEU was intended to promote defense cooperation and to work closely with NATO (76:201).

In 1968 both the NATO Industrial Advisory Group (NIAG) and Eurogroup were formed. NIAG was established by the Conference of National Armaments Directors (CNAD) to "provide a forum for the free exchange of views and information on various industrial aspects of NATO armaments questions" (5:2-2). The CNAD is a sub-committee of the NATO Defense Planning Committee. Consisting of the ministers of defense or their designated representatives, the committee is charged with primary oversight of NATO armaments cooperation (76:112,158). Eurogroup was formed by representatives from the United Kingdom, Belgium, the Netherlands, Luxembourg, West Germany, Greece, Italy, Denmark, Norway and Turkey to "facilitate arms cooperation between the European members of the alliance" (5:2-2).

In 1976, France joined members of Eurogroup to form the Independent European Program Group (IEPG). The organization was created to increase the cooperation between and the collective competitiveness of members'

defense industries (8:34). Abshire praised the IEPG in 1985 when he wrote:

> Under vigorous leadership of Dutch State Secretary Jan van Houwelingen, the IEPG has established itself as a force for European armaments cooperation. It has identified some 30 programs for possible exploitation, with five already beyond the initial stages of investigation. Having met twice at the defense minister level, the IEPG demonstrates Europe's recognition that political will is the critical factor in making real progress [2:69].

U.S. participation in armaments cooperation with Western European nations has been limited primarily to the previously mentioned licensing and coproduction of U.S. designed equipment and limited direct purchases and coproduction of European equipment. Because U.S. industries have not been involved directly in very many truly cooperative R&D ventures, they face a dual role of outsider and potential adversary as pressure for transatlantic cooperation mounts. Where Europeans military and industrial organizations have moved progressively along the cooperative learning curve, U.S. firms must now try to jump in without the benefit of previous experience. As will be discussed in detail later in the chapter, the Western Europeans are often skeptical of U.S. motives for participation and the ability of the U.S. to participate as an equal, not dominant, partner.

Concerted political, industrial, and military efforts have been made to increase the tempo of NATO armaments

cooperation and stress codevelopment as the preferred method. Despite these efforts, success is still limited primarily to coproduction (34:80). Nationally designed and internationally coproduced systems such as the F-16 fighter, NATO AWACS aircraft, AV-8 Harrier fighter and the Multiple Launch Rocket System (MLRS) are touted as success stories. However, international codevelopment projects such as the NATO Identification System (NIS), the European Fighter Aircraft (EFA), and MSOW have produced little or nothing for the substantial funds, time, and effort expended, and they remain embroiled in controversy (21:58-60; 35:1; 48:25; 87:8; 89:62).

Despite numerous setbacks, the pace of transatlantic cooperation has quickened considerably in the past decade. Significant movement began in the U.S. in the mid-1970s under the leadership of Senators Nunn and John C. Culver (D-IA). Abshire noted one such legislative effort:

> The Culver-Nunn Amendments of 1975 and 1976 declared the statutory policy of the US to be that our weapons should be standardized, or at least interoperable, with those of our NATO Allies. The amendments also encouraged the European Allies to make the Two-Way Street concept of military procurement work better by organizing their defense-industrial base "on a united and collective basis" [2:66].

The Defense Systems Management College wrote that U.S. interest in NATO armaments cooperation:

> ... could be said to have begun in earnest in August 1974 with the passage and signing of the DOD Appropriation Authorization Act for FY 1975, containing the

> first of a series of so-called Culver-Nunn amendments expressing Congressional interest in NATO standardization.... Congress added Culver-Nunn amendments to the DOD Appropriation Authorization Acts of FY 1976 and FY 1977. The latter provides for waiver of the Buy American Act in the larger interest of NATO standardization, expresses the sense of the Congress that "greater reliance on licensing and coproduction agreements" within NATO would facilitate standardization, and "encourages the governments of Europe to accelerate their present efforts to achieve European armaments collaboration among all European members of the Alliance" to obtain more realistic cooperation in defense procurement on the basis of a "two-way street" concept [42:2-1].

In 1983 Secretary of Defense Caspar Weinberger created a DOD Steering Group for NATO Armaments Cooperation under the leadership of the Deputy Secretary of Defense. Abshire wrote:

> Secretary Weinberger recognized that a designated management team would be required to oversee the Pentagon's arms cooperation business.... Senior policymakers from all sections of the Pentagon are included, and the objective is simple: to make the US commitment to arms cooperation work [2:68].

Congress followed in the Fiscal Year 1986 Defense Authorization Bill with the Nunn-Roth-Warner and the Quayle-Roth amendments. The Nunn-Roth-Warner amendment (usually referred to simply as the Nunn Amendment) fenced off $200 million per year for five years strictly for cooperative arms development projects between the U.S. and its NATO allies. The amendment also made available $50 million for side-by-side testing of European weapon systems

against U.S. systems. The Quayle-Roth Amendment greatly facilitated the NATO arms cooperation process by reducing the bureaucratic red tape that had hindered past U.S. cooperative efforts such as the NATO Sea Sparrow and AIM-9L missile projects (2:69).

Smith noted the significance of the Nunn Amendment when he wrote of Deputy Secretary of Defense William Taft:

> Secretary Taft notes that if there were no Nunn Amendment funds "it would not be the end of arms co-operation but it would make it more difficult. What the Nunn Amendment does is ensure (that) when we come up with a requirement it makes sense to meet co-operatively, we have the funds available to do it. (The) Nunn Funds are not all committed, so the well is not dry when we get there as in the past. The Nunn Amendment reverses the incentives for the Services who have been reluctant to come up with these ideas because funding was uncertain. Now they have some fenced money only available to them for co-operative projects, so they have every incentive to look for co-operative projects in order to get their hands on that money" [93:397].

In 1987, Deputy Secretary Taft announced the formation of a Defense Cooperation Working Group to be the "central body overseeing planning and execution of all DOD armaments cooperation policy." The working group was to be chaired by Kloske, Special Advisor for NATO Armaments and Executive Secretary of the DOD Steering Group on NATO Armaments Cooperation (95:1). The working group meets bi-weekly to oversee collaboration efforts and reports to the Steering Group through the chairman (93:396).

NATO took the most recent major step toward improved armaments cooperation by establishing a new armaments planning system. Under the system, Alliance members will submit a list of future defense needs to the NATO Conventional Armaments Review Committee. The lists will project needs out at least 10 years, rather than the six years currently projected for in NATO planning. According to Beyers, the committee will:

> ... review lists of all the nations... and develop armaments goals for each nation. The goals will set out when nations hope to meet their armaments needs.... Nations will be expected to compare notes on capabilities needed to determine what weapons could be built jointly to meet the needs of more than one nation [16:1,28].

Beyers reported that NATO officials are hoping the new system will enable governments to consider cooperative programs earlier in the procurement cycle. He noted that many NATO officials believe beginning cooperation in or even before the research and development phase is a key to integrating national objectives and, thus, ensuring project success (16:28). This approach responds directly to the recommendations of many experts. In 1986 then NATO Assistant Secretary General for Defense Support Robin Beard, a former member of the U.S. House of Representatives, wrote:

> What we need to do is to harmonize first not on equipment solutions but on the problems, expressed in terms of operational deficiencies that cannot be corrected by existing and/or planned equip-

> ments. To do this internationally,, we need agreed concepts, threat assessments, technological projections, and all the other critical components of effective ab initio planning [11:29].

U.S. Perspective

The Nunn Amendment. The centerpiece of U.S. armaments cooperation is the 1985 Nunn-Roth-Warner Amendment, which has given impetus and visibility to U.S. efforts to collaborate in arms development and production with its NATO allies. Again, this amendment is usually referred to simply as the Nunn Amendment (See Tables 1, 2, and 3 for a list of Nunn Amendment programs). Cevasco praised the legislation and resultant Congressional support as "an unequivocal endorsement of armaments co-operation as a vehicle for achieving modernisation of NATO conventional forces through equitable burden sharing among members" (33:655). Because it serves as the cornerstone of U.S. cooperative efforts, a more thorough examination of the amendment is essential to understanding many aspects of the current U.S. perspective.

Cevasco summarized the overall requirements established under the Nunn Amendment when he wrote:

> Congress required that projects under this initiative be joint efforts, established by formal agreement between the USA and one or more of the other NATO nations, and that US funds for such projects be spent in the USA [33:655].

Under the Nunn Amendment, Congress provides the funding. Potential cooperative projects are proposed by the services, DOD agencies, or NATO allies. The Office of the Secretary of Defense (OSD) screens and prioritizes the proposals, then selects the projects that will receive funding for development under the amendment (79:11).

Deputy Secretary Taft described DOD strategy based on the amendment as follows:

> What we have attempted is to use specific Nunn Amendment funds for the first two years of a co-operative project, then in the third year we would continue it outside the Nunn Amendment--the idea being by then it would be well launched and Nunn Amendment funds should be reserved for new projects so people will keep looking for and starting these. For the next five years we have reserved about $3 bn ($3000m) for the Nunn Amendment projects; only one billion of that will be in the fenced category at $200m per year, the other $1.9bn will be for the third, fourth and fifth years of projects that started through the Nunn Amendment [93:397].

As was stated earlier, the Nunn Amendment also fences off $50 million to support side-by-side testing of U.S. and similar European weapon systems for procurement to meet U.S. military needs. This initiative is intended to promote direct purchase of military equipment from Europe or licensed production by U.S. firms of European designed equipment.

Kloske and Cevasco see the Nunn Amendment as a catalyst for a unified front on armaments cooperation between Congress and the DOD (33:655; 48:23). Kloske noted

FY88 Nunn Amendment Candidate Programs

AIR FORCE

- F-16 Agile Falcon
- Aircraft Shelter Upgrade
- Super Cockpit Interface
- Ducted Rocket

NAVY

- Surface Ship Torpedo Defense
- Remotely Piloted Vehicle/MOSP
- Night Attack Avionics
- Photonics Mast
- Buried Mine Hunting
- Low Frequency Active Sonar
- E2C Display Software
- Hull Degaussing System
- Towed Twin Arrays
- Mass Memory Module
- Automatic Ship Classification
- Electro-Optic/Infrared Detector
- Radar Upgrade for Fighter Aircraft

ARMY

- Advanced Tactical Patriot (deleted)
- Combat Vehicle Command and Control System
- Radar ESM Payload for UAV
- Laser Standoff Chemical Detector
- Electro-Optic Countermeasures System
- Lightweight Tank Armament System

DEFENSE AGENCIES

- BICES/TADMS/ATTG (DIA)
- Post 2000 Tactical Communications (JTC3A)
- Armor/Anti-Armor (DARPA)
- C3 Interoperability (JTC3A)
- STOVL Integrated Controls (DARPA)
- Multifrequency Radar (DARPA)
- Hypervelocity Projectile (DARPA)
- EM Gun Vehicle Integration (DARPA)

Fig. 1. FY88 Nunn Amendment Candidate Programs (9)

FY 87 NUNN AMENDMENT PROJECTS

	PARTICIPANTS													
	US	CA	UK	FR	GE	BE	NL	DA	NO	GR	SP	IT	PO	TU
• POST 2000 TACTICAL AREA COMMUNCIATIONS (SOI SIGNED)	X	X	X	X			X					X		
• ALTERNATE WARHEADS-ARMY TACTICAL MISSILE SYSTEM (ATACMS) (SOI SIGNED)	X											X		
• ELECTRO-OPTICAL IMAGING SENSOR POD (SOI SIGNED)	X						X							
• HAWK MOBILITY ENHANCEMENT (MOU SIGNED)	X						X							
• NATO ANTI-AIR WARFARE SYSTEM (MOU SIGNED)	X	X	X		X		X				X			
• TACTICAL AIRCRAFT NIGHT COMBAT CAP. ENHANCEMENTS (SOI SIGNED)	X	X					X							X

Fig. 2. FY87 Nunn Amendment Projects (46)

FY 86 NUNN AMENDMENT PROJECTS

	PARTICIPANTS													
	US	CA	UK	FR	GE	BE	NE	DA	NO	GR	SP	IT	PO	TU
• ADA PROJECT SUPPORT ENVIRONMENTS (MOU SIGNED)	X	X	X	X	X		X	X	X			X		
• 155MM AUTONOMOUS PRECISION GUIDED MUNITION (MOU SIGNED)	X	X		X	X		X				X	X		X
• MODULAR STANDOFF WEAPONS (MSOW) (MOU SIGNED)	X	X	X	X	X						X	X		
• MULTIFUNCTIONAL INFORMATION DISTRIBUTION SYSTEM (MIDS) (MOU SIGNED)	X	X	X	X	X				X		X	X		
• NATO IDENTIFICATION SYSTEM (NIS)														
- CO-DEVELOPMENT (MOU SIGNED)	X		X	X	X							X		
- INFORMATION EXCHANGE (MOU SIGNED)	X	X	X	X	X	X		X		X*	X	X		X

* GREECE REQUEST FOR ADMISSION IS UNDER REVIEW BY ORIGINAL PARTICIPANTS

Fig. 3A. FY86 Nunn Amendment Projects (45)

FY 86 NUNN AMENDMENT PROJECTS (CONT)

	PARTICIPANTS													
	US	CA	UK	FR	GE	BE	NE	DA	NO	GR	SP	IT	PO	TU
• STANDOFF AIRBORNE RADAR DEMONSTRATION SYSTEM (ARDS) (MOU SIGNED)	X		X	X										
• ADVANCED SHORT TAKEOFF AND VERTICAL LANDING TECHNOLOGY (MOU SIGNED)	X		X											
• ENHANCED FIGHTER MANEUVERABILITY (MOU SIGNED)	X				X									
• ADVANCED SEA MINE (MOU SIGNED)	X		X											
• NATO FRIGATE REPLACEMENT--1990'S (MOU SIGNED)	X	X	X	X	X		X				X	X		

Fig. 3B. FY86 Nunn Amendment Projects (45)

that Taft and Senator Nunn have developed a close working relationship and that:

> The level of cooperation--because this has been a joint, bipartisan effort, not only on the part of Congress but also on the part of the Administration--I would say has been unique. And more importantly, the Allies understand this. They have taken notice, because usually on specific arms cooperation you were liable to see the Administration and Congress going in opposite directions. I think they have been impressed, and encouraged, that you have the number two man in the Department of Defense, plus his supporters behind him being part of the issue, plus having key, influential members of Congress doing the same thing [48:23].

Proponents. U.S. proponents do not perceive NATO armaments cooperation as a necessity for the equipping of U.S. forces, although that attitude is changing. In the past, the U.S. has held the technological lead in most, if not all, military-related technologies and possessed both the industrial capability and the funds to meet the needs of the U.S. Armed Services. This independence allowed the U.S. to pursue arms cooperation primarily for the benefit of its defense equipment companies and for the purpose of bolstering the ability of its European allies to share in the defense of Western Europe. In 1982, Callaghan expressed the attitude of many U.S. proponents of cooperation at that time when he wrote:

> Thus, Congressional support (then and now) for weapons standardization, for armaments cooperation, and for military trade on a two-way street, was rooted in the belief that these measures would max-

> imize conventional defense and deterrence, minimize the risk of nuclear confrontation, and equalize defense burden-sharing. Standardization and the economies of scale afforded by mass production and intercontinental military trade, were merely the economic means to achieve a strategic end, namely: to redress the conventional force balance between NATO and the Warsaw Pact [29:26].

In 1984, Abshire's conclusions reflected a change in focus that would continue until the present. He wrote:

> Our immediate challenge is to develop a resources strategy that capitalizes on the sum of our potential and which will allow us to apply it efficiently to improving our conventional forces. Armaments cooperation, in its many forms, is a critical ingredient in the achievement of this goal. It is this element of the resources strategy that we must develop to marshall our collective assets to obtain a sufficient and affordable conventional warfare posture [3:23].

In the mid-1980s the U.S. defense budget began to shrink in real terms as Congress wrestled with the growing budget deficit. This made armaments cooperation more of an economic necessity than ever before (25:40) and, with the passing of the Nunn Amendment, pressure to increase cooperative efforts mounted. This also made the U.S. position more like that of its European allies, who have dealt with severe budgetary constraints for decades. In a paper presented to the Defense Economics Workshop in Brussels in February 1988, Cevasco urged:

> The very fact that we face flat or declining budgets perhaps can be turned to our advantage. It is no longer reasonable to assume that things are going to get better as our ongoing modernization programs pro-

> ceed. The reduction of resources available to alliance and national Defense Ministries requires us to face the hard choices. Let the current circumstances be turned into a window of opportunity rather than a setback [30:2].

Aided by the steady increase in intra-European cooperation championed by the WEU and the IEPG, European industries have made solid gains in production and technological capabilities (25:46-49). While some in the U.S. view intra-European cooperation as a move to exclude U.S. firms, most proponents support it as a necessary step in the evolving transatlantic collaborative movement. This rationale has been supported by De Lauer, Walker, and Cohen. Walker wrote that a study by the U.S. Defense Science Board concluded that the European governments needed to put highest priority on achieving:

> a better balanced and more effective technological partnership by making more investments of high quality in basic technologies applicable to military systems [101:10].

De Lauer and Kitfield stressed that European technological gains would make European defense firms more capable of producing quality weapon systems and, therefore, better able to participate in transatlantic cooperation as an equal partner with U.S. firms (43:45; 65:74).

Concern for the preservation of the U.S. defense industrial base--especially maintaining a technological lead along a broad front of emerging technologies--still influences U.S. thought. The same concerns obviously also

influence European thinking. Cevasco noted this influence when he wrote, "The sovereignty imperative generates a strong tendency in each nation to maintain its R&D base in any given field" (30:7). Beard acknowledged the same tendency, but stressed the "NATO" viewpoint that he believes must pervade the thinking of all Alliance members:

> The defense and technological base is viewed by all nations as a critical element of their security policies, and thus of their sovereignty. All nations work to protect and promote this base, safeguard employment, and keep their production lines open. Many, and perhaps most, ideas for reform are therefore likely to involve painful national decision-making; but I suspect that much of what may look in the short term to be a degree of surrender of national interest to the common good, may appear in the longer-term perspective as being good for the individual nation as well as good for the Alliance as a whole [11:27].

One of the short-term disadvantages of cooperation can be the issue of technology transfer. Many developing European industries see this transfer as a means of obtaining expensive high technology without the years of painstaking research normally necessary to achieve a breakthrough. U.S. proponents view technology transfer as a necessary part of collaboration, but one that we must learn to handle with the caution it deserves. U.S. reluctance to share certain technologies has political, military, and industrial roots. U.S. defense firms are reluctant to give up their lead in emerging technologies. These firms are often backed in their reluctance by the

Congressmen whose constituents they employ or by a lobbying organization. Abshire noted the predominant factor contributing to the difficulties in technology transfer, however, when he wrote:

> U.S. concerns over technology leakage are very real and are supported by a mass of credible evidence. The existing mechanism for technology export control, the Coordinating Committee for Export Controls (COCOM), has not proven fully satisfactory as a means to safeguard military technology. The United States is struggling to balance technology sharing for Alliance conventional warfare improvements against the potential damage that the leakage of new military technology to adversaries would produce. A large amount of effort is being directed toward identification of truly critical technologies and toward exploration of viable mechanisms to protect them. This is a difficult problem and, notwithstanding our honest intentions, several of our Allies view it as camouflage for actual unwillingness to share technology because of the economic advantages accompanying that knowledge [3:24].

Wade noted that the perceived disadvantages of technology transfer can be turned into advantages with the proper mind-set and approach. Using the INTELSAT program as an example, he noted that the technology transfer had two positive effects:

> First, the transfer created a space communications industrial base in Europe that has strengthened the West's technological-industrial capabilities. Second, the U.S. firms reinvested the earnings from the transfer of technology and have thereby continued to maintain a strong lead in this technology [100:57].

Taft addressed the concern of many in the U.S. that we are creating our own competition by helping the European industries through technology transfer. He said he favored a free market in NATO's armaments trade, but one that would be consistent with the U.S. industrial base requirements. Taft lauded the free market idea as "healthy" and said it would strengthen the European defense industry and result in "less expensive, more capable arms for all of us" (93:397).

Beard agreed with Taft's assessment of the positive aspects of cooperation and the resultant benefits for European industry. He added, "It is ultimately in the interest of the U.S. that she has a strong European partner able to contribute to collective defence as effectively as possible" [23:18].

Robert A. Wolfe, a Pratt & Whitney vice president, downplayed the impact of technology transfer. He said:

> To be successful in this business, you must continually progress and obsolete your own technology. Therefore, in most cases, what is being transferred is already being surpassed in the laboratory or on the drawing board [104:4].

To achieve progress in both cooperation and competition, Taft, Cevasco, and Kloske asserted that our European allies need to follow suit with the cooperative R&D funding such as the U.S. has made available through the Nunn Amendment (25:23-24; 33:656; 48:23; 55:18). Aviation Week and Space Technology reported that Taft would ask the

European allies to set aside as much as $25-50 million per year in noncommitted funds to serve as venture capital with which to finance cooperative programs (40:26).

Although the European nations may be slow in reacting to suggestions that they provide Nunn Amendment-type funding of their own, many U.S. proponents say overall reaction to the amendment has been very favorable. In a 1987 interview with Military Technology, Beard said:

> There is no doubt whatsoever that during the past three years there has been a real surge of political support for improved arms co-operation... I believe that as an Alliance we are now facing up to the issues. We are being honest with ourselves. We are speaking openly about the challenges. I really detect a new spirit in all this. We know that we must improve arms co-operation, and improve it quickly. There is no rational alternative [23:17].

Kloske stated that the development of the "institutional machinery" to support arms cooperation through Nunn Amendment programs has let the NATO allies know the U.S. means business (48:22-23). The Europeans' reluctance to deal with the U.S. because of uncertainty about U.S. motives and ability to fund a program to production have been at least partially allayed. According to Kloske:

> ... when they see the Administration and Congress working in synch, that grabs their attention. We put manpower into it, that grabs their attention. We put bucks into it, that grabs their attention. So far I think they've responded very well [66:2].

The push from Congress has also grabbed the attention of both top civilian and military leaders at the Pentagon. In his 6 June 1985 Memorandum to the highest level DOD management, then Secretary of Defense Weinberger stated, "... collective security depends upon greater integration of military requirements with alliance-wide defense-industrial cooperation" (80:1). He further outlined the goals the DOD should attempt to achieve through cooperation:

- DOD access to, use of, and protection of the best technology developed by our Allies, and comparable Allied access to, use of, and protection of the best US technology, thereby avoiding unnecessary duplication of developments.

- Deployment and support of common--or at least interoperable--equipments with the Allies.

- Incentives for the Allies to make greater investment in modern conventional military equipments.

- Economies of scale afforded by coordinated research, development, production and logistics support programs [80:2].

To ensure accomplishment of these goals, Weinberger asked DOD leaders to take the following steps:

- continue to stress the importance of cooperative programs to Congress and NATO

- be diligent in protecting NATO technology

- consult with NATO allies when establishing operational and design requirements for future major weapon systems

- ensure competition advocates within DOD consider NATO industry sources and equipment during acquisitions

- establish a program to educate personnel within the services to develop and maintain support for armaments cooperation [80:2-3].

Within the Air Force, the Deputy Chief of Staff for Research, Development, and Acquisition has become the coordinator for cooperative efforts (79). An Air Force working group was formed to develop an implementation plan for Secretary Weinberger's initiatives. Further, the Air Force Systems Command (AFSC) Cooperative Armaments Plan stated:

> The goal of the command is to institutionalize a system whereby thorough consideration and evaluation of allied technology and systems are automatically considered and, if appropriate, included during the research, development, and production process--either as alternatives or as candidates for allied cooperation. Analysis of opportunities for exploitation of allied technology and systems is to become a normal way of business within AFSC [4:1].

U.S. industry has cautiously embraced the concept of armaments cooperation. Wolfe views collaboration as a means for U.S. industries to generate new products or enter new markets, increase business, and share development and production expenses (104:1). Henry J. Peppers, a Gould, Inc. vice president, listed six major benefits of international industrial teaming. Included on his list were: drawing on the strengths of each partner to produce better systems; reduction in R&D and production costs;

elimination of duplication to create a more economical and better coordinated defense posture; and providing economic benefits to all partners (81:48).

Kitfield reported that one of the main difficulties industry has had with cooperation has been the mixed signals being sent out by the Pentagon and Congress. However, this ambiguity may be due to the significantly increased emphasis on cooperation that has taken time to filter down through the numerous layers of DOD management. Kitfield quoted Robert Kromer, former Undersecretary of Defense for Research and Engineering:

> "All the top managers in the Pentagon were saying to American contractors, 'We want you to become more involved with the Europeans.' And then the contractors would find out that the services weren't paying attention... So industry would come back to us and say, 'Well, you are all in favor of this, but nobody's told the Army.' And we'd go back to pound and persuade the Army some more, but it just wasn't that easy. When you think you have everybody in the Pentagon in line, you then find out that some major general in Huntsville, Alabama, is the key man. And he's never heard any of this stuff about a 'two-way street'" [65:74].

According to Rich and others, several industry-to-industry differences have also created problems for cooperative partnerships. First, there are the obvious differences of language, culture, and metric vs U.S. standard. Additionally, European contractors do not emphasize documentation or use of configuration management and the systems approach to design and production as much

as U.S. industries do. This became a problem when U.S. partners discovered a shortage of technical data transferred from Europe in the Roland air defense missile system program. Also, technical drawings and parts numbering are not standardized in Europe as they are in the U.S. (88:23-24).

Proponents view armaments cooperation--with all its inherent difficulties--as the only means of equipping NATO's defense forces in these times of exorbitant weapon systems costs and declining defense budgets. Many see the difficulties merely as challenges that must be overcome to make armaments cooperation work. Rich and others offer four main points as suggestions for improving international collaboration:

- Recognize differences in U.S. and European acquisition settings and environments and plan accordingly.
- Exploit unique U.S. and European industrial capabilities as well as U.S. advantages in scale, work force flexibility, and production redundancy in order to cope with program adversity.
- Involve foreign producers as early as possible in order to facilitate technology transfer.
- Use quantity production to reduce the costs of less efficient coproducers [88:11].

Cevasco recommends keeping performance, cost, and schedule issues at the forefront to minimize the effects of national interests and protectionism; including all interested and able NATO nations regardless of size or

industrial capabilities; and beginning cooperation as early as possible in the acquisition cycle (32:2-3,7). He is skeptical of involving the U.S. in programs where work share requirements are assigned arbitrarily instead of on the basis of the best qualified contractor or subcontractor (30:8).

Kloske stresses the need to achieve interoperability (48:28) and advocates pursuing a few high impact programs with a small number of participants. He argues that a high number of participants "makes for extremely complex negotiating and management procedures" (14:2). On the other hand, Senator Nunn believes NATO should immerse itself in a large number of programs "so that we do not look at each one as the test programme, that if it fails, the whole concept has failed." He believes this will help give the Alliance the discipline necessary to "kill programs that turn out to be dogs" rather than pursuing them because of political, economic, or military pressures (92:642).

Abshire advocated adopting an aggressive attitude of "forcibly" advancing armaments cooperation and working hard to achieve success on initial transatlantic programs. "Each success will fuel additional Alliance efforts to seek rewarding cooperative ventures," he wrote (3:29-30).

Kloske noted that failure to succeed in armaments cooperation could have a devastating effect on the Alliance when he observed:

> We run three very serious risks with the Allies. One, we will undermine our own defense capability downstream due to lack of monetary resources and increasing lack of interoperability in our NATO combat forces. Secondly, I think there will be an industrial drift, and a protectionist drift within the NATO defense market, which could easily lead to a trade war. And thirdly, I think there could be a very serious political problem [48:28].

Opponents. Opposition to NATO armaments cooperation was relatively strong in the earlier stages but has grown less vocal as support for the program gained momentum in Congress and in the upper level of DOD management. Among the more vocal detractors are General James H. Polk (USA Ret.), former commander-in-chief, U.S. Army in Europe and NATO Central Army Group, and then Lieutenant Colonel Michael D. Elland (USA), a former political-military advisor to the Department of State and Assistant for Economic Policy and Analysis in the Office of the Secretary of Defense (International Security Affairs).

Opposition centers around five main points: the relative inefficiency of cooperative ventures; the divergence of industrial and technological capabilities and military requirements between the U.S. and our NATO allies; the difficulties associated with technology transfer; the drawbacks of necessary compromises made to facilitate cooperation; and the reluctance to become dependent on foreign sources for our military needs.

Benjamin Schemmer pointed out that the U.S., because of the size of its military, generates a production requirement larger than all of the remaining 15 NATO nations combined. Further, he noted that the U.S. procurement budget is nearly equal to the total defense budget of all of our NATO allies combined. "That, in turn, creates economies of scale which make a lot of U.S. equipment less expensive on a per-item basis and, thus, tough to compete against," Schemmer wrote (90:74).

What the U.S. hopes to gain in standardization and interoperability, opponents claim, will be lost in the diseconomies of doing business with our European allies. Cohen noted that the joint British-French built Jaguar fighter aircraft overran original price estimates by approximately 475 percent and European built F-16 fighters cost about $1 million more than F-16s built in the U.S. (34:82). Additionally, Eiland wrote that labor costs in Western Europe have been rising at a much higher rate than have those in the U.S. and productivity in Western European industry lies between one-third and two-thirds of that of U.S. industry (49:61-62).

These efficiency factors are compounded when the additional difficulties of building weapon systems cooperatively are considered. As Cohen wrote:

> A jointly procured weapon system takes longer to design and produce than its single-source counterpart. The collaborators must iron out differing requirements, translate technical

> documents, agree on production facilities, and establish management procedures.... The president of one large Italian arms manufacturer estimates that joint projects between two states take over 25 percent more time to complete than a project developed by a single nation; for three-party efforts, the figure is 50 percent [34:81].

A 1981 Rand study listed a number of reasons for the longer development and production time for cooperative programs. Their reasons included "more subcontractors, more production lines, and more schedule slippage, as well as conflicts over system specifications delaying the start of a program" (88:5).

As was noted earlier, the inefficiencies of armaments cooperation can include cost increases over equivalent sole source procurements as well. Polk wrote:

> One German industrialist figured out that bilateral development programs implied 40 percent higher costs, and trilateral ones as much as 73 percent higher costs, thereby casting some doubt on the money to be saved by some form of international research and development [83:17].

Opponents argue that the delays in fielding essential weapon systems and destructive cost increases are inevitable in cooperative ventures. Cohen declared:

> It stands to reason that it would prove difficult to arrange industrial cooperation between companies that are geographically distant, are accustomed to working in different languages, and use incompatible industrial techniques [34:83].

Further, these factors perpetuate rather than attenuate the trend toward what Callaghan termed

"structural disarmament" (27:28)--the spending of ever increasing funds for ever decreasing numbers of weapons. Eiland contends that the inefficiencies are also a product of current national psyches. He wrote:

> Because the perceived margin of physical safety for states has widened, there has been a decline in concerns about survival and the traditional forms of security, and other goals such as political autonomy, economic welfare, and prestige have become relatively more important [49:68].

The importance of factors other than military effectiveness and industrial efficiency have led to decisions that swell development and production costs and delay final production, opponents argue. When nations are more concerned with retaining or creating economic benefits for their ailing defense industries, efficiency gets lost in the shuffle. Cooperative projects are then forced to include technically inferior industries from participating nations rather than simply selecting the best qualified industries for the jobs (36:302).

This contributes to problems in the second area of contention for opponents of armaments cooperation--the divergence in U.S. and Western European industrial capabilities and military requirements. Because of work share requirements built into project MOUs, prime contractors must place subcontracts with companies in each participating nation. This placement is often based upon percentage of funds contributed to the project or

percentage of weapon systems to be bought by each participant. Elland noted that finding qualified subcontractors in each of the participating nations can be difficult (49:61).

The need to include many European companies in projects also complicates the difficulties surrounding technology transfer. Cohen wrote:

> Coproduction also implies the transfer of technology that the United States may wish to keep secret for either security or commercial reasons. The American government simply cannot control foreign technology security as well as it does its own, and some allies--the Germans, in particular--have an extremely bad record at keeping secrets [34:88].

Many opponents see technology transfer as a one-sided U.S. giveaway program, with the technologically inferior European industry benefitting at the expense of U.S. industry. While helping its allies, the U.S. is "giving away" technology that took years and possibly millions of dollars to perfect. Many opponents argue that the U.S. is, in reality, creating competition for its own defense industries by allowing European industries to make quantum technological leaps with transferred technology. Even Cevasco, a major DOD proponent of armaments cooperation, admitted that technology transfer has drawbacks when he wrote:

> The creation and application of new technology comprises a substantial portion of national defense budgets. That technology contributes to the qualitative edge in weapon systems that

> NATO nations have over the Warsaw Pact. That same technology constitutes a national asset. Thus the protection of Western technology becomes a foremost consideration, both from the perspective of denying an adversary the means to countermeasure national systems, and for protecting the investment made in that technology. Even sharing that technology with allies may become a problem [30:3].

DeLauer and James Kitfield point out that third-country sales of weapons developed and/or produced cooperatively has become a key issue in the technology transfer debate (43:47). Highlighting the ambiguity surrounding the debate, Kitfield wrote:

> The crucial issue in the technology transfer debate, however, may turn out to be that of third-party sales. One expert points out, for example, that West Germany may view sales of some technology to the East Germans as crucial to keeping the bridges of dialogue and commerce open, while the United States sees only the leakage of technology to the Eastern Bloc [65:77].

Abshire warns that an over-emphasis on technology protection will spell disaster for NATO armaments cooperation. He adds that NATO has neither "protected its technology adequately nor shared it effectively" (1:68). Both Abshire and DeLauer, as well as others, call for the formulation of a unified NATO policy on technology transfer to harmonize the protection and sharing aspects (1:68; 43:47). Major General James E. McInerney Jr. (USAF Ret.), former Air Staff Director, Military Sales and Assistance, believes the U.S. needs to formulate more clearly its own technology transfer policy (74:38).

The divergence of military requirements is due primarily to the limited military commitments of our NATO allies when compared to U.S. global military commitments. European requirements are geared almost exclusively to a war against the Warsaw Pact on the continent (34:88). Rich and others refer to U.S. worldwide commitments as "perhaps the most important underlying source of many requirement differences," and note numerous examples in the functional performance and support areas (88:22).

This divergence of military requirements has led to problems even within the more limited scope of intra-European cooperation (34:80,88). What U.S. opponents fear is the specter of compromise that they believe is destined to haunt international projects where national priorities and requirements clash. Rich and others discussed the possibility of cooperatively producing weapon systems "so distorted by negotiation and compromise that they represent no one's first choice" (88:5). Daniels contended:

> Large-scale uniformity... is a dangerous goal because the compromises it generates move individual nations away from the admittedly expensive idio-syncracies on which their military elan is based and toward a no man's land of patchwork weapon systems where neither meaningful uniformity nor the confidence born of individual judgement can prevail [36:303].

Finally, opponents argue that cooperation will lead to a capabilities-threatening dependence on foreign industries. In the particular case of Western European

countries, their industries would be more easily targeted by Warsaw Pact aircraft and missiles than firms in the U.S. Cohen points out that supplies from European contractors and subcontractors could be cut off in time of war. He also notes more subtle problems created by dependence on foreign suppliers, using the initial years of the Marine Corps' fielding of the British-manufactured AV-8 Harrier jet fighter as an example:

> The problems include British tardiness in supplying spare parts and the use of manuals that are not geared to the skill level of Marine mechanics. As a result, the Harrier force stands at only 20 to 40 percent operational readiness [34:77].

Opponents contend that Congress will complicate international cooperation even further during lean years when the dollars must be shifted across the Atlantic. Cohen wrote:

> On the purely political level, the representative nature of American government and the geographic location of the defense industry guarantee opposition to the purchase of any major weapon abroad. Particularly in a period of high unemployment, congressmen and senators will protest vigorously against large defense procurements that help a foreign, rather than a domestic, industry.... In any event, the intrusion of politics will prevent free trade in weapons... The United States... need not purchase large quantities of foreign arms. And it will not do so for domestic political and security reasons [34:78-79].

Opponents' answers to the dilemmas seen in the armaments cooperation process are varied. They range from redefining the "two-way street" to using sole-source

competition winners for NATO weapons purchases to dropping or severely restricting the push for NATO standardization and interoperability.

Opponents view the "two-way street" as a politicized slogan backed by biased figures that our NATO allies like to browbeat Congress and the DOD with. Schemmer put the argument in perspective from the opponents' viewpoint when he wrote:

> No topic may get debated more frequently among the 16 nations which spend $350-$400-billion annually on their common defense than the roughly $4-billion spent by Europe buying American equipment, and the $1-billion which the U.S. spends buying European equipment [90:71].

The latest "two-way street" figures show a downward trend in the perceived U.S. advantage. According to DOD figures, the balance in favor of the U.S. dropped from 6.7:1 in FY83 to 3.2:1 in FY84 (10:28). However, Kitfield observed that the favorable downturn in U.S. advantage from FY83 to FY84 came in large part due to a 45 percent reduction in Western European purchases of U.S. military goods during that period (65:76). Because defense procurement tends to come in large, discrete packages, a major weapon system purchase in any given year could bring about a large swing in the balance either way. Plus, individual European nations must also be satisfied with their national balance of purchases vis-a-vis the U.S. So problems in the "two-way street" could exist even though the overall NATO balance was acceptable.

Callaghan noted that a February 1979 House Armed Services Subcommittee study "finds fault with the concept of a 'two-way street.'" He added that the subcommittee reported that the slogan is often used to "equalize the economic benefits for European defense industries without sufficiently considering the contribution to military effectiveness" (28:36).

Opponents argue that the Europeans' version of the "two-way street" is too narrow. The concept should be broadened to include total trade figures and/or what the U.S. spends on military forces based in Europe and dedicated to NATO defense. According to Callaghan, the House Armed Services subcommittee suggested:

> The European approach to defining the two-way street solely in terms of defense trade shows a large advantage to the US. A broader definition of the two-way street that encompasses all defense-related goods and services would show a balance in Europe's favor [28:36].

Schemmer noted that, while the 1984 figures showed a $1.5 billion balance in its favor in military equipment trade, the U.S. spent $7.7 billion in Western Europe to support its military forces. He also noted that overall trade figures for the same year showed an $18.2 billion balance in favor of Western Europe (90:74). What he found most alarming was the deficiency in research and development funding by our NATO allies, who spent four to five percent of their defense budgets on R&D. Britain was the exception, spending approximately 13 percent, while the

U.S. spent approximately 11 percent of its defense budget on R&D. "Those represent national choices; but they also represent Europe's investment in the very foundation of what the Two-Way Street may look like 10 years from now," Schemmer emphasized (90:76).

Eiland advocated a hard-line, pragmatic approach to viewing the "two-way street." He suggested:

> If... it is seen that the structural ratio of high technology defense procurement flow is 1:1 or 50:1, then, in the interest of all parties, that ratio should be accepted until the unconstrained precepts of comparative advantage and cost-effectiveness dictate otherwise [49:68].

Eiland also advocated a return to sole-source procurement (49:68), an approach favored by many opponents. Cohen argued that coproduction would lead to smaller U.S. production lines (34:89). Several opponents lauded the U.S. for encouraging intra-European cooperation. Cohen reasoned:

> Of necessity, the Europeans will collaborate or trade arms with each other. This may make for some efficiencies in their R&D budgets and aid European integration. Washington should, if anything, encourage them to pursue this course [34:89].

Polk took the sole source argument one step further when he broke out development and production responsibilities as he depicted his idea of a NATO sole-source cooperative environment:

> Ideally, the United States should be the sole source for R&D in such areas of

> complex and expensive technology as ICBMs, space defense, smart bombs and missiles, death rays, atomic weapons, and similar systems. The second tier of industrialized nations, such as Britain, Germany, and France, logically should be entrusted with tanks, artillery, and the more conventional armaments. Finally, the Benelux region could work on small arms, tactical radios, and the like [83:22].

To overcome the doubts about reliance on foreign sources for defense equipment, Polk recommended overstocking spare parts to provide adequate safety levels (83:23).

Polk's primary recommendation, however, was to abandon the drive for standardization and interoperability within NATO except in the areas of fuels and ammunition. Polk and Cohen noted that non-standardized armies fought well as allies in World War II. "If history teaches anything, it is that partners fighting a coalition war suffer most from political disunity, not logistical diversity," Cohen pointed out (34:88). Polk further stated:

> ... it would be acceptable to let each nation build and service its own weapon systems around a common fuel and ammunition program. Each nation would be free to build the fighter, tank, or rifle that suits its own national requirements. Then, when and if one nation "builds a better mousetrap," the other armies and air forces should buy it directly from the sole source producer. We do not need an international supply system or dual production under license or common spare parts or identical engines or the rest. Quite simply, we only need to help each other in battle. We need to do this quickly and confidently, by assisting with the essential expendables of ammuni-

> tion, fuel, food, and medical supplies and by giving other help. The rest is window dressing. It is not worth the time, trouble, and money required [83:23].

Daniels asserted that the true underlying purpose for standardization within NATO is economic, not military. He termed standardization, as it was being pursued within NATO in the late 1970s, "economic socialism, a means by which all members of the NATO community can share in the work and the profits of weapon system manufacture" (36:302). Perhaps he best summed up the contentions of the opponents when he wrote:

> If standardization among the NATO group could be limited to the common acquisition of weapons that had first competitively demonstrated their ability to set winning performance standards within reasonable economic limitations, such as the U.S. design-to-unit-cost requirement, then the economies of large production runs and common logistics would properly complement the overriding purpose of the weapons [36:304].

European Perspective

In considering the European perspective, it is imperative to keep in mind that there are significant differences within Europe just as there are significant transatlantic differences. These European disparities affect both transatlantic and intra-European relationships and cooperative ventures (98:45).

Speaking for the smaller, less industrialized European nations, Belgian Minister of Defense Francois-Xavier de

Donnea wrote that large countries have a tendency to associate with one another. He attributed this to a natural association of countries and industries with similar defense needs, industrial technological levels, and production capabilities. But he warned that this tendency also leads to the exclusion of smaller countries. According to de Donnea, two of the major stumbling blocks in the cooperative process are the insistence on equal sharing of expenses in the early phases of a project and a trend to substitute majority rule for required unanimous decisions "which means pure and simple rejection of the weaker country's opinion" (39:1372).

In his report "A Strategy for NATO Armaments Cooperation" prepared for the National Defense University, P. Robert Calaway highlighted the European divergence of thought resulting from geographic location and perceptions of defense requirements. He wrote:

> Armaments cooperation continues to be inhibited by different perceptions of the Soviet threat as seen from the U.S. and Europe. Indeed, within Europe, there are different perceptions depending on whether one examines the Central Region or the Northern or Southern Flanks. Some progress was made last year with the agreement by the NATO Military Committee to a Conceptual Military Framework. However, there still remain significant disagreements on the means to counter the threat. These disagreements are exacerbated by a continued desire, on the part of most nations, to maintain and operate a national Army, Navy and Air Force which, they claim, can meet their own perception of the "threat." This results in a proliferation of "sub-critical" forces and

> an extremely inefficient collective military structure. This is the antithesis of true coalition defense, wherein specialized roles are agreed and national forces structured accordingly [25:12].

According to Callaghan, European perceptions of conventional defense requirements were linked to NATO's nuclear deterrent in a way most U.S. observers might find distorted. This rationale will probably be drastically affected by the U.S. and Soviet agreement to the Intermediate Nuclear Forces (INF) treaty. In 1982, Callaghan noted:

> Many in Europe feared (and still do) that if NATO's conventional forces were too strong, they would weaken deterrence, since they would tend to weaken the escalatory nuclear link between a European battlefield and the American intercontinental nuclear forces. Many in Europe believe that the credibility of the nuclear deterrent depends upon the non-credibility of the conventional defense of Europe. In short, there was simply no agreement between Europe and the United States on the role of NATO's conventional forces in an era of nuclear parity [29:26].

Many Europeans acknowledge that one of the main hindrances to greater intra-European and transatlantic cooperative success is the inequity between industries. De Donnea wrote:

> Lack of balance is hard to compensate since it automatically leads to free technology transfers and thus requires hardly acceptable sacrifices from the large industries in favour of the smaller ones [39:1372].

Jan van Houwelingen, former State Secretary of Defense for the Netherlands, and Lt Gen G. W. Boerman, former director of General Material in the Netherlands, agreed that European industries face internal and external inequities that hinder cooperation. Both characterized European industry as fragmented and inefficient compared to the U.S. defense industry (101:9). These deficiencies could be remedied by a more unified European effort, according to van Houwelingen:

> Western European defence industries should enlarge their capacities of producing competitive advanced products in sufficient quantities through intensified cooperation. At present, European industries are frequently not capable of satisfying the needs of the American armed forces: their weapon systems are often more expensive than American products, they cannot produce in sufficient numbers and within the required time [98:50].

The call for unity is a recurring theme throughout Europe. French defense minister Andre Giraud, Lt Gen Wolfgang Tebbe, former Director of Armament Procurement for the Federal German Ministry of Defence, Spanish Army Maj Luis Esquevillas of NATO Headquarters staff, and former Dutch defense minister Henk Vredeling have all expressed views similar to those of van Houwelingen and Boerman (52:18-19; 61:14; 96:57; 98:45). Many Europeans believe the IEPG is the organization through which Western European unity can be achieved (25:21; 96:58; 99:10-11). Van Houwelingen explained that the overriding purpose of the IEPG is "to strengthen Western European defence industries

to enable them to produce the required technologically advanced weapon systems in a competitive way" (98:49). He added:

> Europe must become one large, undivided market for defence goods, to a large extent able to supply the defence equipment to meet its own needs.... Then, European members of the Alliance will be in a better position to deal with the problems of removing trade barriers within NATO as a whole in order to create a truly open Atlantic defence market.... IEPG is not meant to create European cooperation in opposition to transatlantic cooperation, but as an indispensable element of, and a stimulus for transatlantic cooperation with the US and Canada [99:12].

Healy reported that one of the IEPG's top priorities in pursuing European unity is to "boost armaments cooperation to the highest political levels" (61:14).

In 1987, a NATO Independent Study Team headed by Vredeling recommended following the unified approach to the extent of Europeans nations buying European-built equipment "even if similar equipment would be less costly in the U.S. or elsewhere." The study team argued that this approach would encourage long-term development of European industry and would expose defense industries to normal market forces. This would lead to some "realignment and specialization," which could mean "loss of jobs and technical capabilities in individual companies" but "the possible disadvantages would be offset by higher efficiency" (52:18). Tebbe agreed that exposing the

European defense industry to open competition would be beneficial (96:57).

Other recommendations made by the NATO Independent Study Team included:

- Competing consortiums would be used for multinational procurements, with any company from any participating nation allowed to bid.

- The European NATO nations should set up a $114-million common fund to finance joint research and development. The fund, which would be provided by the nations and administered jointly, would increase to $570 million over a period of years.

- NATO's Independent European Program Group should establish a permanent secretariat to oversee common programs and maintain a central register of all military procurements that will be open for bidding.

- Defense ministers should agree jointly on more military requirements [52:19].

Another move to promote European unity is the European Economic Community's (EEC) drive to eliminate all technical and administrative barriers to trade. This effort is seen as vitally important to the "political and economic future of Western Europe--as a Community and as members of the Atlantic Alliance" (73:35).

Van Houwelingen recognized that the numerous European political action groups were all aiming for the same target. He suggested that IEPG, Eurogroup, EEC, WEU, and the NATO CNAD coordinate activities "to harmonize activities and to avoid duplication of work" (98:46).

As was stated earlier, the drive for European unification is not meant to preclude transatlatic cooperation. However, it is attributable at least in part to European doubts about U.S. resolve on the issue of a true partnership in armaments cooperation. Charles Serre, a former French defense attache who now represents an association of French arms industries in Washington, D.C., said he believes "American pride would never allow the Pentagon to buy its main weapons like jet fighters, attack helicopters or main battle tanks from other countries" (69:42). Wolfgang Flume, Boerman, Calaway, and Kitfield reported similar sentiment among European industrialists, who are frustrated with U.S. parochialism and the influence of lobbyists from the U.S. defense industries on Congress (25:28; 53:73; 65:79; 101:9). Calaway particularly stressed European wariness of Congressional meddling when he wrote:

> The U.S. Congress... retained the prerogative to change budget line items and individual programs and, at times, have unraveled international agreements made by DOD. This has injected a note of uncertainty into all agreements made between DOD and NATO partners for cooperation in R&D and procurement. The Allies view the long term as especially uncertain because of the threat that Congress may approve an initial cooperative R&D effort, but changing political or foreign-policy interests may cause re-direction which makes it impossible to collaborate in latter stages [25:28].

These uncertainties are compounded in the minds of many Europeans by the fact that the U.S. defense budget is

declining. Kitfield pointed out that Europeans fear that, as the DOD's buying power is eroded in the years to come, "Congress will turn its gaze away from the alliance and inward to constituent industries within home-state boundaries" (65:80).

Some of the uncertainty has been eliminated by the fenced off funding for Nunn Amendment programs. Although these funds only cover a limited number of programs, the Nunn Amendment has brought a generally favorable reaction from Western Europe. Ewan Anderson, commander in the Royal Naval Reserve and adviser to the U.K. Ministry of Defence, singled out the NATO Frigate for the 1990s program for particular praise. He wrote:

> ... it represents a complete breakthrough in attitudes and it could mark the beginning of a new era.... Spurred on by the New Nunn Amendment, there has been a drive throughout European NATO for arms cooperation. There now seems to be more political will on both sides of the Atlantic and there is a new determination to ensure success. European fears of U.S. dominance and unfair competition have been quieted [8:34].

Peter Howard agreed with Anderson that the Nunn Amendment was a major boost for armaments cooperation and has created a political will to succeed. However, he argues that the amendment "has not waved a magic wand and produced a series of immediate solutions" (63:660). Flume reported that the number of U.S. orders of defense equipment from European firms has increased slowly. He attributes the slow pace of the increase to the need to

open channels for purchasing European goods and to inadequate presentation and sales efforts on the part of European industries. Flume indicated that the slow European response is due in part to their past "assumption that it would be impossible to penetrate the American market" (53:75).

Despite continuing difficulties, the optimism engendered by the amendment has remained high. Howard reported that the Europeans regard the U.S. legislation highly and:

> ... while each nation can see problems of one sort or another coming along, there is a willingness to make concessions for the benefit of the collective good. This is what sometimes frustrated leaders, including NATO Secretary General Lord Carrington, have been praying for over many years [63:660].

With many barriers falling victim to the enthusiasm and reform generated by the Nunn Amendment, one--technology transfer--remains predominant. Jeffrey Denny, assistant editor of Military Logistics Forum, reported in 1985 that Europeans still considered this a major obstacle to transatlantic cooperation (44:23). Most Europeans typically downplay the difficulties technology transfer has created. Van Houwelingen wrote:

> We do understand the American concerns with respect to the "leaking away" of "high tech" knowledge. But on the other hand, we should realize that the free exchange of technology within the Alliance is indispensable for the quality of our conventional defence in the future [99:13].

To ensure program success, many Europeans agree with U.S. experts that cooperation must begin in the R&D phase. This must be grounded even earlier in the requirements determination phase, according to then IEPG Secretary David Bonner, United Kingdom Ministry of Defence Chief for Defence Collaboration David Perry, and van Houwelingen. Van Houwelingen advocated "harmonization not only of weapon requirements but also of time scales for the acquisition of equipment and even of operational concepts" (98:44). Perry pointed out that collaboration was successful in the past only when there had been a "happy coincidence of requirements." He and Bonner said that NATO armaments directors (ministers of defense) would have to make their requirements coincide in the future (44:26; 101:9). Bonner added:

> This is not easy, because the ministers themselves are under political and economic pressure. But by presenting major weapon systems projects to their nations as the key to building the industrial base and creating jobs down the road, the ministers can overcome this pressure [44:26].

Tebbe advised "every partner to be willing to accommodate the other side's vital economic interests and not to expect it to renounce them." He also said Europeans should give equal effort to ensuring intra-European and transatlantic cooperation, being sure not to neglect one for the other (96:57-58).

Van Houwelingen recommended abandoning the drive for total uniformity. He added:

> We should, however, diminish the present excessive variety which weakens our defense unnecessarily. Standardization is the ideal, interoperability is indispensable [98:45].

The IEPG leader also proposed taking a new look at the "two-way street" when he wrote:

> This does not mean that, bilaterally, a balanced defence equipment trade between the US and each European ally should be the yardstick, or that balance should be the rule for every single year. On the contrary, the defence trade balance should refer to Europe as a whole (being measured over five year periods for instance), taking into account the specific position of member countries with less developed defence industries [99:13].

Colonel Derek R. Ivy, Assistant Director Military Guided Weapons in the United Kingdom Ministry of Defence, presented some valuable lessons learned when he wrote of the Third Generation Anti Tank Guided Weapons (TRIGAT) program. The lessons learned included:

- language training is essential for joint staffs
- mutual trust must be developed through communication
- short time appointments for staff members are not appropriate
- coordination among the many national agencies must always be maintained
- the program management team must always keep sight of the goal of cost effectiveness [64:69].

MSOW

As was stated in Chapter I, the MSOW program is intended to produce three variants of a modular cruise missile that will be carried by a variety of NATO fighter aircraft. Variants' airframes and engines will be identical, with each missile capable of carrying a variety of warheads and sub-munitions in a modular payload bay. The missiles will be designed to attack fixed and limited mobile targets at various ranges, allowing the attacking aircraft to release the missiles before overflying enemy defensive airspace.

Weiss pointed out the need for standoff capability when he wrote:

> Attrition of aircraft is expected both en route and in the target area. Most weapons in the current inventory--general purpose bombs, unguided rockets, guided missiles, captive dispenser submunitions, aircraft guns and free-fall cluster bombs --force the attacking aircraft to overfly the target or at least to approach within the target's defensive cover.... A promising way of reducing the losses of own aircraft is to attack the targets from stand-off positions, staying just outside the target's defensive cover, further away in a lower threat area or even in friendly territory behind the FEBA (forward edge of battle area) [103:33-34].

Weiss further suggested that standoff capability would significantly enhance NATO's ability to carry out offensive counter-air (OCA) operations and follow-on forces attack (FOFA), two major components of Air-Land Battle 2000 (103:38).

The three variants of the MSOW have been labeled Version A, Version B, and Version C. Aviation Week and Space Technology reported that the variants would have the following characteristics:

> - Version A--A submunitions dispensing weapon with a 30-50-km. range that would be used for missions such as area denial, runway cratering and attacking ground based-air defenses. This weapon has its roots in the low-cost powered dispenser (Locpod) program.
>
> - Version B--A weapon capable of carrying submunitions or a single warhead that has a range of 185-600 km. (115-370 mi.). Missions for this weapon would include attack of rear echelon air bases, depots and static assets such as bridges. This program is a descendant of the long-range standoff missile program (LRSOM).
>
> - Version C--A submunitions weapon with a 15-30-km. (9-18 mi.) range that would be used to attack armored columns [91:27].

Because the variants differ in the technology necessary to field them, a graduated timetable has been established, according to Beyers. Version A is planned for initial operating capability in 1994, Version B in 1995, and Version C in 1996, although there seems to be a variety of opinions as to how accurate those estimates are. Beyers also reported that the British were most interested in Version B with maximum range (13:3; 20:3; 57:49).

Current plans call for production of approximately 30,000 missiles, with the U.S. expected to procure 40-50 percent of the total number (17:3; 38:36). Beyers reported that program costs are expected to top $10 billion (20:3).

According to Geisenheyner, interest in a SOM originated in the West German Luftwaffe as early as 1973. At that time MBB began working on a weapon code-named Jumbo at the request of the Luftwaffe. The project was cancelled in 1976 due to technical difficulties, lack of funding, and a failure of the Luftwaffe to attract partners to share the cost of the project. The concept resurfaced in 1979 when NATO conducted a prefeasibility study on a long-range SOM to attack fixed targets. Additionally, in 1983 the Luftwaffe formulated a requirement for a medium-range SOM (57:46-47).

The two programs evolved into three separate efforts. The West Germans continued work on a short-range SOM to be carried by their Alpha jet ground attack aircraft. Meanwhile, NATO teams began work on LRSOM (United Kingdom, U.S., and West Germany) and LOCPOD (U.S., Italy, Spain, and Canada). The Luftwaffe reportedly joined the LRSOM team because of political pressure (57:47; 103:38).

Both international programs proceeded through the initial phases of development until 1986. At that time representatives from Canada, Spain, Italy, Germany, the United Kingdom, and the U.S. met to discuss the feasibility of merging all SOM programs (57:48). From those initial meetings, the MSOW program evolved. The MSOW Letter of Intent was signed by the original participants in February 1986. The MOU was then drafted and signed in July 1987 (60:1).

The partnership has been marked by discontent from the start. Martin Cohen and Geisenheyner reported that some Europeans believe the program is merely a ploy by the U.S. to take advantage of European technology while claiming leadership in the SOM development process (35:1; 57:49). Cevasco countered for the U.S. when he wrote:

> ... some of our allies were unhappy because the United States stopped two earlier efforts--the Long-Range Stand-Off Missile programme (LRSOM) and the Low-Cost Powered Dispenser (LOCPOD). However, it should be recognized that MSOW includes three variants. Those variants include both LRSOM and LOCPOD, so all past work remains relevant.... I would add that we are confident that MSOW will meet the goals of the two other programmes, but at lower cost [32:4].

Obviously, major stumbling blocks to program success remain. Primary among them are the redundant programs being conducted concurrently in participating nations. This appears to be in direct violation of a restriction imposed by the MOU, that all participants:

> ... refrain from initiating and/or funding future competitive programmes during MSOW development phases which would fulfill the same operational roles as any of the primary variants [47:ii-iii].

Along with the French-German Apache program, the U.S. Navy and Air Force are pursuing interim standoff programs designed to fill the requirements gap until the mid-1990s. Additionally, the Navy's Advanced Interdiction Weapon System (AIWS) is seen by many as a duplication of Air Force

MSOW efforts. Both services may also be involved in secret standoff missile programs, according to Polsky (84:3).

The interim programs include the Navy's Standoff Land Attack Missile (SLAM), the Air Force's AGM-130, and Israel's Popeye missile. According to Beyers, SLAM is a version of the Harpoon missile being developed by McDonnell Douglas Astronautics Co. for use by carrier aircraft. The AGM-130 is a rocket-powered version of the Air Force's GBU-15 glide bomb being built by Rockwell International. Popeye is a long-range SOM referred to by the Air Force as Have Nap. It is being tested for use on B-52 and FB-111 aircraft. Martin Marietta will team with Israel's Rafael if Popeye is approved for U.S. production (18:6).

The AIWS will be a short-range standoff missile for use against mobile land targets. The Navy plans to award a contract for the demonstration/validation phase in the third quarter of 1988 (18:6). Two teams are currently competing for the AIWS contract:

- McDonnell Douglas Astronautics Co. and Hughes Aircraft Co. Missile Systems Group

- LTV Missiles and Electronics Group and Texas Instruments (84:3).

The DOD was directed in 1988 defense appropriations legislation to complete a multiservice master plan for standoff missiles (18:6; 84:3). The plan, which was supposed to eliminate costly duplication, was still incomplete in May. Amouyal indicated that the MSOW and AIWS programs will most likely be merged when she wrote:

> ... one House Armed Services Committee staffer... suggested that the Navy's Advanced Interdiction Weapon System (AIWS) may be incorporated ultimately into the Air Force missile program. A well-placed DOD official substantiated this claim, offering cautiously, "We've looked at both programs... and discovered there were ways of joining the two" [6:15].

Finalizing a DOD master plan may improve the efficiency of U.S. SOM efforts. It is not likely to have great impact on the international MSOW program, however.

IV. Findings

Chapter Overview

This chapter presents the findings developed from an analysis of the interviews (Appendix A) conducted as the major segment of the research. The initial portion of the chapter summarizes findings related to overall NATO armaments cooperation and U.S. involvement in this endeavor. The second portion presents findings related directly to the MSOW program. The findings presented in the initial sections of the chapter support many of the key points previously presented in the literature review. Additionally, the findings related to the MSOW program correlate with those related to overall cooperation.

The remainder of the chapter focuses on suggested improvements in the NATO cooperative process offered by those involved in policy making and implementation as well as those who work international cooperation at the program management level.

Except for the interviews with management personnel from the defense industry, the interviews were conducted prior to France and Canada withdrawing from the MSOW program. No interviews had been conducted with Canadian personnel prior to the withdrawal, so no effort was made to contact them afterward since their exposure to the MSOW

program--and thus the expected value of an interview--was minimal.

Overall NATO Armaments Cooperation

The two points upon which there was a consensus were that armaments cooperation is essential to the ongoing NATO defense effort and that the number of cooperative programs will continue to grow in the foreseeable future. Most respondents acknowledged rising defense costs and declining defense budgets as major factors in the increased interest in international cooperation. Further, many European representatives discussed particular interests that their nations were attempting to satisfy through NATO cooperation. Italy and Spain want to boost their armaments industries by involving them in leading edge technology research, development, and production (75:1-2; 82:1). The West Germans, on the other hand, have a solid technological base but wish to focus their efforts in certain areas and use international cooperation both to multiply the benefits of their efforts and to augment them in areas they choose not to pursue (94:4).

U.S. personnel as well as most Europeans acknowledged the economic and political forces that play dominant roles in determining the extent of each nation's participation in armaments cooperation. In Spain and Italy, the governments play the dominant role in pursuing international cooperation. In the other European countries involved in

the MSOW partnership, the governments, defense departments, and armaments industries all play major roles, with the industries more aggressively pursuing cooperation than do U.S., Spanish, or Italian defense industries.

The West Germans and the French expressed strong support for interoperability but reluctance to work toward standardization. Walter Spies of West Germany and Tran Thi Thu Van of France both said that interoperability is attainable and realistic, while complete standardization is too constricting a goal. Most U.S. personnel who commented on this issue believe that interoperability is essential, while standardization is not essential but is worth pursuing for certain weapon systems or equipment.

U.S. Participation

One perception shared by numerous U.S. and European respondents is that U.S. participation in NATO armaments cooperation is driven by a few supporters on Capitol Hill and in the upper echelons of the DOD. Further, cooperation receives little active support from the majority of Congress or the services. The Europeans applaud the Nunn initiatives. The effect of this series of legislative initiatives seems to have been to spur our NATO allies to like actior. According to Luigi Napolitano of the Italian Embassy:

> We took note with the utmost interest of the two Nunn initiatives. It has the potentiality to reverse some negative

> perceptions of the Alliance, of burden sharing, of the allies not taking care of themselves, of the big ally always in charge and always supposed to pay for everybody... So, we feel in a way that we have a kind of responsibility. We cannot let Senator Nunn down. He's done a good thing, but what's the follow-up? We feel this responsibility. We have to give a proper answer back to this kind of initiative [75:2].

What the Europeans as well as U.S. contractors and DOD personnel note with concern is the protectionist legislation that is introduced or invoked to protect parochial interests in the U.S. This effort is seen as supported in part by smaller U.S. defense contractors, who often handle only sub-contract work. The major U.S. defense contractors are perceived as opposed to most protectionist legislation because they have less to lose through international cooperation and because they fear retaliation in Europe if U.S. protectionism increases.

There exists a parallel sentiment in Europe, however. Just as many Americans oppose transatlantic cooperative efforts, so too do many Europeans. Including the U.S. in cooperation--particularly codevelopment--often complicates a process the Europeans have been refining among themselves for decades. Dr. Dermit Cummings of the United Kingdom, Deputy Director of the MSOW International Program Office (IPO), noted that the Europeans are far more experienced at international cooperation and that European procurement systems are similar to each other and dissimilar to the U.S. system. Most other Europeans agreed with Cummings

that the U.S. Federal Acquisition Regulations (FAR) are too complicated and voluminous. The Europeans have far fewer acquisition regulations, smaller contracting offices, and place more faith in their contractors than does the DOD (77:3).

On the other hand, many Europeans tend to be overwhelmed by the scale and range of R&D and production efforts undertaken by U.S. contractors. According to Senate Armed Services Committee Professional Staff Member Bill Hoehn, the immensity of U.S. efforts and the lack of coordination of presentations to the Europeans leads to misunderstandings and further complicates the cooperative process. This has an especially profound effect on the smaller European nations (62:1).

Another aspect of U.S. participation many NATO allies dislike is U.S. insistence on limiting or controlling third country sales of the end products of cooperative programs. France, in particular, has a much more liberal policy of foreign sales of weapon systems than does the U.S. As Thu Van noted:

> France and European countries have always been reluctant to get involved in cooperation with the United States because of the very restrictive control export policy of the United States. We, France, have also concerns about export controls. But, if France and the United States have produced common equipment, the United States would want to put in the Memorandum of Understanding that every sale to a third country will be approved by the United States government. This is some-

> thing I don't think that France is willing to accept [97:4].

Technology transfer, which is linked in part to the third country sales question, is another point of contention. U.S. personnel acknowledge that our technology transfer policies are sometimes too restrictive. Hoehn said:

> The problem you're up against is technology transfer, which has been a particularly important area of concern, some would say overemphasized in this administration particularly in terms of restricting technology to the allies and trying to prevent it from being transferred to our enemies. As a result of that, opinions differ all over the map on the issue of what to do about it, how to do it, etc. All I can tell you is my own perspective on that, which is I think technology is going to leak almost no matter what we do and what you have to ask yourself is, "Is it better when the other half of our alliance gets no benefit from our technology and therefore falls even further behind in their capabilities vis-a-vis the Soviets, or do we need to recognize we're on a technology treadmill and that the only way you can survive is to run like hell and hope that you have the next generation ready by the time somebody gets ahold of the last generation you had" [62:2]?

Hoehn noted as an example the European Fighter Aircraft (EFA), which he said is considerably deficient in stealth technology compared to the next generation of U.S. fighter aircraft. He said the Alliance would benefit if the U.S. shared at least "last generation's" stealth technology with the European EFA partners. This would enable them to progress faster in their own stealth R&D and

also enable them to divert funds already earmarked for stealth R&D to other important areas (62:2).

Drawbacks of International Cooperation

The primary drawbacks pointed out by the respondents were similar to those presented in the literature review: increased cost and time compared to a single nation program; national economic and political interests taking precedence over military needs; and the difficulty in managing international programs because of the number of participants, each having its own set of requirements and priorities.

Colonel Richard Koehnke of the Office of the Assistant Secretary of the Air Force for Acquisition said the loss of control experienced by participants in international collaboration is a drawback. He pointed out that not only the services, but the users--the individual commands within the services--prefer to have significant input into the final products their personnel are going to use. International programs have limited opportunity for input compared to national programs. Service or command input may be further diluted by the compromises reached in negotiation between participating nations with conflicting requirements. Koehnke also noted that, because international cooperation is a relatively new and often difficult endeavor, proponents battle resistance to change in most organizations. He said:

> It's just an observation that, when you accommodate other nations, you're going to have to change your own internal procedures and all that. You don't really realize until you start trying to coordinate all that how far down it goes in the subordinate units. It may be a very simple policy or procedure change with no impact, but because it's not the way we've done business before, you'll find a very large natural resistance within an organization to changing. So that's a constant battle [67:12].

Colonel Robert Lison (USAF), Special Assistant to the Armament Division's Deputy Commander for Resources, Development, and Acquisition, believes instability at all levels is one of the most prevalent problems in armaments cooperation. He noted:

> Each nation has its own stability problems and they aggregate and impact. So either the impact that is real or the instability that is perceived, in either case, the impact is the same. We have an election. So, folks need to have confidence that, if they sign up to something, if there is a new administration we're going to adhere to it.... So the desire for very specific contractual-like wording and the desire that everything be covered, the necessity that it all be put down in excruciating detail is there because it's driven partially by the fact that everybody knows that the people who are the authors of the agreement, the people who are the signators of the agreement are not necessarily the people who are going to have to live with the agreements because of the turnover of people on all sides. And obviously, each nation perceives the other nations' instability to be probably greater than their own [71:12].

Dana Caldwell of Rockwell International Corporation's Missile Systems Division and Dr. Ray Beuligmann of General

Dynamics Corporation's Convair Division pointed out numerous drawbacks from the defense industry perspective. Caldwell said differences in procurement policies and regulations greatly complicate international cooperation. As an example, he recalled:

> In one country that we dealt with on this program (MSOW), a firm fixed price development contract in that country means they do the best job they can with the amount of money and, if they don't meet the specification requirements, the government sort of turns its head and says, "Well, we did the best we can and that's all we have." Whereas in this country, if you don't meet all those specifications, it's called default. They call it a contractual firm requirement and the other countries are very hesitant to sign up for that in what they call guaranteed performance. They don't mind it once you're in production, okay, but not in the early stages [28:2-3].

Caldwell said seemingly minor discrepancies like time differences between consortia offices, unpredictable currency fluctuations, and different fiscal years can create major problems. Because of time differences, the amount of time available for interaction between offices in different locations might be very limited. This kind of problem is minor, but it may magnify the difficulties in resolving time sensitive issues, Caldwell pointed out. The MSOW program sought to avoid these problems by co-locating all program management personnel at Eglin AFB in the IPO.

Unstable currency rates in participating nations can create economic disaster, according to Caldwell. He said:

> ... If you're going to have to bid a contract in common dollars, as various monies fluctuate compared to the American dollar, you could win or lose severely. For example, when I was in Japan I could get 360 yen to the dollar. If I bid something against Japan on something like that and then had to live with 120 yen per dollar, I might have to file bankruptcy. It can be a very big swing, coupled with the exchange rate and inflation rate in your own country [26:5].

Differing fiscal years create planning and payment problems for consortia partners. Timetables must be set up so that each partner can meet the economic requirements of the team within the constraints of each countries fiscal policies, according to Caldwell.

Beuligmann said a leadership dilemma and equitably distributing workshares are also major problems in international cooperation. Because many joint ventures are managed by committee, these ventures lack the dynamic leadership of typical prime-subcontractor relationships. Beuligmann favors working relationships where one company takes prime responsibility and is the outright leader of the effort. The MSOW program has been set up to avoid at least most of the "management-by-committee" difficulties Beuligmann noted. The IPO has day-to-day control of the program, while the steering group and management group offer overall guidance and direction.

Equitably distributing workshares is complicated because both the amount and content of the work are key aspects of the distribution. Countries expect to receive

workshares commensurate with their level of participation. Each nation is additionally interested in maintaining or expanding its technology base through participation in international programs. Often, however, the host or lead nation's workshare consists of an inordinate amount of administrative work or one nation is relegated to working on low technology components, according to Beuligmann. He added:

> ... you must find a good breakout of the work, a good breakout of what we call the noble work, reasonably good technology work, so that everybody is kind of happy with the balance of the exciting work, the technical work, as well as some of the more mundane portions of engineering and development that go on [12:3-4].

Finding companies in some of the less developed European countries to undertake high technology manufacturing may mean transferring considerable technology--both for the weapon system and in the manufacturing process. This may also result in the manufacture of components that are not as advanced or reliable as those manufactured in the more developed nations. Several respondents said this type of compromise is a major drawback to the equal sharing of work. Many said they would prefer finding the best qualified subcontractors within the partnership regardless of nationality. This would result in the manufacture of higher quality components and would involve less technology transfer. However, it would probably exclude the

industries in many of the smaller and less developed nations. This is an outcome that is considered unacceptable to these nations, according to the literature review.

Benefits of International Cooperation

Again, the most frequently mentioned benefits correlated directly with those presented in the literature review: overall cost savings; eliminating duplication in R&D; and improving the combat capabilities of Alliance forces by producing interoperable or standardized weapons.

Another major benefit recognized by several respondents was the increase in Alliance cohesion that results from working together on cooperative programs. As defense officials and industry representatives work together, they increase their understanding of the policies and character of the other nations. Additionally, cooperation broadens and strengthens NATO's technology base by including more industries and R&D personnel from the various nations in high technology programs. This, along with the elimination of duplicative programs within the Alliance, will allow NATO R&D resources to be spread across a much broader spectrum of technologies (62:7).

MSOW Goals and Benefits

Obviously, the main goal of the MSOW program is to produce an affordable standoff weapon that will meet the

requirements of the participating nations. The requirements include the following: modularity, so that different submunitions and warheads can be used on the same basic missile; interoperability; and the capability to be delivered by most of NATO's combat aircraft.

Colonel Alan E. Haberbusch, Director of the MSOW IPO, Dr. Martin Zimmer, MSOW Program Manager, and others noted that MSOW represents a significant leap in capability for NATO forces, with the potential to greatly reduce the vulnerability of NATO aircraft in wartime. But Haberbusch and Zimmer said the cooperative aspects of the program may be more important than the end product. "Hopefully, we're going to have a cooperative program that we can show that worked," Haberbusch stressed (59:4; 105:4).

The MSOW program is a three-tiered NATO effort, with a steering committee-management group-program office organizational structure. The IPO, located at Eglin AFB, Florida, is headed up by Haberbusch and Cummings and is one of the first truly international program offices where each participating nation is contributing dedicated staff members and funding.

The U.S. is serving as host nation, not lead nation. This means that the IPO will use the U.S. contracting system, but the IPO is placed directly under the chain of command of a NATO Steering Committee-Management Group (60:4) rather than under the Aerospace Systems Division

(ASD) or Air Force Logistics Command (AFLC) chains of command.

According to Haberbusch, the management group's function is to "handle the inter-governmental issues negating the need for the program manager to resolve everything at the higher level of the steering committee" (60:3). The steering committee will:

> ... resolve significant policy issues; approve various plans for such things as work sharing, technology, costs, and acquisition strategy; make arrangements relative to new participants or withdrawal; and prepare joint reports to national or NATO bodies [60:2-3].

According to the MOU, the steering committee will meet at least annually. Major General Donald Lamberson, Assistant Deputy to the Assistant Secretary of the Air Force for Acquisition, is the U.S. member of the committee (60:3).

Each of the original participating nations--with the exception of Canada and Spain--originally contracted to contribute 16 percent of the funds for the project definition (PD) phase of the program. Canada and Spain were to contribute 10 percent each (91:27). The PD phase equates to the U.S. demonstration-validation (dem-val) acquisition phase and is expected to last 40 months (13:6; 86:233).

This funding arrangement and all other program arrangements will be severely complicated by the withdrawal of France and Canada from the program. The French

reportedly were unhappy with the funding-work share and funding-procurement ratios, which serves to highlight a major problem in international cooperation identified in the literature review. French officials complained that their funding share was much larger than the benefits of their projected work share and procurement justified and that the program had become too complicated and time-consuming because of the large number of participants (38:1; 54:28).

After the French announced their intentions in May 1988, a reworking of the cost sharing for the program was begun. The MSOW executive steering committee asked Canada and all other participating nations to carry larger percentages of the financial burden. The Canadian government countered with an offer to fund no more than 11 percent. When the remaining MSOW participants rejected the offer, Canada withdrew from the program. Barbara Amouyal reported that one Canadian official said, "We looked at the Canadian up-front percentage as well as the probable realistic return on our investment... and they were too far apart" (6:1).

The steering committee assigned funding shares for the remaining five participants as follows: U.S., the United Kingdom, West Germany, and Italy 22 percent each; Spain 12 percent. The five nations reaffirmed their commitment to the MSOW program after the 9 June 1988 steering committee meeting in London (7:4).

France may pursue work on its own short-range standoff missile, the Apache, with the French defense companies Matra and Aerospatiale teaming for the effort. Matra has worked on the Apache with Messerschmitt-Boelkow-Blohm (MBB) of West Germany for a number of years. The two companies reportedly had decided in 1987 to continue the project despite also participating in MSOW (13:3; 54:28).

The French and Canadian withdrawals appear to have also complicated industrial teaming for MSOW. Industrial participation in the program is predicated on governmental participation. Previously, two international consortia had been formed to answer the request for proposal (RFP) for the PD phase issued in August 1987. Industry sources estimate work in the PD phase will cost approximately $450 million (38:36). According to Defense Daily, initially the selection process was to evolve as follows:

> Two or more prime contracts will be awarded, with a progressive competition planned (downselect) for all future phases. The project definition teams will be the only sources able to compete for full-scale development and low rate initial production [86:233].

However, at the recent meeting in London the steering committee revised its position. Amouyal reported:

> Also significant to the MSOW program was Thursday's decision to award one rather than two contracts for the missile's full-scale development. Previously, the MSOW partners had planned to select two teams of contractors to compete in the first phase of the development program... The committee now intends to cut costs by requiring the single contract winner to

incorporate plans and technologies from the excluded bidder [6:1,15].

As noted in the literature review, opinions vary as to the proper strategy for allocating work within the industries of the partner nations. The U.S. and West Germany favored the two-team approach at least through the PD phase. Amouyal quoted one DOD official as saying, "We always believed that two teams would provide additional security, different ideas... and put pressure on the companies involved to work harder." The remaining partners favored the cost-saving, one-team approach opted for by the committee (6:15).

The two teams originally competing for the prime contracts reportedly were:

- Rockwell International, Duluth, Ga., British Aerospace of the United Kingdom, Bristol Aerospace of Canada, CASA of Spain, CASMU of Italy, Messerschmitt-Boelkow-Blohm of West Germany, and Matra of France.

- General Dynamics, San Diego, Brunswick Corp. of the United States, Dornier of West Germany, Hunting Engineering of the United Kingdom, Aerospatiale of France, Augusta of Italy, Garrett of Canada, and INISEL of Spain [15:4].

Three international consortia were teaming for work on the MSOW engines, reportedly required to be in the 1,000-pound thrust range. These consortia were:

- Garrett Turbine Engine Co. of the U.S., Turbomeca of France, and Motoren und Turbinen Union of West Germany

- Teledyne CAE of the U.S. and Microturbo S.A. of France

- Rolls-Royce of the United Kingdom, Williams International of the U.S., and KHD Luftahrttechnik of West Germany [17:13].

Amouyal reported that the consortia are currently (as of June 1988) revising work packages. "The revised proposals are expected to be protracted and costly, with several industry sources estimating a six month delay to the MSOW's program schedule," she wrote (6:15).

Caldwell pointed out that the Europeans are still very much concerned with workshare, and Lieutenant Colonel Raymond Charguellon of the French Embassy's Armament Attache's Office added that France remains interested in the potential for foreign sales of standoff weapons.

Zimmer, Beuligmann, and Caldwell each expressed the hope that, through the MSOW program, U.S. defense and armaments industry personnel would develop a greater respect for European technological and manufacturing capabilities. Zimmer also said he hoped the U.S. would learn to treat the Europeans as equal partners and the Europeans would learn to trust the U.S. He felt these factors would be keys to success in future cooperative ventures (105:4).

Maureen Preta, MSOW Contracting Officer, said her experience with MSOW contract negotiations has been educational. She noted:

> It was very difficult at first to understand why they were taking exception to various things because I really didn't see the point. Through many meetings

> with them and listening to them, I've got a much better understanding of what their thought process is [85:3].

MSOW Drawbacks

Again, the major findings in this area correlate with both the literature review and the findings related to overall NATO cooperation. However, there are many practical, program management-level difficulties that were not brought out earlier in the research. These can be grouped according to two of the major problem areas identified in the literature review: harmonization and program management.

Technology transfer, or the Europeans' perception that the U.S. is not willing to share certain secret technology with program participants, has created an atmosphere of mistrust within the MSOW partnership (59:13; 71:3). This is perhaps the most critical harmonization problem. Cevasco explained:

> With MSOW, you can pick in the open literature veiled references to a parallel black program, probably perceived in Europe as being a fact. There's a concern that we're pushing MSOW with them, but that it'll be a second rate weapon system. There's some concern on the part of our partners that we have some red hot thing we're doing and we're not going to let them see it and we're doing this simplistic, less capable system with them. ... While they've all entered in, they've done it with some reservations that the program may be cast aside when we move our black program further along and find that it really can do all these neat things and this (MSOW) is nothing more

> than a hedge for us that we'll abandon in a nanosecond if we have something that is better and more affordable [31:10].

Further mistrust was created by starting with what MSOW program office personnel call unrealistic cost and time estimates. Apparently, the cost and time estimates for the program were optimistic projections agreed upon prior to the signing of the MOU. Lison said the MSOW program is progressing rapidly, especially compared to most international programs, but expectations created by the early estimates still have some participants grumbling about the length of program phases. Ronald Krzan, Project Manager of the MSOW IPO, noted that a faulty estimating procedure resulted in unrealistic MSOW cost projections. Krzan said:

> ... we really shot ourselves in the foot in that area in the early part of the program. Instead of sitting down and writing the statement of work and then costing it out, before we had the statement of work done we just listed a bunch of things on the blackboard and our cost people sat down and costed those out. So what numbers they came up with are numbers that we're having to live with now because, even though the program has been estimated again at a much higher cost, the other countries want to sit back and still use the initial cost estimates... I think that, if we had gone about that differently in the beginning, we could have had a much better working relationship with them [68:4].

Zimmer noted that this type of cost estimating is still being done in the program. He related:

> For instance, we're going through another process right now to estimate what the

> FSD (full scale development phase cost) is going to be. The first estimate is going to be under. They did not include terminal guidance and seeker. Why, I don't know. It has become apparent in order to complete the mission with the type of accuracy you need, you need to have terminal guidance and seekers and all that. So, you need to put this on and it's going to up the price [105:3].

John Nopanen, an engineer assigned to the MSOW IPO, and Preta said another major problem with the initial phase of MSOW program was that the people who negotiated and authored the MOU did not understand the intricacies of contracting and program management. Preta believes contracting and program management personnel, preferably the ones who will have to work the program and live with the results of the MOU, should be included in the MOU negotiations (85:3).

Lison said he originally thought that since the U.S. planned to buy 40 percent of the missiles, the U.S. would fund 40 percent of the effort, contribute 40 percent of the technology, and receive 40 percent of the work. He observed:

> That was based on one concept of allocating costshare-workshare. The concept that was dictated down to us was one of seven equal shares. Now that concept may have had good reasons from a political standpoint. I don't know the rationale. There may be absolutely good reasons for the concept of seven equal shares, but that imposed great difficulty on the technology sharing issues and I'm sure it gives the industry no end of problems as to how you participate in this kind of effort but you only contribute one-seventh of the technology. It also

> raises cost issues. I'm going to take a quote from Dr. David Ebeoglu (an associate at Eglin). That is, if you take seven directors and get them together and say, "I want you to produce a two-hour movie," what you're going to get is a 14-hour movie. If you take seven equal pieces of the pie, there's a real danger that you're going to have a bigger product than you really wanted and it's going to cost you more than you can afford [71:3].

Beuligmann said Lison's point is well-taken. His understanding of the equal shares decision was that each partner wanted an equal say in determining program goals and outcomes. Therefore, each--except for Spain and Canada--was asked to fund an equal share of the development costs. This was a main reason France withdrew from the program. As was stated earlier, the French were asked to fund 16 percent of the program when they intended to buy less than 10 percent of the missiles.

Charguellon reiterated the French arguments that the program involved too many countries and was too ambitious. He also questioned the requirement of having at least one company from each of the participating nations included in each of the consortia competing for MSOW contracts. The French favored the approach of selecting the best available companies regardless of nationality.

Another major area of contention mentioned by Nopanen was the proposed navigation system for MSOW. According to Nopanen, the Europeans want to use a terrain-based navigation system, while the U.S. wants to use a system

that operates with the Global Positioning Satellite (GPS) system. The GPS system sends signals from satellites directly to receivers on aircraft and missiles for highly accurate navigation. But the U.S. controls the GPS and, Nopanen believes, the Europeans fear the U.S. might close allied access to the GPS during a war. A compromise was worked out whereby the MSOW will be capable of accommodating either navigation system (77:1).

Haberbusch, Nopanen, and Krzan agreed that reaction to the IPO and a resultant lack of support from the participating nations as well as the host agencies at Eglin have been the predominant program management problems. This, again, is related to the resistance to change issue. Also, the fact that this is truly an international effort and not directly under the command structure of Armaments Division has created problems, according to the MSOW program management personnel. Because the IPO has no sponsor at Eglin, the office has been shuffled from one inadequate facility to another and given minimal support. Krzan offered:

> They (the European partners) were reluctant at first to commit themselves to three or four people to help run the IPO and yet they have committed people. They are going to put people over here during the whole program. We ourselves, the U.S. side, we're having a heck of a time trying to get manning straightened out. We just finally got some manpower slots in here a few days ago (April 1988). But the Europeans have been arriving, looking at the IPO. They find that we have no building of our own. We don't have any

> decent furniture. We don't have any people that are actually assigned to the IPO. They just kind of throw up their hands and say, "Well, what kind of a host have we got here?" If we're going to be a host nation, then we're going to have to be able to do a little better job of it, I think [68:5].

The IPO will have a building of its own after construction is completed this summer. But the building is located on the outskirts of the base, far away from what MSOW IPO personnel believe is an ideal location for doing business.

Haberbusch said the European participants had to be convinced to give the IPO the power and freedom to run the program on a day-to-day basis. He said he thinks that has been done. "It remains to be seen how well it will go," he cautioned. Haberbusch summed up the IPO difficulties by saying:

> It's all new and different. Really, no matter where you go in this program, I guess that's the key thing, that we're plowing new ground everywhere. So everything you do, you've got to explain in excruciating detail to people about why things have got to happen and you've got to have adjustments, sort of a long-standing "This is the way we do business" kind of thing [59:7].

According to Cummings, the United Kingdom sees as prominent drawbacks: 1) the need for consensus in decision making; 2) the range of aircraft that MSOW must accommodate; 3) the divergent languages and procurement systems within the MSOW partnership; and 4) the large technology transfer requirement brought about by the

disparity in technical capabilities between the industries of the participants.

Suggested Improvements in NATO Armaments Cooperation

The primary foci of suggested improvements seemed to center around establishing the institutional foundation for international cooperation.

Carlos Aquino, Special Advisor to the Deputy Secretary of Defense, and Hoehn said this institutionalization must begin in the U.S. at the DOD. Both said the impetus for international cooperation must shift downward from the highest offices at the Pentagon. Hoehn stressed:

> If this is ever going to take hold as an institutionalized project, it's going to have to develop a bureaucratic following behind it at a much lower level that allows project proposals to kind of float up from the military staffs into some centralized network that will discuss them and negotiate arrangements and so forth and does not get to the level of the Secretaries or Defense Ministers of the various countries other than in an aggregate reporting [62:5].

Aquino believes that proper emphasis and training of young officers and DOD civilians are keys to success. He also said he believes the DOD must encourage U.S. industry to expand international cooperation. This would include helping companies new to cooperation understand the peculiarities of international programs and keeping the defense industry updated on changes in U.S. laws and regulations related to international cooperation.

Preta contended that part of the training Aquino felt was vital should consist of lessons learned from previous international cooperative programs. She said the U.S. should be diligent in amassing corporate knowledge and including it in DOD training courses. She also said she had attended a symposium that brought together personnel working on international programs. She felt the exchange of ideas at the meeting was very helpful and suggested continuing to hold this type of symposium. When asked if developing international cooperative specialists in the contracting and procurement fields would be beneficial, Preta said only if there were enough programs ongoing to keep these individuals occupied (85:4).

Zimmer and Cevasco said the U.S. needs to develop a new mindset. Before the services spend money on R&D, they must learn to first look overseas and see if that R&D is already underway in an allied nation. If so, consideration should then be given to purchasing the technology, equipment, or weapon system from our ally rather than duplicating the program ourselves. Thu Van suggested that the NATO allies should begin to think in terms of protecting and expanding NATO's industrial mobilization base, rather than just their own nation's mobilization base. Zimmer stressed the importance of the idea of widening our focus by giving the following example:

> I was involved with the Korean efforts when I was in the laboratory. We had gotten to a point with the Koreans, and

> the area I'm talking about is explosives, where they have a very, very fine capability. The have in the laboratories which are dedicated to this type of research the best equipment from all over the world. You will see a German piece of equipment, a French, a British, a U.S. Whoever had the best type of equipment in that area, they bought it and they've come to a point now where they scratch their head and say, "Now what are we going to do with this?" I look upon this as a marvelous opportunity for the U.S. to step in and help them in the sense that we say, "Look, this is what we're doing and we would suggest you work the following areas." By doing that and by giving the proper guidance, we can supplement our efforts. We are always short on manpower. We have always more ideas than we have money and people to pursue them. This way, the Koreans would be more than happy to jump on it because they need to start. And we would reap the benefits because they would be doing the work and we would be exchanging information [105:5].

Haberbusch, Thu Van, Senate Armed Services Commitee Professional Staff Member John Hamre, and Colonel Francisco Perez-Mulnelo, Assistant Defense Attache at the Embassy of Spain, suggested developing some form of overall NATO guidelines for international cooperation. These guidelines would be in addition to the already established NATO procedural guidelines and would give guidance in establishing and running an IPO, for instance. All of the above respondents admitted that these guidelines would be difficult to refine and establish, however. But the key point made was that the Alliance should not have to "reinvent the wheel" every time a new international program is begun.

Krzan, Nopanen and others from the MSOW program said the IPO needed assured, adequate support from its host unit to properly function. They added that the other members of the partnership may have reason to question the sincerity of the host when the IPO receives inadequate support.

Many U.S. respondents also suggested that the U.S. needs to stablize its funding of international programs to match that of the Europeans. The uncertainty created by the current year-to-year funding battle for virtually every program is a major hindrance to progress in collaboration.

Hoehn argued that increasing the pace of international cooperation would alleviate some of the stress on program members. He said:

> ... this complicated ball of projects is approved at too high a level, so that limits the number of them. Because the number is limited, everybody wants to play in it because it's the greatest thing since sliced bread, or alleged to be, and nobody wants to be left out of this new game in town. What we've got to do is get it to the point where projects flow up in substantial numbers, get approved at a relatively modest level, and don't involve NATO's 16 nations in every project [62:7].

This would also alleviate some of the political pressure of every program holding the international spotlight. Koehnke argues that we already have many smaller international cooperative ventures ongoing, but they don't receive the publicity they merit. He said publicizing the success of these less visible programs

would help relieve the pressure for success on the larger programs.

Many of the respondents said starting the program off properly is a key to success. Thu Van insisted that beginning programs in the earliest stages of R&D, if possible, would ensure program continuity. Cummings listed common requirements and agreed procedures as paramount. He said programs most often disintegrate when partners come into the program with dissimilar requirements and then are forced to seek too many compromises.

Lison added that the U.S. should establish its disclosure restrictions on technology related to a proposed international program before beginning negotiations on the MOU. He also said the U.S. should more carefully and completely research and staff its position before MOU negotiations begin. Apparently, U.S. personnel made commitments they later had to retract during MSOW negotiations. Lison also argued that other partnership options should be explored. He related:

> ... when it became clear that MSOW was going to be the initiative that would get support out of OSD and the Air Staff and when it was first given to us as a four-power initiative and even later when it became a seven-nation undertaking, we proposed to sit with the Germans and reach a bilateral agreement with the Germans on a program and then to invite other nations to join us. In other words, our strategy was to start off with a bi-lateral agreement and let it expand into a multilateral agreement based on that strong bilateral agreement [71:6].

Lison said there were several legitimate reasons for not establishing and building from the bilateral agreement in the MSOW case, but this may be an option for future international programs. He also argued that establishing different levels of partners would work better than the equal partners concept of MSOW. He explained:

> ... the concept that we came up with originally down here was that you could have full participants, you could have partial participants, and those who are waiting. You could even reach some sort of agreement where the full participants will bear this amount of the load and so a share in the cooperative effort will cost you this much contribution, and another class of participation would be where you get a lesser share, but you do get jobs in return for your share. But you don't get to make the decisions because you're kind of an associate member. And a third category may even be where you pay a small amount to keep an option. You contribute nothing in terms of determining the design and you don't get any jobs in return for your contribution, but you preserve the option to buy later not as a third party but as a member of the group [71:9].

Hamre suggested enlisting two or three "main players," establishing a timetable to let others know when the deadline will be to sign up for the program, and starting the program as quickly as possible. Then, strictly adhering to the deadline for signing up would be essential. Hamre believes this approach would limit the partnerships to those nations truly interested in the technology, equipment, or weapon system being developed.

V. Conclusions and Recommendations

Introduction

The conclusions and recommendations that follow are based on the researcher's literature review and the interviews summarized in Chapter IV.

Conclusions

The primary conclusion this researcher has drawn is that NATO armaments cooperation, though essential, is condemned to bitter frustration and possibly eventual failure unless proper attitudes are developed. The key players--political, military, and industrial--from each of the NATO nations must realize that this endeavor is still in its infancy. This is especially true for transatlantic cooperation. The U.S., particularly, is just learning to cooperate as an equal partner with its NATO allies in the development and production of armaments. For decades the U.S. has dominated NATO armaments production and sales. The transition to equal--not dominant--partner will take time.

The lack of success achieved thus far in NATO armaments cooperation means that the three U.S. goals identified by Lorell (p. 23) are not being met, and this is true for the MSOW program at this time as well. However, the progress being made and the increased emphasis in both

governments and military establishments throughout the Alliance show promise for future improvements in NATO military capabilities and in the efficiency of NATO R&D efforts. The results of ongoing Nunn Amendment programs will ultimately determine whether the third U.S. objective of strengthening transatlantic NATO links will be realized.

A second conclusion is that each nation involved in the MSOW program was sincere in its desire to fulfill its perception of requirements in the area of a standoff missile. However, these requirements were not sufficiently harmonized at the beginning of the program to allow the program to progress without significant difficulty such as that which culminated in the withdrawal of France and Canada from the program.

A final conclusion is that the MSOW program was indeed too ambitious. Developing three variants of a modular weapon system to satisfy the divergent needs of seven partners is virtually impossible, especially considering the political pressure and time and cost constraints placed on the IPO.

The program, in all likelihood, will eventually produce a viable weapon system or family of weapons. The increased cost and time involved because of MSOW's collaborative nature will make the program difficult to justify in the short term. But the long term benefits of bringing a transatlantic codevelopment program to fruition --the cohesion generated by success, the valuable

cooperative lessons learned, and the battlefield interoperability created--should make MSOW worthwhile simply because it is a pioneer program. Success in this program would generate momentum for future programs that would, in itself, far outweigh the short term drawbacks.

Recommendations

From the realization that NATO armaments cooperation is still in its developmental stage must come the patience to give the people directly involved in the process time to work out the major problems. Also needed are the determination to see worthwhile programs through to completion, some degree of flexibility to adapt as new issues come to the forefront, and the courage to abandon programs that are not worth continuing. The researcher acknowledges the difficulty in achieving these rather idealistic goals.

A second recommendation is that the U.S. must stabilize funding of international programs if they are to be successful. Our partners will never enter programs with complete faith if U.S. participation becomes questionable each new fiscal year.

Additionally, the Alliance must start with simpler programs which involve fewer countries, or involve fewer countries as full partners if, for example, a three-tiered level of participation is used. Champions of international cooperation need some programs to point to as successes.

Starting with simpler, smaller programs will allow the Alliance to complete some programs successfully. These successes can then be used as the foundation for attempting much larger, more complicated programs once the process is refined. Some of the research respondents argued that a few big programs would receive more political attention and thus would be more likely to receive support and funding. However, the researcher agrees with those who contended that increasing the number of programs would decrease the pressure on NATO's members to join each program and thus, have too many participants trying to compromise on each program. Success is what is needed in the near future, and success will come with small, simple programs.

A forth recommendation is for the DOD to ensure that each program--whether successful or unsuccessful--end with the writing of a lessons learned document. These documents should then be compiled and used as training tools for program management personnel. Also, symposiums like the one mentioned by Preta should be continued on a regular basis. These steps are keys to ensuring that the invaluable experience and knowledge accumulated by individuals working international programs will not be lost.

Finally, several European representatives as well as a number of articles in the literature review suggested having the European nations represented by an organization--the IEPG, WEU, or some like organization--in negotiations

for transatlantic cooperation. This option should be explored. It might greatly simplify negotiations if the Europeans worked out their requirements and priorities first, then spoke with one voice in meetings with the U.S.

This might also allow for a more realistic assignment of workshares, with the European organization controlling workshares for its members. For example, each nation would not receive the workshare for each program exactly equal to its level of funding in that particular program. Rather, the workshares could carry over to other cooperative programs. The European organization could track funds expended by each nation in all international cooperative programs. The organization could then equalize the overall funding-workshares ratio over some acceptable period of time by assigning work to nations in programs where they can contribute the best technology and manufacturing capability. This would require high degrees of cooperation and coordination, which the researcher believes would be more readily available in a European-only organization at this time.

Recommendations for Further Research

Because international cooperation is a relatively new concept and is evidently so vital to the future effectiveness of NATO as a defensive alliance, further research in several signficant areas is recommended.

First, research could focus on the Nunn initiatives. A study should be done in 1990 or beyond to determine exactly how effective legislation related to international cooperation--primarily the Nunn Amendment--has been in promoting U.S. participation in NATO programs. By 1990 many of the programs begun in the first two or three years following the Nunn Amendment should have progressed into at least full scale development. At this point, a fair assessment of the effectiveness of the Nunn Amendment and related legislation might be possible.

A second recommendation is to attempt to consolidate the lessons learned information from as many international cooperative programs as possible. This would include perspectives from both U.S. personnel and those of our allies. This consolidation would serve as a useful tool in training DOD personnel for future assignments in international programs.

Two other issues which merit further research are the process of developing MOUs and technology transfer. Both issues are important in the continued improvement of the international cooperative process. Although some suggested developing a standardized boilerplate NATO MOU, the researcher agrees with Cummings, who said that this would accomplish little because the individual issues arising from each program take up most of the negotiating time. Research on refining the entire MOU process would be beneficial, however.

Likewise, research on the U.S. technology transfer policies and regulations and their impact on NATO armaments cooperation would be beneficial. Many of the respondents in this research effort indicated that the U.S. technology transfer position needs clarifying and updating to make it more relevant to today's environment.

Appendix A: List of Interviews

Mr. Carlos Aquino	Special Advisor to the Deputy Secretary of Defense The Pentagon, Room 3D947 Washington DC 20301-3070
Dr. Ray Beuligmann	Division Vice President and MSOW Program Director Convair Division General Dynamics Corporation P.O. Box 85357 San Diego CA 92138
Mr. Dana Caldwell	Manager of Contracts, MSOW Missile Systems Division Rockwell International Corporation 1800 Satellite Boulevard Duluth GA 30136
Mr. Francis M. Cevasco	Assistant Deputy Under Secretary of Defense (NATO/ Europe) The Pentagon, Room 3D161 Washington DC 20301-3070
Lt Col Raymond Charguellon	Office of the Armament Attache Embassy of France 4101 Reservoir Road N.W. Washington DC 20007-2172
Dr. Dermit Cummings	Deputy Director, MSOW IPO Eglin AFB FL 32542
Col Alan Haberbusch	Director, MSOW IPO Eglin AFB FL 32542
Mr. John Hamre	Professional Staff Member Senate Armed Services Committee Russell Building Room 222 Washington DC 20510
Mr. Bill Hoehn	Professional Staff Member Senate Armed Services Committee Russell Building Room 222 Washington DC 20510

Col Richard Koehnke	Division Chief Advanced Programs Division Director for Tactical Programs Assistant Secretary of the Air Force for Acquisition The Pentagon, Room 4D337 Washington DC 20301-3070
Mr. Ronald A. Krzan	Project Manager, MSOW IPO Eglin AFB FL 32542
Mr. Georg A. Kuehnhold	Federal Republic of Germany Liason Office of the Armament Sector for Defense Materiel 1601 N. Kent Street, Suite 1200 Arlington VA 22209
Mr. Bernd Leithardt	Federal Republic of Germany Technical Representative MSOW IPO Eglin AFB FL 32542
Col Robert H. Lison	Special Assistant to the Deputy Commander for Resources, Development, and Acquisition AED/XRI Eglin AFB FL 32542
Mr. Luigi Napolitano	Counselor, Embassy of Italy 1601 Fuller Street N.W. Washington DC 20009
Mr. John Naponen	Engineer, MSOW IPO Eglin AFB FL 32542
Col Francisco Perez'-Muinelo	Attache for Defense Procurement and Cooperation Assistant Defense Attache Embassy of Spain 4801 Wisconsin Avenue N.W. Suite 300 Washington DC 20016-4634
Mr. Roland Pinard	Office of the Armament Attache Embassy of France 4101 Reservoir Road N.W. Washington DC 20007-2172

Mrs. Maureen Preta	MSOW Contracting Officer AD/PMYS Eglin AFB FL 32542
Col Jean-Marie Six	French Technical Representative MSOW IPO Eglin AFB FL 32542
Mr. Walter O. Spies	Counselor, Defense Research & Engineering Embassy of the Federal Republic of Germany 4645 Reservoir Road N.W. Washington DC 20007-1998
Ms. Tran Thi Thu Van	Office of the Armament Attache Embassy of France 4101 Reservoir Road N.W. Washington DC 20007-2172
Maj John Wegner	Avanced Programs Division Director for Tactical Programs Assistant Secretary of the Air Force for Acquisition The Pentagon, Room 4D337 Washington DC 20301-3070
Dr. Martin Zimmer	MSOW Program Manager AFSC/ADYGX Eglin AFB FL 32542

APPENDIX B: INTERVIEW GUIDES

INTERVIEW GUIDE

Department of Defense

PART I: PERSONAL BACKGROUND & GENERAL INFORMATION

DATE:_____ PHONE #: (____)____-_____

RANK/NAME:_____

JOB TITLE:_____

COMPLETE ADDRESS:_____

YRS PROCUREMENT EXP:_____ YRS INTERNAT'L EXP:_____

MSOW EXP:_____ ATTND DSMC MULTIN'L PROG MGR CRS:_____

PART II: QUESTIONS FOR DEPARTMENT OF DEFENSE PERSONNEL

GENERAL

1. How would you categorize NATO armaments cooperation overall based on current international programs, as successful or unsuccessful? Why?

2. What lessons have been learned from past programs that will make ongoing and future programs better?

3. What are the main difficulties involved in NATO armaments cooperation for the U.S.? The Europeans?

4. What are the most beneficial results that have been derived by the U.S. from our most recent cooperative programs (F-16, Roland, MLRS, NATO Frigate, etc.)? By the Europeans?

5. Do the benefits of participation in NATO armaments cooperation outweigh the drawbacks for the U.S.? For the Europeans?

6. What U.S. hinderances to truly successful NATO armaments cooperation remain? What European hinderances remain?

MODULAR STANDOFF WEAPON PROGRAM

1. What does the Department of Defense want to get out of the MSOW program?

2. What do our NATO partners' military departments want to get out of the MSOW program?

3. Has the concurrent R&D on similar weapon systems by the Air Force and the Navy hindered progress on the MSOW NATO program?

4. What have been the most difficult aspects of working in the MSOW partnership?

5. What have been the most positive aspects of working in the MSOW partnership?

6. Do you expect the modular standoff weapons to further NATO standardization or interoperability?

7. Do you expect the modular standoff weapons to substantially improve the effectiveness of our military?

8. Is the MSOW program on schedule compared to the schedule that would be appropriate for a U.S. procurement program?

9. What compromises have we asked for in the MSOW program?

10. What compromises have the partners asked for?

11. What extraordinary problems has working with international consortia caused?

PART III: SUMMATION QUESTIONS

---

1. Has recent U.S. legislation (Nunn and Quayle) improved U.S. participation in NATO armaments cooperation? If so, how? If not, why not?

2. What suggestions do you have for improving the NATO armaments cooperation process.

3. Is U.S. participation in NATO armaments cooperation worthwhile?

INTERVIEW GUIDE

Government

PART I: PERSONAL BACKGROUND & GENERAL INFORMATION

DATE:_____ PHONE #: (____)____-_____

RANK/NAME:_____

JOB TITLE:_____

COMPLETE ADDRESS:_____

YRS PROCUREMENT EXP:_____ YRS INTERNAT'L EXP:_____

MSOW EXP:_____ ATTND DSMC MULTIN'L PROG MGR CRS:_____

PART II: QUESTIONS FOR GOVERNMENT (POLITICAL) PERSONNEL

GENERAL

1. How would you categorize NATO armaments cooperation overall based on current international programs, as successful or unsuccessful? Why?

2. What lessons have been learned from past programs that will make ongoing and future programs better?

3. What are the main difficulties involved in NATO armaments cooperation for the U.S.? The Europeans?

4. What are the main benefits that have been derived by the U.S. from our most recent cooperative programs (F-16, Roland, MLRS, NATO Frigate, etc.)? By the Europeans?

5. Do the benefits of participation in NATO armaments cooperation outweigh the drawbacks for the U.S.? For the Europeans?

6. What U.S. hinderances to truly successful NATO armaments cooperation remain? What European hinderances remain?
(National barriers: transfer of technology, industrial capabilities, military needs, culture, language, etc.)

MODULAR STANDOFF WEAPON PROGRAM

1. What does the Senate Armed Services Committee (Congress) want the U.S. to get out of the MSOW program?

2. What do our NATO partners' governments want to get out of the MSOW program?

3. Has the concurrent R&D on similar weapon systems by the Air Force and the Navy hindered progress on the NATO MSOW program?

4. What have been the most difficult aspects of working in the MSOW partnership?

5. What have been the most positive aspects of working in the MSOW partnership?

6. Do you expect the modular standoff weapons to further NATO standardization or interoperability?

7. Do you expect the modular standoff weapons to substantially improve the effectiveness of our military?

8. Is the MSOW program on schedule compared to the schedule that would be appropriate for a U.S. procurement program?

PART III: SUMMATION QUESTIONS

---

1. Has recent U.S. legislation (Nunn and Quayle) improved U.S. participation in NATO armaments cooperation? If so, how? If not, why not?

2. What suggestions do you have for improving the NATO armaments cooperation process.

3. Is U.S. participation in NATO armaments cooperation worthwhile?

INTERVIEW GUIDE

Contractor

PART I: PERSONAL BACKGROUND & GENERAL INFORMATION

DATE:_____ PHONE #: (____)____-_____

NAME:_____

COMPANY:_____

JOB TITLE:_____

COMPLETE ADDRESS:_____

YRS MSOW:_____ YRS INTERNAT'L EXPERIENCE_____

ATTND DSMC MULTIN'L PROG MGR CRS:_____

PART II: QUESTIONS FOR CONTRACTOR PERSONNEL

GENERAL

1. What have your company's involvements in NATO armaments
cooperation been like in the past?

2. How does your company feel about participating in international consortia? What are the benefits? What are the drawbacks?

3. Is participation in NATO armaments cooperation good business or a necessity?

MODULAR STANDOFF WEAPON PROGRAM

1. Do you see changes in the MSOW program compared to past NATO cooperative programs? If so, are they good or bad? Why?

2. What does your company expect to gain by participating in the MSOW program?

3. Will the U.S. military get exactly what it wants in the MSOW? Will the U.S. government? Will the European partners?

4. How much will the schedule of the MSOW program differ from the schedule of a U.S. program?

5. How much will the costs of the MSOW program differ from the costs of a U.S. program?

PART III: SUMMATION QUESTIONS

---

1. Has recent U.S. legislation (Nunn and Quayle) improved U.S. participation in NATO armaments cooperation? If so, how? If not, why not?

2. What suggestions do you have for improving NATO armaments cooperation?

3. Is U.S. participation in NATO armaments cooperation worthwhile?

INTERVIEW GUIDE

NATO Military

PART I: PERSONAL BACKGROUND & GENERAL INFORMATION

DATE:_____ PHONE #: (____)____-_____

RANK/NAME:_____

JOB TITLE:_____

COMPLETE ADDRESS:_____

YRS PROCUREMENT EXP:_____ YRS INTERNAT'L EXP:_____

MSOW EXP:_____ ATTND DSMC MULTIN'L PROG MGR CRS:_____

PART II: QUESTIONS FOR NATO MILITARY PERSONNEL

GENERAL

1. How would you categorize NATO armaments cooperation overall based on current international programs, as successful or unsuccessful? Why?

2. What lessons have been learned from past programs that will make ongoing and future programs better?

3. What are the main difficulties involved in NATO armaments cooperation for your country? The U.S.? The (other) Europeans nations?

4. What are the most beneficial results that have been derived by NATO from our most recent cooperative programs (F-16, Roland, MLRS, NATO Frigate, etc.)?

5. Do the benefits of participation in NATO armaments cooperation outweigh the drawbacks for your country?

6. What U.S. hinderances to truly successful NATO armaments cooperation remain? What European (Canadian) hinderances remain?

MODULAR STANDOFF WEAPON PROGRAM

1. What does your military want to get out of the MSOW program?

2. What do your NATO partners' military departments want to get out of the MSOW program?

3. What have been the most difficult aspects of working in the MSOW partnership?

4. What have been the most positive aspects of working in the MSOW partnership?

5. Do you expect the modular standoff weapons to further NATO standardization or interoperability?

6. Do you expect the modular standoff weapons to substantially improve the effectiveness of your nation's military?

7. Is the MSOW program on schedule compared to the schedule that would be appropriate for an indigenous procurement program?

8. What compromises has your country asked for in the MSOW program?

9. What compromises have the partners asked for?

10. What extraordinary problems has working with international consortia caused?

PART III: SUMMATION QUESTIONS

---

1. Has recent U.S. legislation (Nunn and Quayle) improved U.S. participation in NATO armaments cooperation? If so, how? If not, why not?

2. What suggestions do you have for improving the NATO armaments cooperation process?

3. Is your nation's participation in NATO armaments cooperation worthwhile?

INTERVIEW GUIDE

NATO Partner Government

PART I: PERSONAL BACKGROUND & GENERAL INFORMATION

DATE:_____ PHONE #: (____)____-_____

RANK/NAME:_____

JOB TITLE:_____

COMPLETE ADDRESS:_____

YRS PROCUREMENT EXP:_____ YRS INTERNAT'L EXP:_____

MSOW EXP:_____ ATTND DSMC MULTIN'L PROG MGR CRS:_____

PART II: QUESTIONS FOR GOVERNMENT (POLITICAL) PERSONNEL

GENERAL

1. How would you categorize NATO armaments cooperation overall based on current international programs, as successful or unsuccessful? Why?

2. What lessons have been learned from past programs that will make ongoing and future programs better?

3. What are the main difficulties involved in NATO armaments cooperation for your country? The (other) Europeans nations? The U.S.?

4. What are the main benefits that have been derived by NATO from our most recent cooperative programs (F-16, Roland, MLRS, NATO Frigate, etc.)?

5. Do the benefits of participation in NATO armaments cooperation outweigh the drawbacks for your country?

6. What U.S. hinderances to truly successful NATO armaments cooperation remain? What European (Canadian) hinderances remain?
(National barriers: transfer of technology, industrial capabilities, military needs, culture, language, etc.)

MODULAR STANDOFF WEAPON PROGRAM

1. What does your country want to get out of the MSOW program?

2. What do your NATO partners' governments want to get out of the MSOW program?

3. What have been the most difficult aspects of working in the MSOW partnership?

4. What have been the most positive aspects of working in the MSOW partnership?

5. Do you expect the modular standoff weapons to further NATO standardization or interoperability?

6. Do you expect the modular standoff weapons to substantially improve the effectiveness of your nation's military?

7. Is the MSOW program on schedule compared to the schedule that would be appropriate for an indigenous procurement program?

PART III: SUMMATION QUESTIONS

---

1. Has recent U.S. legislation (Nunn and Quayle) improved U.S. participation in NATO armaments cooperation? If so, how? If not, why not?

2. What suggestions do you have for improving the NATO armaments cooperation process?

3. Is your country's participation in NATO armaments cooperation worthwhile?

Appendix C: Milestones in NATO Armaments Cooperation

1949 - North Atlantic Treaty is signed, NATO is established.

- NATO Military Production and Supply Board is created to improve rationalization of defense production within the Alliance.

1952 - NATO Production and Logistics Division is created as part of the newly created International Staff. Division's goal is to promote the most effective use of Alliance resources for the equipping and support of its forces. Division renamed Production, Logistics and Infrastructure Division in 1960, then Defense Support Division in 1967.

1954 - Western European Union formed to promote defense cooperation among Western European allies.

- NATO Defense Production Committee created. Committee assumes supervision of collaborative production programs and other standardization efforts. Committee's title is changed to Armaments Committee in 1958.

1959 - NATO Basic Military Requirement (NBMR) Procedure adopted as a means of developing common military requirements. These requirements were to serve as a basis for future standardization and interoperability efforts. Procedure was abandoned in 1966 because no existing NBMR had resulted in a cooperatively developed or produced weapon system.

1964 - NATO Committee of Defense Research Directors is established to advise the Alliance on defense-related applications of science, especially those calling for international scientific cooperation.

1966 - Conference of National Armaments Directors (CNAD) is created to facilitate Alliance armaments cooperation.

1968 - CNAD establishes NATO Industrial Advisory Group (NIAG) to promote the free exchange of views and information on the industrial aspects of armaments questions.

- Eurogroup formed to facilitate intra-European arms collaboration.

1975 - Culver-Nunn Amendment enacted, directing DOD to conduct a study and report on the implications of NATO's failure to standardize defense equipment and tactics and to make recommendations aimed at accelerating standardization efforts.

1976 - France joins Eurogroup members to create the Independent European Program Group (IEPG). The IEPG devotes its efforts to improving intra-European cooperation and competitiveness in defense equipment research, development, and production.

1977 - Building on FY76 legislation designed to facilitate armaments cooperation with NATO, the DOD issues Directive No. 2010.6, "Standardization and Interoperability of Weapon Systems and Equipment with the North Atlantic Treaty Organization." The Special Advisor to the Secretary of Defense on NATO Affairs position is created and NATO RSI staffs are established throughout DOD.

1979 - The Trade Agreements Act of 1979 was signed, opening the U.S. government procurement market to international competition by signatory countries who likewise agreed to open their government procurement markets. In the U.S., the act meant preferential treatment would no longer be afforded to domestic offers on DOD procurements.

1982 - Secretary of Defense Caspar Weinberger initiates a program designed to increase the common utilization of emerging technologies to improve NATO conventional defense. This program became known as the "Weinberger Initiatives."

- Under Secretary of Defense for Research and Engineering Richard De Lauer directs the Defense Science Board to form a task force on international industry-to-industry armaments cooperation. The task force is chaired by Dr. Malcolm Currie. The resulting "Currie Report" recommends that the U.S. increase investment in long-range R&D to maintain its technological leadership, thus alleviating U.S. industry fears of technology sharing and cooperation.

1983 - Secretary Weinberger creates the DOD Steering Group for NATO Armaments Cooperation to oversee U.S. cooperative efforts.

1984 - Senator Nunn proposes an amendment threatening withdrawal of U.S. forces from Europe if NATO's conventional defense is not improved. The proposed amendment is defeated. This sent a clear message to the Alliance that the U.S. Congress was frustrated with European reluctance to make substantial improvement in conventional deficiencies.

- Heseltine initiative advocates the enhancement of intra-European armaments cooperation as the European pillar of the Alliance. The initiative was named for then British Defense Minister and chairman of Eurogroup Michael Heiseltine.

1985 - Nunn-Roth-Warner Amendment fences off $200 million per year for NATO cooperative development programs, establishes a formal mechanism for early consideration of such projects, and sets aside $50 million for side-by-side testing of U.S. and similar European weapon systems.

1987 - DOD establishes the Defense Cooperation Working Group to oversee and serve as the focal point for all DOD armaments cooperation efforts.

- DOD creates 40 manpower billets in U.S. embassies in Western Europe specifically to support arms cooperation projects. These embassy personnel will be directly responsible to the Under Secretary of Defense for Acquisition.

1988 - NATO establishes an armaments planning system to centralize and increase the range of planning under the NATO Conventional Armaments Review Committee.

(2:66-68; 5:2-1 to 2-4; 8:34; 16:1,28; 40:26; 41:1-3; 76:195-218; 95:1-2)

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[redacted]

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GLM/LSM/88S-4	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics 6b. OFFICE SYMBOL (If applicable) AFIT/LSM	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB OH 45433-6583	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) See Box 19	
12. PERSONAL AUTHOR(S) Gage A. Bleakley, B.S., Capt, USAF	
13a. TYPE OF REPORT MS Thesis 13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1988 September 15. PAGE COUNT 158
16. SUPPLEMENTARY NOTATION	

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP
16	04	01

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
Armaments Cooperation, NATO, Standoff Missiles, MSOW, International

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Title: INTERNATIONAL ARMAMENTS COOPERATION:
A CASE STUDY OF THE MODULAR STANDOFF WEAPONS

Thesis Chairman: Craig M. Brandt, Ph.D.
Assistant Professor of International Logistics

Approved for public release IAW AFR 190-1.

WILLIAM A. MAUER 17 Oct 88
Associate Dean
School of Systems and Logistics
Air Force Institute of Technology (AU)
Wright-Patterson AFB OH 45433

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL Craig M. Brandt	22b. TELEPHONE (Include Area Code) (513) 255-4149 22c. OFFICE SYMBOL AFIT/LSM

DD Form 1473, JUN 86 Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

This research examined various aspects of NATO armaments cooperation. The Modular Standoff Weapons (MSOW) program was studied within the context of a broader examination of overall NATO cooperation. The MSOW program currently involves five nations in an effort to build a family of air-launched ground attack missiles.

The study attempted to determine the benefits and drawbacks of NATO armaments cooperation, as well as the military, economic, and political factors that influence it. Further, the study attempted to determine whether MSOW's benefits, drawbacks, and influential factors paralleled those of overall NATO cooperation and whether the MSOW program was projected to yield a weapon system worth the additional effort required in a joint program.

This research indicated that NATO armaments cooperation is worthwhile and, because of the Europeans' significant experience base, intra-European cooperative projects have a higher probability of success than do U.S.-European efforts. Armaments cooperation historically has increased the cost and duration of procurement. Despite these drawbacks, NATO cooperation is supported by high ranking members of Congress and the Department of Defense. Cooperation is believed to reduce costs for each nation because the higher costs are shared. Cooperation also reduces duplication of research and development (R&D) within NATO. However, armaments cooperation is complicated by political, military, and economic factors.

MSOW's benefits, drawbacks, and influential factors were found to be essentially the same as those of overall NATO cooperation. The program was complicated by incorporating divergent requirements from several previous cooperative R&D programs into MSOW. However, MSOW is expected to satisfy most requirements and represent a significant leap in capability.

The researcher's recommendations included stabilizing funding for NATO cooperative programs, beginning with simpler programs, and ensuring that the knowledge and experience gained in each international program is documented and used to train personnel new to international cooperation.