PERSPECTIVES IN SECURITY ASSISTANCE MANAGEMENT

a focus on special topics of interest

ACQUISITION STRATEGY FOR MULTINATIONAL PROGRAMS

by

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CONCEPT

If analysis of the RSI alternatives indicates a viable international program is possible, the program manager may be called upon to prepare an acquisition strategy for the international program. The acquisition strategy is the program manager's plan for achieving the goals of the program and must consider each and every stage of the acquisition process from concept to deployment and operation. In the NATO program environment, unlike in a domestic U.S. program, the program objectives are usually set forth in the Memorandum of Understanding (MOU) signed by the participating national governments. These objectives then become the basis for the major portions of an acquisition strategy: management of the requirements technical strategy, business and financial strategy, contracting strategy, and integrated logistics support strategy. As in any acquisition strategy, each strategy must be tailored to the specific program. Throughout the program's life, the strategy evolves as the various program aspects and personnel interact with each other to accommodate change and reduce risk. The acquisition strategy can never be regarded as a rigid plan,

but must change as conditions change to meet the program goals. In the complex environment of the international program with many complex and sometimes sub-optimizing goals, the acquisition strategy must remain even more flexible. There are also legal restrictions and approvals required for releasability of critical technology and classified military information and agreements required on intellectual property rights. Modes for NATO acquisition strategies are also discussed in detail.

THE NATO RSI ACQUISITION PLAN

Standardization and interoperability are to be pursued on a priority basis to increase the combat effectiveness of the allied military forces and to conserve the scarce research and development resources. Emphasis of these features in the U.S. is placed on communications, command, control, and intelligence systems (C^3I); cross-servicing of aircraft; ammunition and battlefield surveillance; and target designation and acquisition systems. The emphasis also extends to interoperability and standardization of system components, spare parts, and common logistics systems.

The PM should consider the use of competition to obtain the trade-offs between cost, performance, supportability, and schedule to the best advantage of his program where there is a net benefit to the NATO participants.

The NATO RSI Acquisition Strategy (henceforth simply referred to as acquisition strategy or AS) should not contain planning details; it is intended to serve as an overall strategy for guiding functional implementation plans. Formulated by the PM with the assistance and advice of acquisition, contracts, international, and other functional specialists, the strategy is coordinated with the appropriate materiel development commands (DARCOM, AFSC, AFLC, NAVMAT) and OSD [USDRE(IPT), USDRE(AP)IA, ASD(ISA)]. Appendix A illustrates the topics to be covered in the NATO RSI Acquisition Plan as required by DARCOM.

The AS includes a discussion of operations and alternative systems of NATO origin, strategy for acquisition and logistics support of the system, a technology release plan, organization of the management group, test and evaluation plan for foreign systems, and the extent of NATO involvement. The types of U.S. participation with NATO countries range from U.S.-produced/European-purchased via Commercial or Foreign Military Sales, to joint U.S./European production with different assembly points, to limited European or U.S. licensing agreements for components, and to fully European-produced systems for purchase by the United States.

The AS defines the interrelationships among the participating countries' management, technical, business, resources, military force structure, support, testing, and the other aspects of the program. It must also address typical management issues ranging from co-development to co- and dual production, assess the impact of different levels of funding, and consider problems in testing, changes in requirements, control of engineering changes, length of product maturation, and effects of long lead times. The plan should suggest preferred responses to program problems disruptive of progress.

Usually, coproduction is the technology transfer used where the system is assembled on both sides of the Atlantic. Coproduction becomes dual production where independent production sources produce all parts for the separate production lines; however, "coproduction" is also used where sources are essentially independent with some parts or components produced on only one side of the Atlantic Ocean. The various institutionalization arrangements used to acquire weapons throughout NATO's history will be discussed in a later section of this article.

MANAGEMENT OF THE PROGRAM

The management structure is directly related to acquisition strategy. A program can be wholly U.S. managed, joint-consortium managed, or NATO managed. The management organization necessary to facilitate the program usually consists of a part-time NATO program steering committee and a multi-national full-time management group. The steering committee controls the program by providing guidance and direction to the management group. A high-level representative from each participating NATO country sits on the committee. Meeting as necessary to make decisions, the committee issues regular reports to the NATO Conference of National Armaments Directors (CNAD) about program status, and is responsible for liaison with the NATO military authorities for planning integration of the system into the participating countries' inventories. Each representative to the steering committee provides his country's policy and position guidance. The MOU, signed by the participating countries' CNAD representatives, specifies the form and structure of the management group responsible for detailed management, evaluation of alternatives and detailed planning. The management group may consist of representatives from each participating nation. A policy group may be formed at the military service level to provide coordinated U.S. policy and guidance to U.S. members. Position guidance is established through coordination with the Department of State, Office of the Secretary of Defense, and military service staff agencies.

MANAGEMENT OF THE REQUIREMENT FOR MULTILATERAL PROGRAMS

A multinational program offers an international dimension to the acquisition strategy for management consideration. A multinational program strategy can be structured from the beginning if a proper bilateral or multilateral requirements fit can be found. Multinational programs are initiated by Memoranda of Understanding (MOUs) and monitored through the Periodic Armaments Planning System (PAPS). It is sufficient to summarize that when the early stages of the acquisition process are conducted properly, the following goals should be achieved:

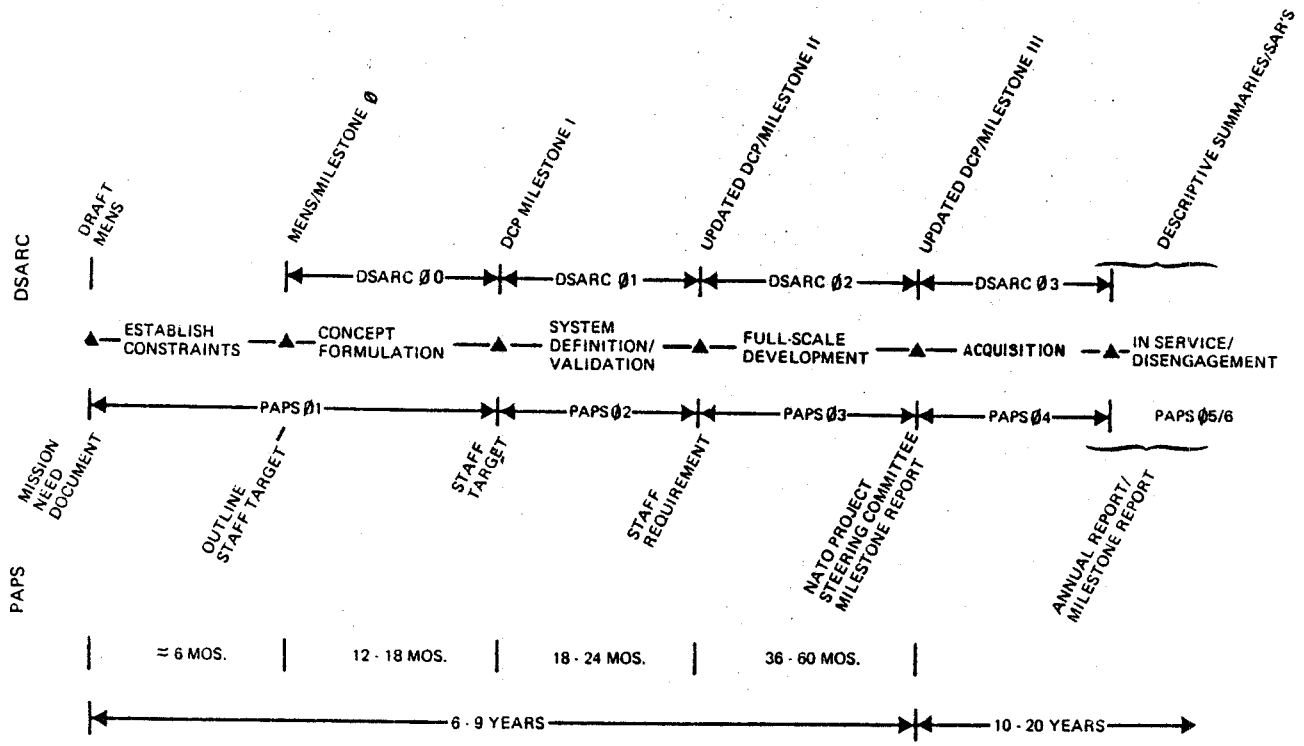
- -- The system's performance specifications match its mission requirements.
- -- Alternate ways of performing the mission are explored before systems are selected.
- -- A variety of associated technologies and subsystems are considered, and the development is initiated so that the technology will be available to meet new threats and needs.

The PAPS allows for development of competing alternative technology approaches by the participating nations, with the mission need document (MND) procedure making the requirements process more orderly. The MOU at the end of selected phases within PAPS signifies the agreement to support the requirement through specific bilateral or multilateral arrangements. The PAPS/MOU process tends to reduce the influence of national and contractor advocacy in deciding what systems are to be acquired and helps ensure that alternatives for satisfying the mission need are considered.

The NATO RSI Acquisition Strategy should be developed immediately following approval of the Mission Need Document (MND) and the formation of a NATO sub group for the program. The strategy will become a source for the NATO Outline Staff Target, NATO Staff Target and the various MOUs required as the program progresses. It should address program alternatives, trade-offs, and selection of the appropriate alternative to meet the MND and program objectives. The plan must be tailored to the unique requirements of the specific acquisition effort and the different phases of the acquisition cycle. Prior to the codevelopment phase (PAPS Phase III), the program manager should complete his plan for co-development and co- and dual production. The strategy for co- or dual production must be updated prior to initiating the negotiation of the MOU for the acquisition phase (PAPS Phase IV). A comparison of PAPS with the Defense Systems Acquisition Review Council (DSARC) process is given in Figure 1.

FIGURE 1

PERIODIC ARMAMENTS PLANNING REVIEW



TECHNICAL STRATEGY

The technical strategy is the approach for achieving the program's system performance, design and reliability goals. Unlike a domestic program, where technology to optimize system performance may be pursued, the program manager might have to attempt to integrate the technological capabilities of several different national economies. Programs should be tailored by partitioning the standards and systems specifications to suit that program's complexity. A key consideration in the technical strategy is the degree to which the participating nations will share in transfer technology.

The difficulties of developing and/or producing a system within the boundaries of the U.S. technological environment become even more complex when it is necessary to use and integrate several foreign technologies. Problems inevitably occur when the technical strategy involves integrating subsystems or components which are products of different countries, and therefore derived from different technological approaches. In these situations, the cultural differences which

influence the way that Europeans deal with problems will also impact on arriving at a workable technical strategy.

A major consideration of any technical strategy is the selection of alternative concepts, approaches or systems to fill the mission need. It is policy, under a domestic program, to maintain alternatives, commensurate with the existing risk and technological uncertainty, so that existing or maturing systems are considered, as well as state-of-the-art technical approaches. In a NATO program, political factors complicate these considerations, as participating governments may dictate that their specific systems or technical approach be used. PMs must therefore walk a narrow path in trying to maximize the effectiveness of the selected technical approach, while still meeting the conditions imposed by the participating governments.

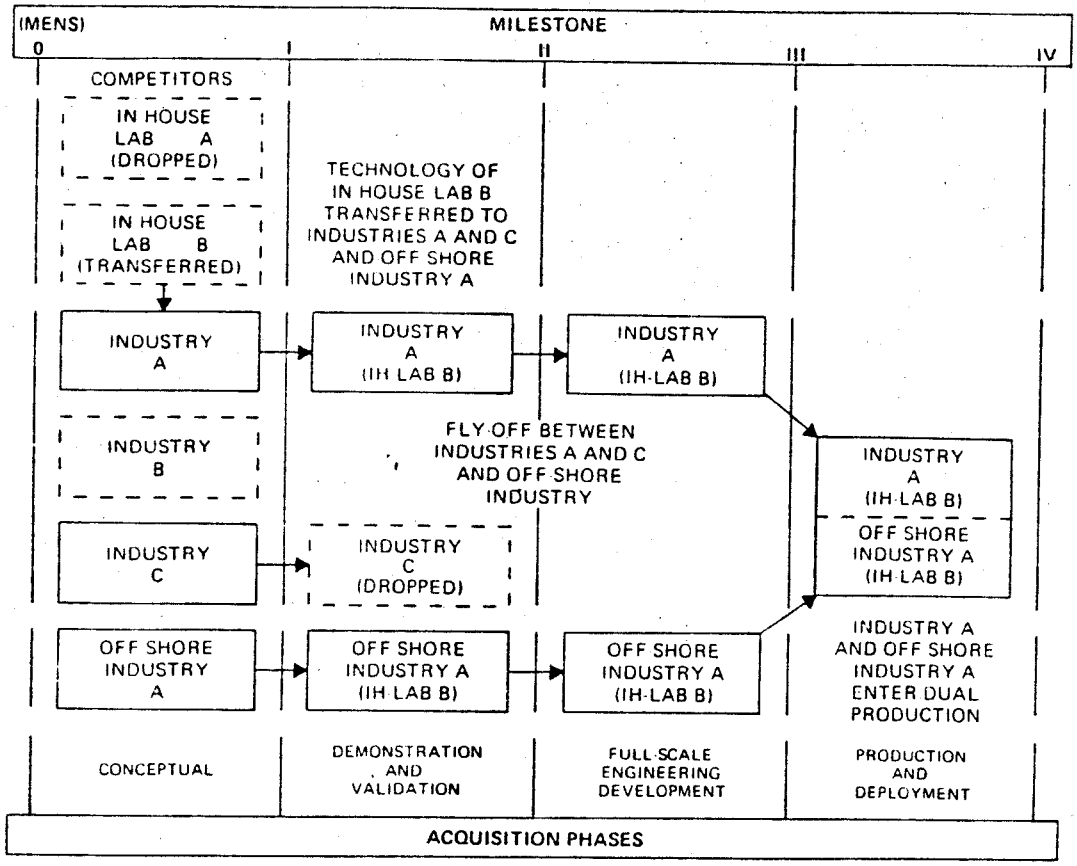
Technical Advances

The technical strategy should include a listing of critical pacing technology advances required to satisfy the program thresholds. The initial NATO RSI Acquisition Strategy after approval of the MND and formation of the NATO subgroup may only contain a few of the pacing technology advances required, because not all weapon system alternatives have yet been explored. However, as the concept formulation (PAPS Phase I) proceeds, necessary advances become more defined through study of the preferred alternatives. The kind of pacing technology advances required for each alternative system determines the technology risk used in the analysis of the alternative concepts. Once the preferred system is chosen, and the Staff Target is approved, the technology advances required should be well-defined, and the risks for developing those technologies should be understood in terms of performance, cost, schedule, and supportability thresholds. The PM must then consider these risks in following his program acquisition strategy by assigning and controlling critical resources (time, money, personnel) appropriately, with special attention to the critical pacing technologies.

When technical risks are acceptable, parallel, short-term fixed-price contracts are sometimes used to evaluate and explore selected concepts. This can aid in reducing technical uncertainties for alternative approaches. Unsuccessful approaches are eliminated by continuous evaluation of contractor/in-house laboratory efforts. Figure 2 is an example of parallel development efforts to maintain competition. Two in-house government laboratories, three U.S. industry participants, and one European contractor develop and investigate the feasibility of various concepts. The successful feasibility study done by one government laboratory is provided to the two selected U.S. companies and one European NATO participant for the demonstration and validation phase. A fly-off competition among the three participants' prototypes results in selection of one full-scale engineering development approach, with a team arrangement consisting of the European industrial partner and the remaining U.S. industry participant, resulting in an eventual dual-production agreement.

FIGURE 2

METHODS TO MAINTAIN COMPETITION DURING THE LIFE CYCLE



Various considerations are required in engineering management, technology transfer, and manufacturing and production management including translation of technical data packages, understanding the differences in engineering practices, training of production personnel and a host of issues in co-development and coproduction programs.

Technology Release Plan

The technology release plan provides detailed planning actions required because certain technologies needed for production may not be releasable to NATO contractors, or they may pose problems in performing the cooperative effort. Such technologies fall into five categories:

1. Security. Items of hardware and software affecting national security which are either controlled or deemed unreleasable for foreign production, by the National Security Agency (NSA). These include communications security equipment (COMSEC) and items, logic, or documentation that the United States does not release, even when doing so would add to the overall NATO capability.

2. Configuration Control. Items of software and hardware for which controls are required to assure the interoperability of the co-produced system. Items in this category will be considered for release for manufacturing, but strict control is needed.

3. Critical Technologies. Technologies for which there is a bar on exporting the capability to produce the item or its equivalent.

4. Buyer Considerations. Technology for which the participating NATO contractors have not demonstrated a capability to produce the items or its equivalent; technology whose cost of associated tooling and/or test equipment is significant, and technology for which it is difficult and expensive to accomplish technology transfer.

5. Unconstrained. Items and technologies that are wholly releasable for which it is assumed that European equivalents will be used.

To build this plan, a work breakdown structure (WBS) is used to decompose the system into its producible end items of hardware and software, which are then classified into one or more of the five categories listed above. For those items in categories 1, 3, and 4, purchase of specific end items from a U.S. vendor is required. Licensing agreements between vendors should be considered for technology transfer whenever European equivalents are not acceptable.

CONTRACTING STRATEGIES

In co-development, the MOU takes precedence over the DAR. The MOU stipulates which country's contracting practices are to be followed or modified. Thus, the contract for the JP-233 system, a Joint U.S.-U.K. program, utilized U.K. contracting practices. Similarly, the Rapier is being brought under the U.K. contracting system.

Contracting Approach

The program may frequently be constrained by contracts or other commitments made prior to the current acquisition life cycle phase. For example, technology developed by a contractor under his independent research and development program or from a foreign developer holding intellectual property rights may be available to the government only if his participation in the program continues. The program manager should identify all such contracts or commitments and understand their influence on his program. Elements in other contracts that affect the program, such as for related platforms and subsystems should be identified. Many programs depend upon other projects and government agencies for their subsystems or components. An example is the Multiple Launch Rocket System (MLRS). The derivative vehicle used as the basic carrier is the responsibility of the U.S. Infantry Fighting Vehicles Systems

Office. The project manager's office for Selected Ammunition at Picatinny Arsennal is responsible for modifying and supplying the M-42 submunitions. Harry Diamond Laboratories is developing the XM-445 electronic fuse for the MLRS. The MLRS program is also a codevelopment program in which the United Kingdom and France provide funds to support the U.S. development effort, and Germany develops a scatterable mine warhead. Most large programs are broken up into manageable project offices and integrated through development and production schedules.

The program manager can make use of different types of contracts that have evolved and survived the test of time. They were developed to fit particular circumstances and, insofar as possible, provided a fair and equitable legal relationship for participants. Each major system acquisition program has unique features; differences in the contracting approach can be expected to harmonize time, cost, technology, and management environment. The AS allows innovative contracting approaches. Through consideration of program goals and objectives, the PM should be able to develop a compatible contracting schedule, and select a contracting strategy that maintains competition when practical, so as to utilize resources effectively, and reduce development time by allowing contractors and in-house personnel to explore competing approaches. Contracting is a tool in the acquisition process, not a substitute for management. The contracting strategy must consider the impact of procurement lead times, preclude "technical leveling" between competing contractors, and encourage innovation in proposal submittals for the next planned increment.

Prior to working in multinational contracting, a review of current and recently published Section VI of the Defense Acquisition Regulation (DAR) for international programs is essential.

Prior to negotiating a contract with a U.S. prime contractor requiring foreign subcontractors or directly with a foreign contractor, it is essential that the following be accomplished:

-- A review by DOD of mandatory flow-down provisions must be undertaken for the purpose of deleting or diluting those requirements which are unworkable or not applicable for foreign procurements.

-- Business Strategy Panels must review contract provisions prior to instituting discussions with foreign suppliers or governments to determine necessity/desirability for inclusion of each clause. Results of this review must be made available to the negotiating team, whether from DOD or industry.

-- Government/industry teams should be tasked to document difficulties in imposing mandatory flow-down provisions on foreign suppliers. This documentation should be made available to DOD personnel for review with the goal of deleting or diluting those deemed to be unworkable or not applicable for foreign suppliers.

Preceding this review, it is also essential that the relationship between the prime and subcontractors be addressed in the MOU. In the NATO E-3A (AWACS) program for example, contractual terms and conditions relating to indemnification, pricing rules, taxes, technical data, and patents became problems for the prime contractor because the MOU did not properly address these issues. The U.S. Government must make concerted effort to involve U.S. industry in MOU activities as an advisor/consultant. In processing major foreign military sales cases, the MOU between the U.S. Government and foreign governments should only indicate generally that there will be a sale at a certain price and that Terms and Conditions of any offsets will be negotiated by U.S. industry directly with foreign industry. When agreeing to offset goals/commitments in MOUs, the PM should not use percentages but instead identify offsets in terms of work packages.

Contracting Methods

There are various contracting methodologies which should be considered during the different phases of the life cycle. These include co-development teaming, use of a technology transfer clause, leader-follower arrangement, second sourcing, breakouts, and pre-planned product improvement.

Co-development is an effective technology transfer method for cooperative activity within NATO. Teaming of domestic and foreign contractors provides benefits in terms of price and technical competition. Teaming is especially useful when one contractor does not have all the resources to accomplish development and production. Also, at some point in time, the teams may also be used to compete the production contract.

If competition is used during development, a technology clause in the development contract should require the licensing of data and technical information to the winner of the production contract if it is a different company. The production firm pays royalties and compensation for technical assistance to the licensor. There can be problems with this strategy because many companies are reluctant to part with proprietary information. This can result in critical production delays and in "buy-ins" by firms desiring trade secrets.

Leader-follower procurement establishes contractual arrangements during the development phase for the lead contractor to transfer technology to other firms for the establishment of production lines. This strategy has been used extensively in naval shipbuilding programs, the TOW missile system, and for transferring certain production capabilities to our NATO allies. The leader-follower concept has more often been used to obtain increased production capacity rather than increased competition, partly because of the difficulty in motivating contractors to transfer technical expertise if there is a threat of losing future contracts.

Under second sourcing, firm(s) performing development provide the government a complete technical data package (TDP). The DOD, after validating the drawings, specifications, and other technical information, transfers the TDP to other suppliers to establish one or more production lines. This method can be used only with comparatively large programs because of the cost involved in setting up duplicate production lines. However, second sourcing or threat of second sourcing can be helpful in reducing costs through creating competition. It has been used successfully for small missiles (Sidewinder and Bullpup), target drones, aircraft engines, and torpedoes.

Pre-planned production improvement is an area where competition can be encouraged. Such improvements normally are initiated at the time of the initial design freeze to accommodate requirement changes by the user (given sufficient system growth potential), extend the system capabilities into new mission areas, correct minor deficiencies discovered in testing, and integrate new technology to enhance performance.

The tailored AS may permit component/module product improvements for breakout to second sources or they may be provided as government-furnished equipment (GFE) in the form of standardized modules. Breakouts involve competitive reprocurement of spare parts and components for weapon systems. Breakout has been especially cost effective when the weapon system producer is an assembler and piece parts are available from other vendors.

These techniques for competition require the program manager to possess an adequate data base, a knowledgeable in-house team, and a detailed definition of the objectives of the contracting strategy. Patent and data rights must belong to the government or equivalent products be available from other contractors for competition to be effective. Specific clauses for technology transfer must be inserted into the original developer's contract earlier in development to assure that proprietary rights are not a roadblock to competition. The contractor should at least be required to list all proprietary rights prior to the contract initiation. It is well recognized that a technical data package (TDP) is rarely adequate for recompetition; some form of technology transfer is normally required between contractors.

In considering the above techniques to enhance competition in development and production phases, an economic analysis is required to estimate net long-term savings and the impact of technical competition. Non-recurring and start-up costs, learning-curve effect, technology transfer cost, inflation effects, and hardware costs must be considered. The government administrative personnel burden and costs for additional engineering, contracting, and testing support should also be included. In addition, DODD 2010.6, 5 March 1980, states that "Commercial implications of technology transfers proposed in support of a collaborative project should be considered when weighing the costs and benefits of that project. These considerations should include an estimate of how the commercial applications of the technology transfer might affect U.S. commercial competitiveness in future international markets." The

Secretaries of the Military Departments are required to "prepare the technical positions on individual exchanges of technology and prepare a statement of the potential impact of impending technology transfers on the U.S. economy when such transfers can be identified as having significant commercial implications. The Military Departments are encouraged to consult with industry and knowledgeable U.S. Government agencies to assess commercial implications of technology transfers."

Using competition to drive research and development may result in shortening the acquisition cycle by allowing "doubling up," involving substitution of a shorter maturation phase with parallel completion of research and development, and low rate initial production (LRIP) for full-scale development. This meets the challenge to shorten the acquisition cycle time to field a system. Doubling up can be most effectively used on low-technology systems where high schedule and cost risks are acceptable due to urgency of the requirement to meet critical threats or needed capabilities. Examples of current systems employing a doubling-up technique are the Multiple Launch Rocket System (MLRS), Division Air Defense (DIVAD) Gun, Single Channel Ground and Airborne Radio Subsystem, Air Launched Cruise Missile (ALCM), and M-1 tank. Without doubling up on these systems, the initial operating capability (IOC) would be delayed 2-4 years.

BUSINESS AND FINANCIAL MANAGEMENT STRATEGY

Another major component of the AS is the business/financial management strategy encompassing all the aspects of the program pertaining to funding and budgeting, investment decisions, utilization of personnel and contractor resources, schedule management, evaluation of the business base, etc. It addresses such issues as the amount, timing and sources of funding; the weapons system developer and manufacturer organization and sources; the extent of competition to be infused into the program; and apportionment of development/production tasks and responsibilities among the various nation's industrial sectors; and potential use of leader-follower procurement or second sourcing.

One of the key decisions in any NATO program's business strategy is the selection of the prime contractor, associate contractors and subcontractors. These decisions are obviously affected by political considerations required by offsets to the participating countries. The program manager must assess and evaluate each participant's defense and commercial industrial base. Extensive research may be required by either the program office personnel in liaison with the participant's ministry of defense or by the U.S. contractors. The PM must develop an understanding of the capabilities of the industrial base to structure the program properly under the political constraints.

For domestic programs, OMB Circular A-109 emphasizes use of strategies which will maximize competition throughout a program's life cycle. When several foreign countries are participating in a program,

options on competition may be limited to competition only in the early developmental stages of a program, or for a particular subsystem/component within one of the participating nations. Competition may be limited because of offset requirements, intellectual property rights, or many other possible conditions/decisions incorporated into the acquisition as a result of agreements in the MOU. The PM's task remains, however, to obtain the best possible benefits within the conditions imposed by the governments.

The business/financial plan must address utilization of available assets, to include support via both foreign and domestic matrix management, systems contractors, government laboratories, universities, and industry.

One method sometimes employed by program offices to reduce the number and frequency of contract actions they manage is to use an integrating contractor. In this case a major contractor is selected essentially to coordinate activities of a family of other contractors working on various parts of the program. This may be accomplished in two ways. One method places a prime contract with a firm which then subcontracts for the various parts of the program. In another method, the project places the contracts, but employs a single contractor to provide technical coordination of the work of the other contractors. If resources available within the program office are inadequate to manage a multitude of contracts, either of these methods is a viable way of reducing the workload.

Affordability is another issue to be addressed in the business/financial strategy by the PM. The outline staff target and staff target should include an analysis of overall capability requirements, priority of need, and resources required. Affordability in this sense is what each participant can bear either in a multilateral sense or from NATO infrastructure funds for a NATO weapons system.

INTERNATIONAL INTEGRATED LOGISTICS SUPPORT STRATEGY

Logistics planning and programming strategy will be directed towards avoiding significant reliability and durability problems. The anticipated problems are to be identified as critical technology advances when they are significant enough to affect performance thresholds for the system. In addition, industry capacity to produce critical components, long subcontractor leadtimes, use of commercial systems and components, and use of commercial logistics support should be considered by the PM. Centralizing the defense logistics functions via consolidating management of individual nonconsumable stock-numbered items of equipment and expeditiously transferring NATO consumable items to the NATO Maintenance and Supply Organization (NAMSO) or other appropriate organizations, and use of the Standard Integrated Support Management System (SISMS) should be considered for very early implementation in the initiation of the logistics program. By coupling the

manpower and logistics functions, support of the weapons system should be emphasized in the acquisition process.

Logistics and Engineering Management requires the consideration of various aspects of technical management to include core DOD requirements configuration management, preplanned product improvement, software management, and the joint engineering review process. STANAG 4159 requires that a Joint Configuration Control Committee (JCCC) be established for each multinational co-development or coproduction program. The MOU for a co-development program shall designate the national members and chairman of the JCCC who shall be at program manager level. Effective accomplishment of RSI during development requires joint agreement on the level of authority vested in the JCCC members and body. To maintain the agreed-on degree of RSI in the system, configuration baseline changes must be jointly approved by all participating nations. Refusal of one participant to comply with a configuration baseline change decision will reduce RSI accordingly. Only those functional and physical characteristics essential for interface interchangeability should be designated as baseline characteristics under JCCC control. To encourage maximum agreement on baseline changes, disagreement at the JCCC level shall be elevated to a Joint Configuration Control Board (JCCB). Senior national authorities shall constitute the JCCB.

STRATEGY FOR REDUCING RISK

During the development program, efforts should be directed to reducing risk to an acceptable level. Since that is the fundamental purpose of research, development, test and evaluation, much of the acquisition strategy will depend on what the program manager determines to be the major remaining uncertainties about cost, schedule, performance, and supportability. These uncertainties will change, as the program progresses, forcing reassessment and revision of the acquisition strategy. The NATO RSI Acquisition Plan should specify those major problem or risk areas to be overcome to achieve the overall MOU program objectives and goals and help in the selection of the most appropriate approach.

When program risks have been identified, the program manager should identify the four complementary methods available for reducing them to an acceptable level:

- -- Ideas or concepts.
- -- Studies and analyses.
- -- Prototypes or demonstrations.
- -- Tests and evaluations.

His blending of the four should be governed by the stage of the acquisition program, nature of the risk, and the time and money available.

Competitive demonstrations are effective for evaluating alternative system designs. They must include a reaffirmation that the alternative is meeting mission need and program objectives, and verify that the chosen concepts are sound, and can perform in the intended operational environment. Competitive demonstrations can provide an effective basis for selections of the systems or critical subsystems to be continued through full-scale engineering development.

The primary objective of Foreign Weapons Evaluation is to discover significant technical and operating deficiencies which can affect the acquisition of reliable, effective, and supportable weapons systems for our NATO operating forces. The development of a comprehensive test and evaluation master plan (TEMP) as an integral part of the AS is essential. Data from our NATO allies' test and evaluation programs, useful to evaluate the system suitability for the intended mission, for force structure planning, for definition of needs, and for weapons improvement, are to be included, if appropriate. In addition, candidate NATO and ABCA alternatives should be assessed against the U.S. requirement via a formal foreign weapons test and evaluation.

SPECIAL CONSIDERATIONS FOR APPROVAL OF TECHNOLOGY TRANSFER

Foreign participation in U.S. programs is governed by the National Disclosure Policy, International Traffic in Arms Regulation, Arms Export Control Act, Export Administration Regulation, International Security and Development Act, and other statutory or administrative policies. Some specific factors that must be considered concerning technology transfer and information disclosures are:

- -- Releasability of classified information.
- -- Releasability of sensitive advanced technology.
- -- Arrangements and agreements for handling intellectual property rights.

When these factors are not resolved early-on, they can be expected to result in problems with technology transfer, evidenced by:

- -- Delays in munitions licensing.
- -- Denials or delays in the clearance of certain classified information for release to foreign governments.
- -- Conflicts in the transfer of intellectual property rights.

The principal difficulty is not with the policies themselves, but rather that too often decisions and commitments are made without due consideration of all the relevant factors, or consultation with elements of DOD and industry who would implement such programs. Thorough consultation at the working level with action agencies of the Government and similar industry groups is a necessary prerequisite to the

formulation of intelligent and feasible international cooperative ventures.

COMPARISON OF U.S. VERSUS NATO ALLIES ACQUISITION MANAGEMENT

Some broad comparisons can be made with representative NATO allies on the philosophy for managing acquisition of defense equipment. Acquisition management control runs the gamut from departmental autonomy in some countries after the program is funded for production, to management by the Executive and Legislative branches of Government through the annual authorization and appropriation process in the U.S. Programs in Canada, the United Kingdom and Germany are all funded incrementally, with their Parliaments and Bundestag providing annual funds to meet total estimated current year cash expenditures. Current year funding is tied to the long-term defense plans developed and approved by the respective Ministries of Defense and the cabinets. Individual programs are not normally reviewed by the legislatures. Based on the program's inclusion in their Long-Term Defense Plan, our Allies normally make commitments to their contractors for the total program. The NATO Allies prepare long-term plans based on need and their estimates of priorities and available funding. If funds are not approved to support the total plan, the Defense managers must decide which programs do not have sufficient priority within the new constraints, and make adjustments accordingly. Figure 3 illustrates the fundamental differences in how Canada, the United Kingdom, Germany and the United States manage defense equipment needs.

FIGURE 3

MANAGEMENT AND FUNDING OF REPRESENTATIVE NATO COUNTRIES

COUNTRY	MANAGEMENT OF THE PROGRAM	FUNDING OF PRODUCTION PROGRAMS
Canada	Ministry of Defense (MOD)	Annual Expenditures (Cash Flow) approved by Parliament to support current year total of the MOD Ten Year Defense Services Program.
United Kingdom	Ministry of Defense (MOD)	Annual Expenditures (Cash Flow) approved by Parliament to support current year total of the MOD Ten Year Long Term Equipment Plan.
Germany	Ministry of Defense with some Bundestag review of selected programs	Annual Expenditures (Cash Flow) approved By Bundestag to support current year total of the MOD Five Year Plan.
United States	Department of Defense with close oversight by Congress	Annual Authorization and Appropriations by Program Element under Five Year Defense Plan.

MODES OF NATO ACQUISITION STRATEGY

This section deals with the observed modes for international weapons development and production. These modes are discussed as alternatives for the program manager's acquisition strategy development. Eight different modes have been identified as used in NATO programs:

Mode 1	License Production in one European nation.
Mode 2	License production in Europe by a multinational consortium of a system developed in the U.S.
Mode 3	Co-development and coproduction among European nations.
Mode 4	License production in the U.S. of a system developed in Europe.
Mode 5	Transatlantic joint development.
Mode 6	Bilateral offset arrangements for the purchase of a foreign system.
Mode 7	Transatlantic joint production or systems management by a U.S. led consortium.
Mode 8	Package deals with the "Family of Weapons" concept.

Mode 1 -- License Production in One European Country

The oldest method of international production used by NATO members has been the production of weapons systems in one country of a system developed in another NATO country under a bilateral licensing agreement. Under this mode, the production technology developed in a particular country is transferred to a foreign manufacturer under a formal licensing agreement which authorizes use of the developer's data and manufacturing technology to produce the same weapons system. Examples of programs using this mode include:

a. Bell helicopters built in France and the United Kingdom (UK).

b. British Sea Venom fighters built in France.

c. Fiat G-91 fighters built in the Federal Republic of Germany.

European countries have the most experience with this mode, and the U.S. has the least. To insure success in this mode, there must exist maximum cooperation between the licensing and licensee companies. The cooperating governments under this mode should have only a monitoring responsibility, with the majority of work being controlled and managed by the companies.

Mode 2 - Licensing Production of a U.S. Developed System in Europe by a Multinational Consortium

Under this mode, a system which has been developed and manufactured in the U.S., is licensed to a multinational consortium for production in Europe. Similar to Mode 1, the technology and production techniques of a U.S. weapons system manufacturer are transferred to European firms for their use. Examples of this mode include:

a. F-104G fighter production in the Federal Republic of Germany (GE), Italy, Belgium, Denmark, Norway, and the Netherlands.
b. HAWK surface-to-air missiles production in Belgium, GE, Netherlands, Italy, and France.
c. Bullpup air-to-surface missiles production in the UK, Norway, Denmark, and Turkey.

Under each project, there existed an international project office which was operated using two different organizational concepts. For those projects using the first concept, the project office coordinated the efforts of all participating nations' procurement systems. Under the other concept, the project office worked through only one nation's procurement system, with that nation's contractor acting as the prime. Industries from the other participating countries then acted as subcontractors to the prime.

Mode 3 - Co-Development and Coproduction among European Nations

This mode is a natural outgrowth of Mode 2 in that not only do firms jointly produce a system, they also jointly design and/or develop the system as well. Under this mode, a multinational management scheme is established to coordinate the efforts of organizations in several European nations in developing and manufacturing a weapons system. Some of the programs which have operated under this mode include:

a. Transall cargo transport aircraft, a Franco-German project.
b. Martel anti-submarine missile, an Anglo-French project.
c. Euromissile, a Franco-German missile project.

Under this mode, there have been four organizational systems in use since the late 1970s. The first one consists of the permanent binational project office and its counterpart Groupement d'Interet Economique covering three Franco-German tactical missile projects. The second system involves the Anglo-French Projects Committee overseeing Project Management Committees for each of the three joint helicopter development programs. One nation's government handles the procurement, with its industry acting as the prime for any given project. Under the

third system for the Alpha-jet, the procurement takes place through one nation's procurement system with its own firm acting as prime. And finally, there is the case of an international system selected by NATO for production, which is managed by a NATO project office that procures the system from an international company.

The most significant characteristic of Mode 3 is the high degree of integration which is necessary in this type of intergovernmental and interindustrial arrangement. Because of the sharing of work among the cooperating parties there is a considerable transfer of technology to potential continental competitors.

Mode 4 - License Production in the U.S. of a European Developed System

This mode represents the reverse concept of that found in Modes 1 and 2. It involves acquiring a European developed system through either direct purchase of an off-the-shelf system, license production of a more or less "Americanized" version of the system in the U.S., or development of an advanced version of the system using the purchased technical data package. This represents a reversal of the classical pattern within the NATO countries of using American developed weapon systems. With the increased capability and successes of jointly sponsored European system development and production programs, this mode has become a more viable and appealing alternative for the U.S. Department of Defense, especially in achieving enhanced RSI within the NATO alliance.

Often, the motivation for pursuing this mode has been less a desire to increase the use of foreign technology by the U.S., rather than to obtain a needed piece of military hardware with a short development leadtime. Benefits in terms of cost savings and reduced leadtimes can be achieved as proven in the U.S. Roland program. It has been estimated that the cost of developing a comparable U.S. system would have cost $1.2 billion, while requiring 8-10 years from concept to a low rate initial production (LRIP). The actual cost of the U.S. Roland, based on the European developed system, was only $300 million and took less than four years.

Some other examples of programs following Mode 4 include:

a. B-57 bomber, a British developed aircraft.
b. AV-8 Harrier aircraft, a British developed vertical take-off and landing fighter.
c. AN/TPS-58, the French developed RATAC ground surveillance radar.

It might be assumed that since U.S. industry has considerable experience in moving U.S. developed systems into European licensed production, that the reverse process would not be difficult. That assumption is incorrect. American firms have experienced difficulties in understanding, coordinating, and using European data and drawings.

They have found a lack of standardization and consistency of method, numbering systems, descriptions, etc., especially when dealing with multiple subcontractors and vendors on a system. The lack of a standard convention for data and drawings within Europe has made the task extremely difficult. Additionally, U.S. firms often come across methods, processes and technologies in the manufacture of European developed systems which are either unavailable in the U.S. or with which they have no previous experience. These problems must be overcome to ensure success in this mode.

Mode 5 - Transatlantic Joint Development

This mode involves a joint development program with both American and European industry participating, with possible follow-on joint production. In this mode, the cooperation and partnership of all the participating parties is the key factor which will ensure the success of the program. The needs, desires, and capabilities of both the American and European participants must be channeled into the management and decision making process from the concept phase through the remainder of the program.

Transatlantic joint development represents a significant step in improving NATO RSI, since a joint research and development effort will often produce a better system at a lower R&D cost to each participant, and should help to achieve the operational and logistical advantages of a commonly acquired system. This mode can often be more acceptable to the partners, both European and American, since the respective national industries can share in the development of technology, manufacture of portions of the weapon system and employment of workers, rather than the all or none aspect of single nation programs. This concept has been tried in the AV-8 fighter program, Mallard tactical communication system, and the NATO Sea Sparrow surface-to-air missile program.

Because of its joint nature, programs conducted under this mode should possess some of the following characteristics. First, the system configuration, and approximate cost and schedule should be identified by the participating countries and agreed upon early. Second, there should be early agreement among the participating countries as to cost sharing and allocation of work so that detailed planning and early commitment to the program can be made. To be equitable, a country that wishes to participate in program decision making should make a firm financial commitment to the program. Third, a clean chain of command for the program organization should be established. This mode will operate best if there exists a single program manager and program office which can act under a multinational steering committee for program direction. Programs which have not operated under a similar chain of command have been unsuccessful. Lastly, this mode will operate successfully when all participating countries have a share of the work, based on the equity which they contribute to the program.

Mode 6 - Bilateral Offsets

This mode involves some type of offset by one country as a result of selling its system to another country. Based on an agreement to acquire a particular piece of military hardware, the selling country agrees to compensate partially the buying country by "offsetting" a portion of the effect of buying a foreign system or hardware. These offsets can cover a wide range of categories such as financial offset, industrial goods offsets, other military or non-military goods, internal offsets of subsystems or components of the system being procured, second source offsets, etc. It can be viewed as a partial restitution by the seller, so that the economic effect of a totally foreign buy is not fully borne by the purchasing economy. Thus, if country A decides to buy an aircraft from country B, an offset might provide for country B to buy some equipment from country A.

This mode has been used with the sale of U.S. F-4 aircraft to the GE and UK, U.S. F-5 aircraft to Switzerland, and with the GE role in the Leopard I tank development.

Offset agreements run a gamut of varying arrangements from waiving restrictions to the Buy American Act to setting up U.S. aerospace firms as trading agents for the industries of the buying country. In the negotiations for purchase of the F-111K by the United Kingdom, the U.S. agreed to waive Buy American restrictions on British firms competing on an equal basis with U.S. firms for military contracts. When the U.S. sold F-5 aircraft to Switzerland, the Northrop Corporation, manufacturer of the F-5, agreed to find U.S. markets for numerous and varied Swiss firms. In other instances, the two parties to a program might agree to offsets with a third country, based on commitments in other countries.

The next mode which is discussed is basically an expansion of Mode 6 from a bilateral to a transatlantic multilateral basis.

Mode 7 - Transatlantic Joint Production and/or Systems Management by a U.S. Led Consortium

This mode is basically an expansion of Mode 6 but is multilateral rather than bilateral. These U.S. led joint production and/or systems management consortia involve no joint development, and are for systems being purchased by government consortia after a multinational competition. Examples of this mode include:

a. The F-16 aircraft being produced by the U.S., Belgium, Denmark, Norway and the Netherlands.

b. The HAWK European Limited Improvement Program which included the U.S., Italy, France, Federal Republic of Germany, and the Netherlands.

In this type of complex acquisition arrangement, the first step is usually the signing of a Memorandum of Understanding (MOU) by the Governments, or some governmental organization of the consortium countries.

The MOU then becomes the basic charter for the conduct of the international program. A consortium steering committee is organized to provide overall program direction to the program office which will manage the program for the consortium. This program office is usually an existing U.S. DOD organization which has already managed the development of the system and the initial stages of the U.S. production phase. Because of this organizational overlay of the international program on the U.S. program, many of the methods and procedures will be based on the Defense Acquisition Regulation and other DOD acquisition directives. However, representatives of the participating governments will be integrated into the program office, and will give some of the program management a European twist. These representatives will be responsible for protecting their countries' interests in program management decisions and sit on such key committees as the Joint Configuration Control Committee (JCCC).

In order for this type of program to work most effectively, a strong unilateral program should exist in the U.S. prior to transatlantic coproduction. The program should be mature and have strong home government support before expanding to a multinational program. The complexity of such arrangements also requires that the prime contractor exercise strong program management with all the participating industrial firms.

All in all, this mode of operation represents a complex management situation within which all parties, especially the U.S. program office, must operate. Successful completion of such programs require flexibility and creativity in coping with the numerous problems having international ramifications.

Mode 8 - Families of Weapons

The "Family of Weapons" concept attempts to harmonize the requirements of a number of different countries within a specified number of projects for a "family" of weapons, for example, missiles. The concept can be applied to projects which are closely related in overall properties but which differ in some important parameter. The goal of this approach is to achieve more efficiency in developing weapon systems by making acceptable trade-offs between the one project approach and the alliance-wide attempt at development of a system. An example will help to explain better this mode. Consider the family of weapons for advanced air-to-air missiles. The U.S. and Canada have taken the lead in developing the medium range air-to-air missile (AMRAAM). For the short-range air-to-air missile (ASRAAM), a European consortium has assumed the lead in development. When the systems are developed, production will be allocated to firms in both the American and European industrial sectors.

Several advantages may result from the Family of Weapons approach to weapon systems collaboration. First of all, from the political standpoint, it might be an acceptable compromise as against lopsided development and production in one country. Secondly, it can help avoid unnecessary duplication in R&D efforts between the participating countries. Thirdly, this mode can result in greater technology sharing between participating countries resulting in a more state-of-the-art system.

CONCLUSION

In the day-to-day press of carrying out this acquisition strategy, the program manager should reserve for himself the occasional opportunity to reassess his strategy. He will want to verify that assumptions continue to be valid, that results of decisions have not taken the program in an unanticipated direction, and that the selected course continues to be directed toward accomplishment of the program goals. The four keys to a successful NATO program are a recognized multilateral need, a NATO RSI Acquisition Strategy that makes sence, management commitment via the MOU to include funding stability, and program follow-through by the participants.

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