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SECTION I - EXECUTIVE SUMMARY

The staff of the Office of Naval Research (ONR) overseas offices, exchange scientists from U. S. laboratories, and some individuals from private industry possess in-depth knowledge in state-of-the-art International Research and Development (IR&D). A panel of experts assembled from this group conducted a top level review of Navy IR&D. The subject is of concern to the Navy because two ongoing cooperative programs were recently cancelled and several others appear to be in trouble. As a result, the panel was asked to address several issues listed in the terms of reference for the study.

The study begins with a discussion of the changing global environment. The military threat is perceived as blurring and the economic threat as sharpening. National policy objectives for IR&D are then reviewed, as are recent congressional actions, the Department of Defense (DoD) posture and Navy efforts. The panel observes that no formal national policy exists for international programs, and that current Office of the Secretary of Defense (OSD) and Navy directives are out of date.

A number of factors that influence cooperative Research and Development (R&D) are also discussed. These include strengthening alliances, economic considerations, technology transfer and some of the options available to U.S. allies and friends. Several recommendations are made concerning policy, policy implementation, program selection and incentives. A list of lessons learned compiled from discussions with managers of Navy international programs is also provided.

The panel summarized its observations as follows:

1. The Secretary of the Navy (SECNAV) should support an initiative through the Secretary of Defense (SECDEF) to develop and promulgate a national security policy promoting cooperative IR&D to include co-production. Close linkage between DoD, State, Commerce and Congress is required to make this policy change function effectively.

2. SECNAV, the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps (CMC) should identify classes of programs for consideration as prime candidates for cooperative development and coproduction.

3. The Navy should foster an environment, which encourages cooperative IR&D, to enhance National security objectives by:

- Supporting existing processes and mechanisms for basic research and applied technology sharing between allies

- Working with industry to facilitate improvement and expansion of cooperative endeavors for development and production
- Providing a strong set of incentives to encourage DoD program managers and industry to pursue international cooperative development projects

4. The Navy should focus its international efforts in a single organization to integrate the combined skills required for these programs (i.e. technical, management, weaponry and international experience).

5. In responding to a question concerning the fiscal goals established by OSD for service participation in international programs, the panel offered its final comment; considering the complexity of implementing IR&D programs, attaining the OSD fiscal goal (of 25 percent toward cooperative development) by the year 2004 is unrealistic. The panel recommends that SECNAV support the establishment of mutually achievable fiscal goals.

SECTION II - TERMS OF REFERENCE

1. BACKGROUND: The Navy actively participates in international armaments cooperation. By sharing Research, Development, Test and Evaluation (RDT&E) costs with our allies and friendly nations we reduce the cost of developing weapon systems. Cooperative programs enhance interoperability and standardization, and provide for economies of scale and accelerated delivery dates. The principle of international armaments cooperation is well founded.

Recently the Navy has experienced several problems in implementing these programs. Two ongoing cooperative development programs were terminated and several others appear to be in trouble. We are evaluating numerous weapons systems under our Foreign Weapons Evaluation (FWE) programs with only limited success in procuring these systems. It appears that we are giving away our technology without getting much in return. While we frequently send our people abroad to discuss foreign technology and programs, we do not efficiently collect appropriate information required to target the technologies needed to benefit the fleet.

A recent command inspection of Naval Office of Technology Transfer and Security Assistance (NAVOTTSA), by the Navy Inspector General (IG), highlighted many of the above areas as they relate to security assistance and technology transfer. However, many of the IG concerns also can apply to Navy IR&D programs.

2. Because of the above, the Naval Research Advisory Committee (NRAC) Panel should address the following issues:

a. How can the Navy better identify and assess foreign technologies to facilitate the rapid and long term incorporation of these technologies into Naval weapon systems?

b. How can the Navy better identify potential cooperative development programs? What fundamental elements impact the success or failure of a cooperative development program? Which elements should be considered in determining priority?

c. How can industry be used to facilitate international cooperative programs and take advantage of available foreign technologies? What is necessary to maximize industry involvement in these programs and strengthen the U.S. industrial base? How can IR&D funding be used in these programs?

d. What incentives should be used to promote international cooperative programs? How can the Navy reward program managers and industry for savings achieved through these programs?

e. How can international programs be used to promote the maritime strategy objectives of the Navy?

f. How can the coordination and review of Navy international programs be improved? What organizational changes are necessary?

g. Are the fiscal goals established by OSD for service participation in international programs practical and adequate?

h. New legislation requires the Department of Commerce to review all Memorandums of Understanding (MOUs) before signature. How will this legislation impact Navy cooperative development programs and U.S. industry?

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SECTION IV - BRIEF CHARTS AND TEXT

OUTLINE

INTERNATIONAL R&D

- PURPOSE
- PANEL MEMBERSHIP
- TERMS OF REFERENCE
- BRIEFINGS/DISCUSSIONS
- PERSPECTIVE
- FACTORS INFLUENCING COOPERATIVE R&D
- RECOMMENDATIONS
- SUMMARY

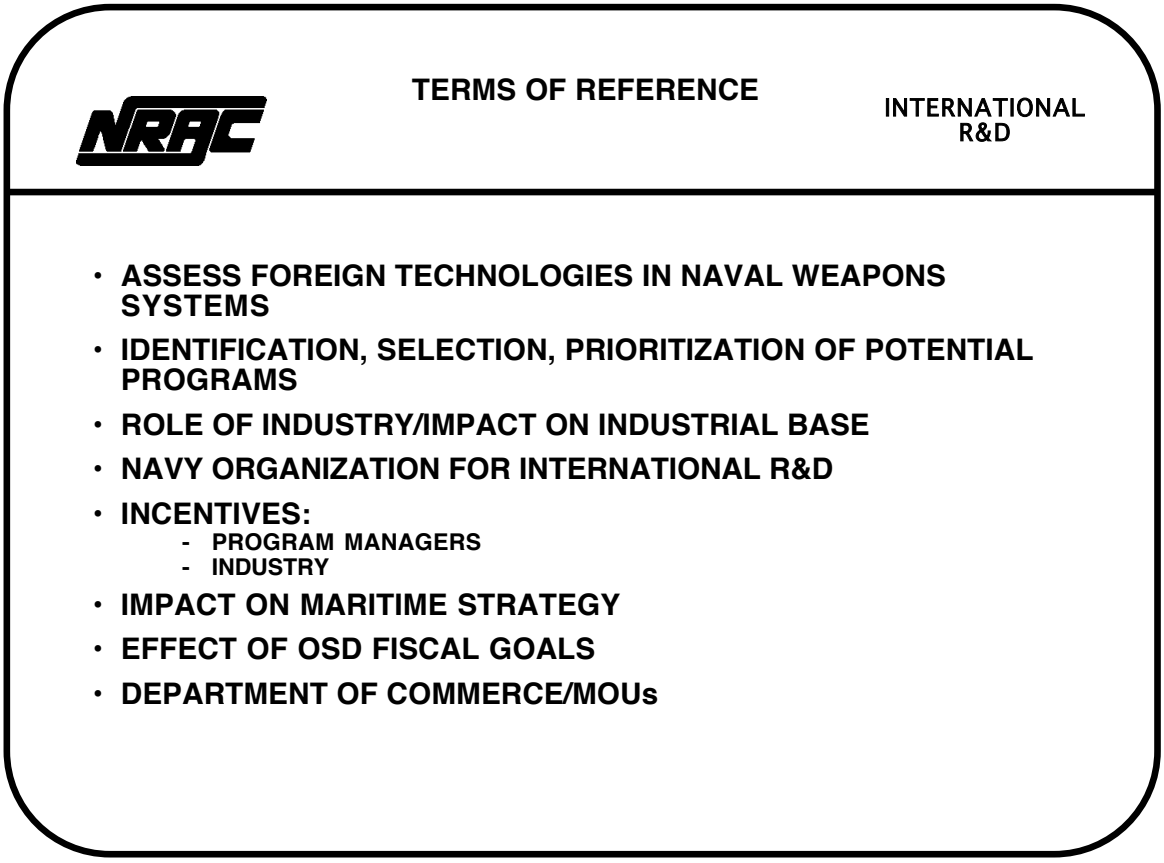
PURPOSE

INTERNATIONAL R&D

EXAMINE THE NAVY'S EFFORTS IN

INTERNATIONAL COOPERATIVE R&D PROGRAMS AND PROVIDE

RECOMMENDATIONS AS APPROPRIATE FOR IMPROVEMENT

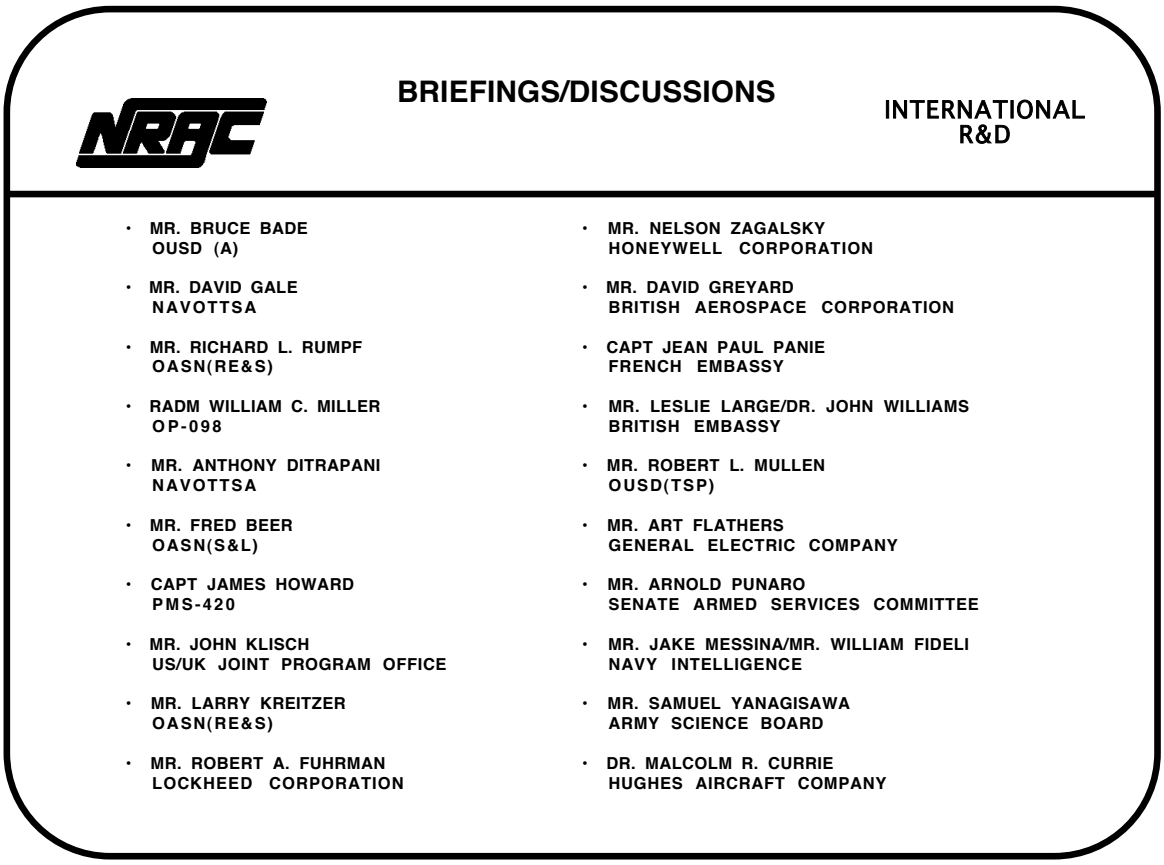


TERMS OF REFERENCE

The panel was asked to address the following questions in the Terms Of Reference (TOR) (see Appendix A):

- How may the Navy enhance identification and assessment of foreign technologies to facilitate both the rapid and long term incorporation of these technologies into naval weapon systems?
- How may the Navy better identify potential cooperative development programs? What fundamental elements impact the success or failure of a cooperative development program? Which elements should be considered in determining priority?
- What role can industry assume to facilitate international cooperative programs and take advantage of available foreign technologies? What is necessary to maximize industry involvement in these programs and strengthen the U.S. industrial base? How may IR&D funding be used in these programs?

- What incentives should be offered to promote international cooperative programs? How may the Navy reward program managers and industry for cost savings achieved through successful programs?
- How may international programs be used to promote the maritime strategy objectives of the Navy?
- How may the coordination and review of Navy international programs be improved? What organizational changes are necessary?
- Are the fiscal goals, established by the OSD for service participation in international programs, practical and adequate?
- New legislation requires the Department of Commerce to review all MOUs before signature. How will this legislation impact Navy cooperative development programs and U.S. industry?

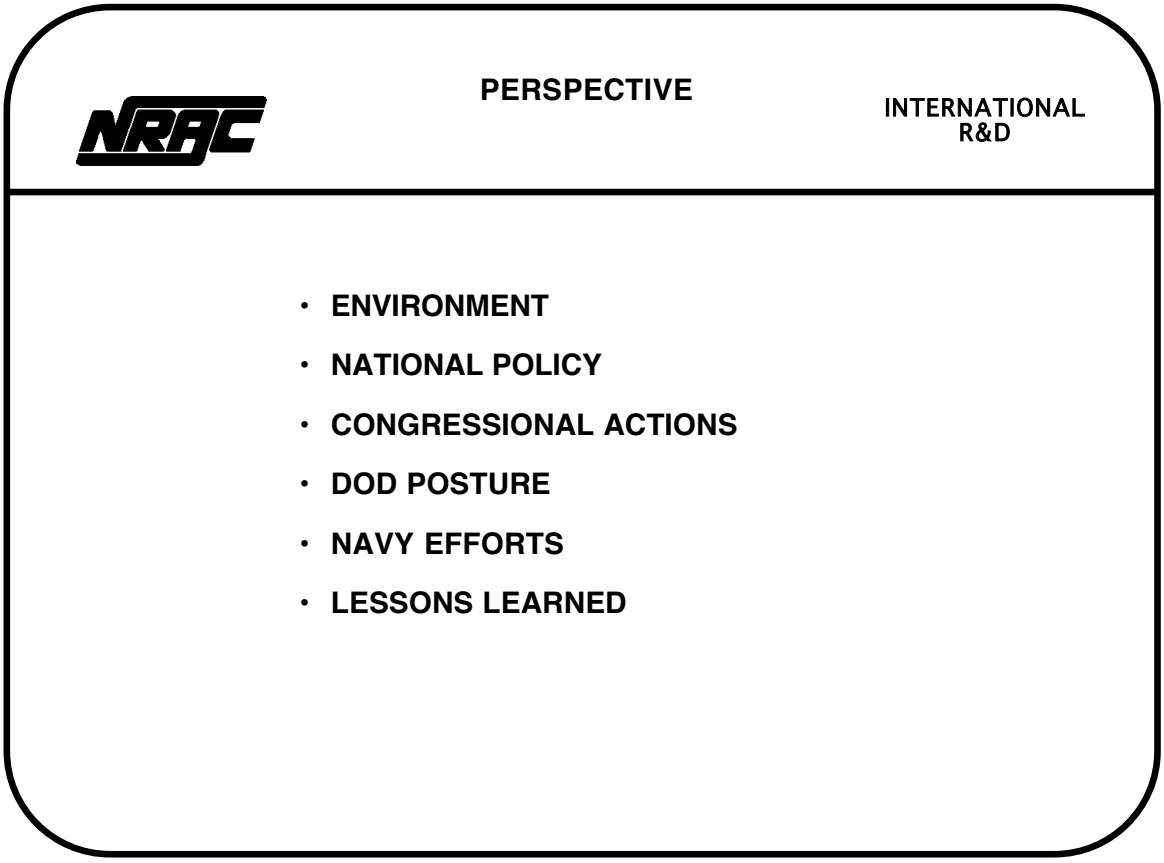


BRIEFINGS/DISCUSSIONS

In order to be certain that the panel had a well rounded view, great care was taken to hear from many sources. These included policy makers from OSD, the Navy's Secretariat, implementing organizations, and Navy managers as well as U.S. defense industry contractors.

Additionally, the panel heard from United Kingdom (U.K.) and French officials representing both government and industry. To represent the major role Congress plays in international programs Arnold Punaro, from the Senate Armed Services Committee (SASC) staff, discussed this subject with the panel.

The panel received inputs from the Army Science Board concerning their international technology study. In addition, the Defense Science Board presented the results of two efforts they had undertaken: first, the Industrial Base Study chaired by Robert A. Fuhrman and, second, the Pacific Rim Study recently completed by Dr. Malcolm R. Currie.


NRAC
PERSPECTIVE
INTERNATIONAL R&D
• ENVIRONMENT
• NATIONAL POLICY
• CONGRESSIONAL ACTIONS
• DOD POSTURE
• NAVY EFFORTS
• LESSONS LEARNED

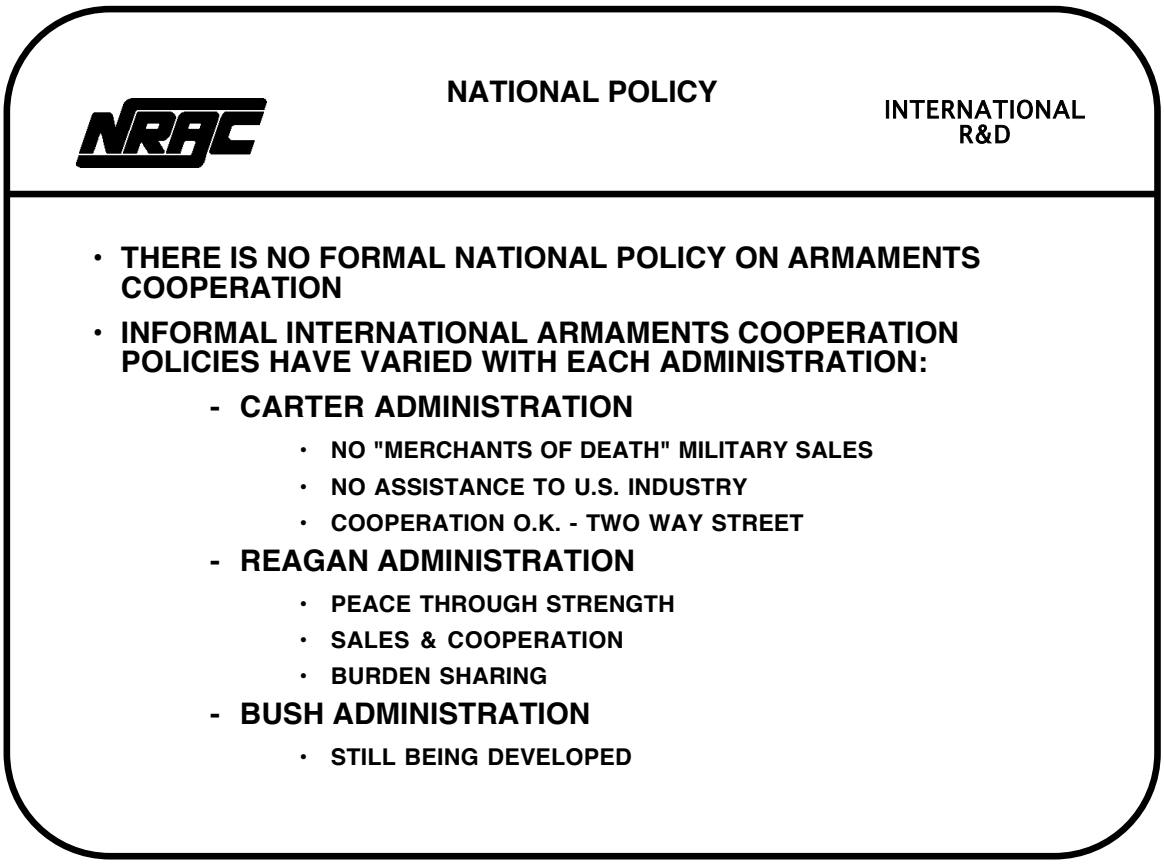
ENVIRONMENT

Documentable change has occurred in the external environment which profoundly impacts R&D requirements. Central among these is globalization of the economy, industry and trade. This, in turn, has fostered increasing interdependence among nations.

The U.S. position of dominance in advanced technology and manufacturing capability has given way to erosion of our leadership position in several important areas, such as microelectronics, ceramics and manufacturing process technology. Foreign capability in the design of integrated circuits, launch vehicles and commercial aircraft underscores the general trend toward technology leveling. As a result, intense competitive pressure has promoted widespread dual use of our most advanced technologies.

The threat to our nation's integrity and stability is in transition. The military threat is blurring, while at the same time the economic threat is sharpening. Industry's preoccupation with short term profit and corporate book value puts us at a distinct competitive disadvantage in dealing with Japan's longer term goal of securing market share. Finally,

we face even more intense competition with the emergence of EC-92 and its goal of retaining existing market share on a global scale.



NATIONAL POLICY

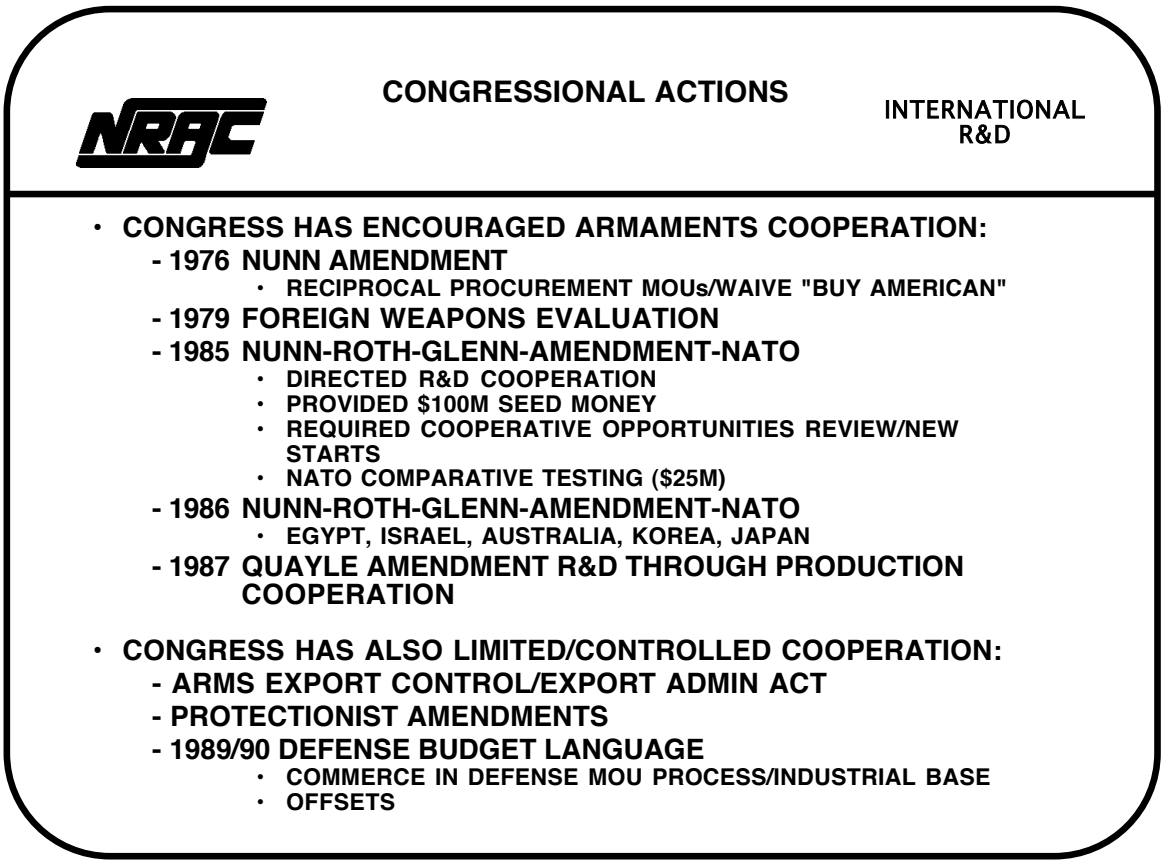
Armaments cooperation with North Atlantic Treaty Organization (NATO) nations and other friendly countries has been an integral part of DOD's RDT&E and production procurement programs since World War II. Until the late 1970's the majority of cooperative efforts involved sales and coproduction of U.S. weapons and equipment and the exchange of applied research data.

These activities were carried out under the various administrations, in accordance with the prevailing international views held by each administration, without a formal or official national policy on international armaments cooperation. For example, the Carter administration wanted to greatly decrease the U.S. sales of weapons around the world, thus avoiding a reputation as "Merchants of Death." Correspondence, dubbed the "Leprosy Letter," was sent to all U.S. embassies early in the Carter administration prohibiting support and assistance to U.S. defense industry corporations trying to sell overseas. Legislation was enacted by Congress disallowing foreign marketing expenses to be charged as a valid cost of doing business.

Paradoxically, the Carter administration supported cooperation with our allies and friends. During the mid-70's, reciprocal procurement MOUs were negotiated and approved; initial steps were taken toward cooperative developments. It was during this time period that the term "Two Way Street" was applied to our armaments cooperation efforts.

During the Reagan administration with its military buildup and "peace through strength" philosophy, armaments cooperation was pushed on all fronts. The "Leprosy Letter" was repudiated; the first international cooperative development program was started (Terminally Guided Warhead for the Multiple Launch Rocket System); defense cooperation offices were established in most major U.S. embassies to promote cooperation; and over thirty new cooperative development MOUs were signed. These improvements were accomplished without an official or formal national policy statement or directive on armaments cooperation. The panel has also observed that although there has been a continuation of the Reagan administration international cooperation policies, there has been no action by the Bush administration to prepare a formal policy statement — this despite the recent controversy concerning the FSX cooperative development project with Japan.

While there has been general recognition within DoD of the desires of the various administrations, the issuance of a national security policy directive on international armaments cooperation is needed to guide the many agencies (DoD, State, Commerce, U.S. Trade Representative) involved in this activity. A comprehensive policy statement is required to enable stabilized, long-term planning and execution of IR&D projects.



CONGRESSIONAL ACTIONS

Since the mid-1970's, Congress has been the major source of new initiative and direction for international armaments cooperation. The 1976 Nunn amendment encouraged reciprocal procurement of equipment between the U.S. and other NATO nations, and authorized the SECDEF to waive the "Buy American" law in the interest of NATO standardization and interoperability. This law enabled the establishment of bilateral reciprocal procurement MOUs between the U.S. and the European nations of NATO. Since then several other similar MOUs have been signed with other friendly nations (e.g. Israel, Sweden, Switzerland, Egypt). Similar agreements have been in place with Canada and Australia since the 50's and 60's.

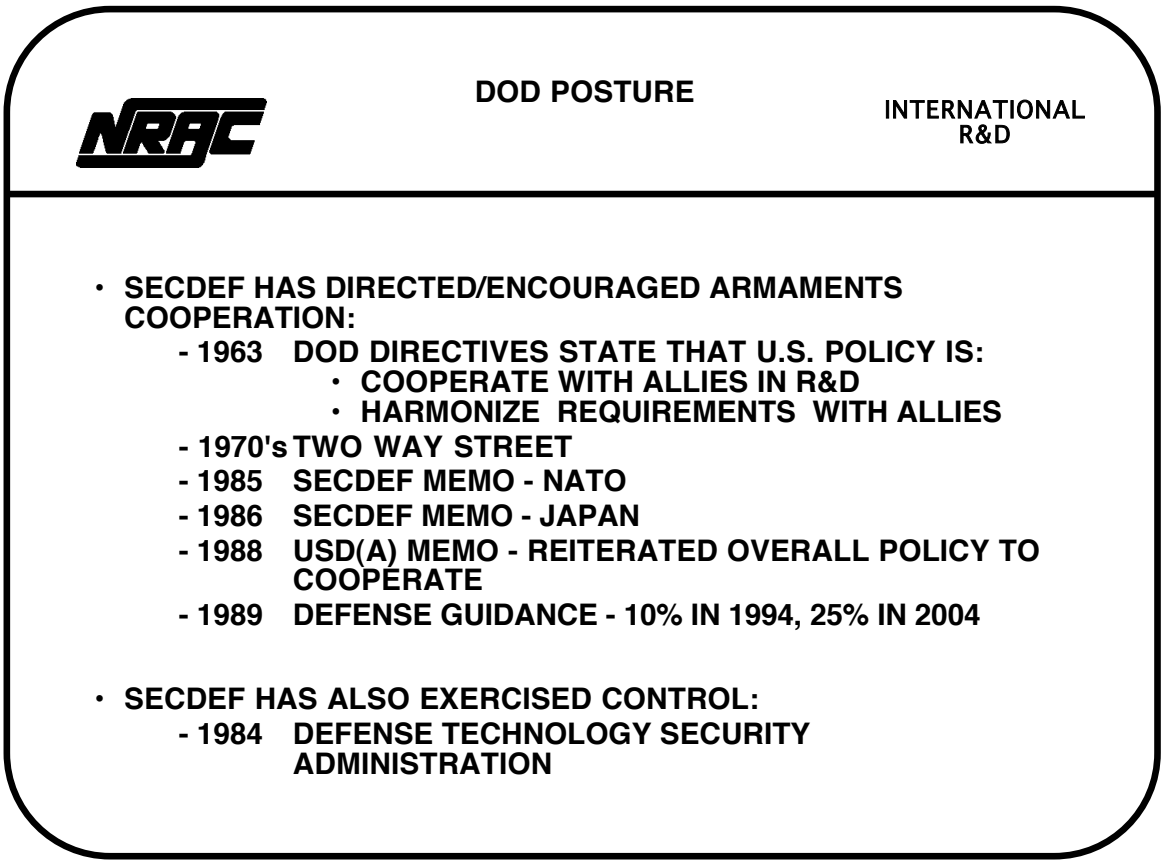
In 1979, Congress directed that the DoD test and evaluate foreign weapons, prior to U.S. unique development/production, in order to avoid wasteful duplication. Funding was thus established for Foreign Weapons Evaluation (FWE). Since then, more than $200M has been appropriated for FWE, resulting in over $2B in purchases.

The major new initiative in armaments cooperation occurred in 1985 with the FY 1986 Nunn amendment. It directed R&D cooperation with NATO allies, provided $100M in "seed money" for new development programs, and required that each new start in development be examined for international cooperation. In addition, it provided $25M for testing equipment and systems already developed by other NATO nations prior to starting production in the U.S. — again, encouragement to cooperate and avoid duplication.

Application of the 1986 Nunn amendment was extended to Egypt, Israel, Australia, Korea and Japan with the certification of these countries as major non-NATO friendly countries by the Secretaries of Defense and State. In 1987, Senator Quayle sponsored an amendment permitting the DoD to cooperate with foreign nations from R&D through procurement.

Congress has also sponsored laws and amendments which limit or control cooperation, sales/export and purchases — primarily in the Arms Export Control and Export Administration Acts. The 1989 Defense Authorization Act includes provisions to require Department of Commerce participation in MOU approval because of concerns over the health of the defense industrial base. It included the requirement for the President to develop a national policy on offsets — also related to the industrial base.

Finally, nearly every defense authorization act in the 1980's has included individual protectionist amendments which affect armaments cooperation activities (e.g. ball bearings, anchor chains, optics, special metals, etc.).



DOD POSTURE

The DoD has always been in the forefront of U.S. armaments cooperation with its allies. Historically, Secretaries of Defense have encouraged cooperation with our allies. In 1963, this encouragement was strengthened by the promulgation of two DoD Directives (3100.3 and 3100.4) which state DoD policy for the U.S. to cooperate in R&D and harmonize requirements with its allies. R&D cooperation in the 60's and early 70's concentrated in applied research and component development. The majority of international cooperation was in coproduction and sales of U.S. weapons. Currently, an updated policy directive is being coordinated in OSD which continues to encourage armaments cooperation with our allies.

SECDEF encouragement and direction to engage in cooperative R&D and production continued through the 1970's. Examples of this include signing reciprocal procurement MOUs (Two Way Street), initiation of foreign weapons evaluation and initial codevelopment efforts.

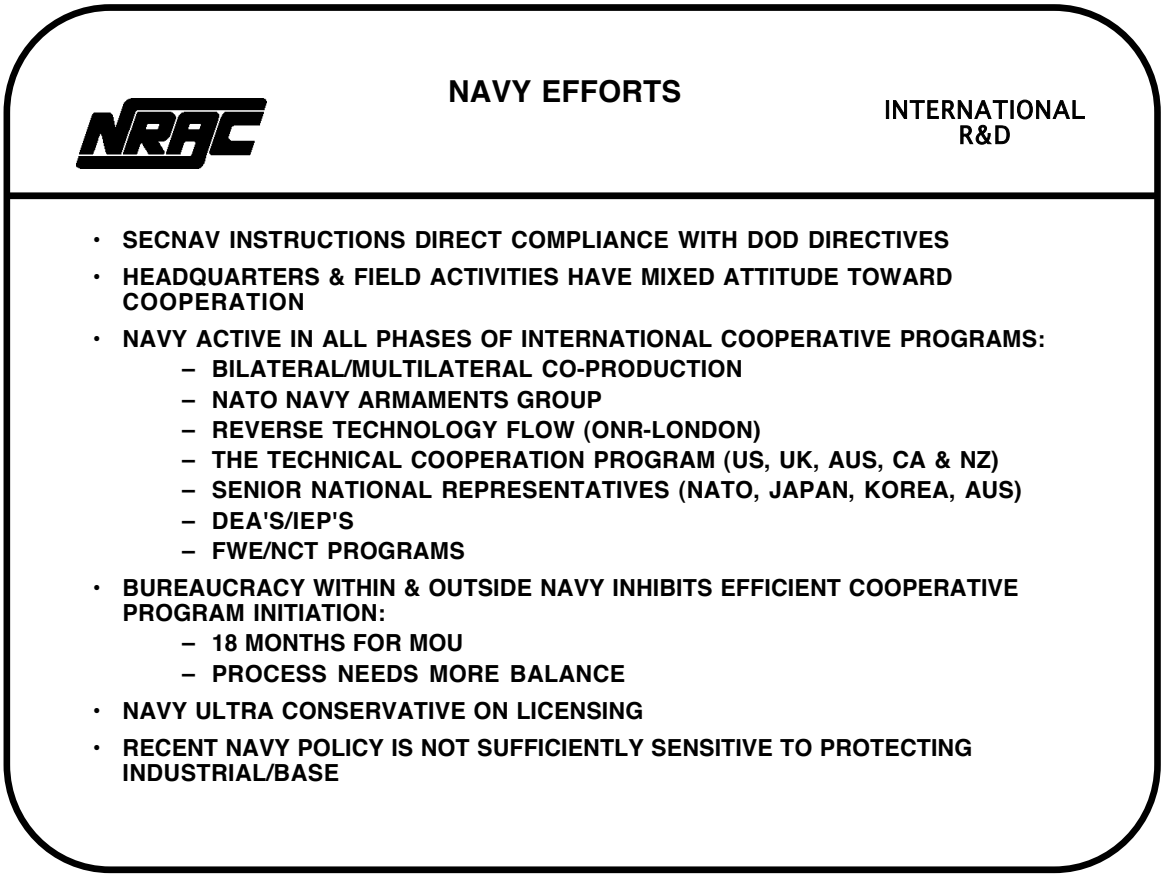
During the Reagan administration's reemphasis on defense preparedness, cooperative activities continued with NATO, and cooperative

development actions with Japan and Korea were initiated. In 1985, SECDEF signed a policy memorandum encouraging increased cooperation with NATO followed closely by the Deputy SECDEF 1986 policy memorandum directing more cooperative activities with Japan. These roughly coincided with the landmark FY 1986 and FY 1987 Nunn amendments directing and funding greater international cooperative R&D with our allies.

Just recently, in November 1988, the principal Deputy Under SECDEF (Acquisition) signed a memo which reiterated the overall defense policy of cooperation with our allies.

Current FY 1989 Defense Guidance, issued in late 1988, directs 10% of DOD's R&D funding be allocated to cooperative activities by the year 1994, and increase to 25% by 2004.

SECDEF has also exercised control through his ultimate signature authority on cooperative MOUs. More importantly, he has exercised his control of technology transfer through the international licensing process. This authority was institutionalized in 1984 with the establishment of the Defense Technology Security Administration (DTSA). DTSA is a key activity in determining which technologies can be transferred through commercial licenses, which is frequently a key milestone in deciding if a cooperative program can proceed.



NAVY EFFORTS

The Navy has, in general, followed OSD direction for international armaments cooperation. It has issued SECNAV instructions which direct compliance with DoD directives. In addition, several OPNAV instructions and manuals provide internal Navy guidance on the conduct of international armaments cooperation activities such as MOU negotiation, NATO and bilateral meetings, et al.

OPNAV, Systems Commands and field activities have embraced international cooperation to varying degrees, but are participating in all phases of the DoD armaments cooperation program, which includes:

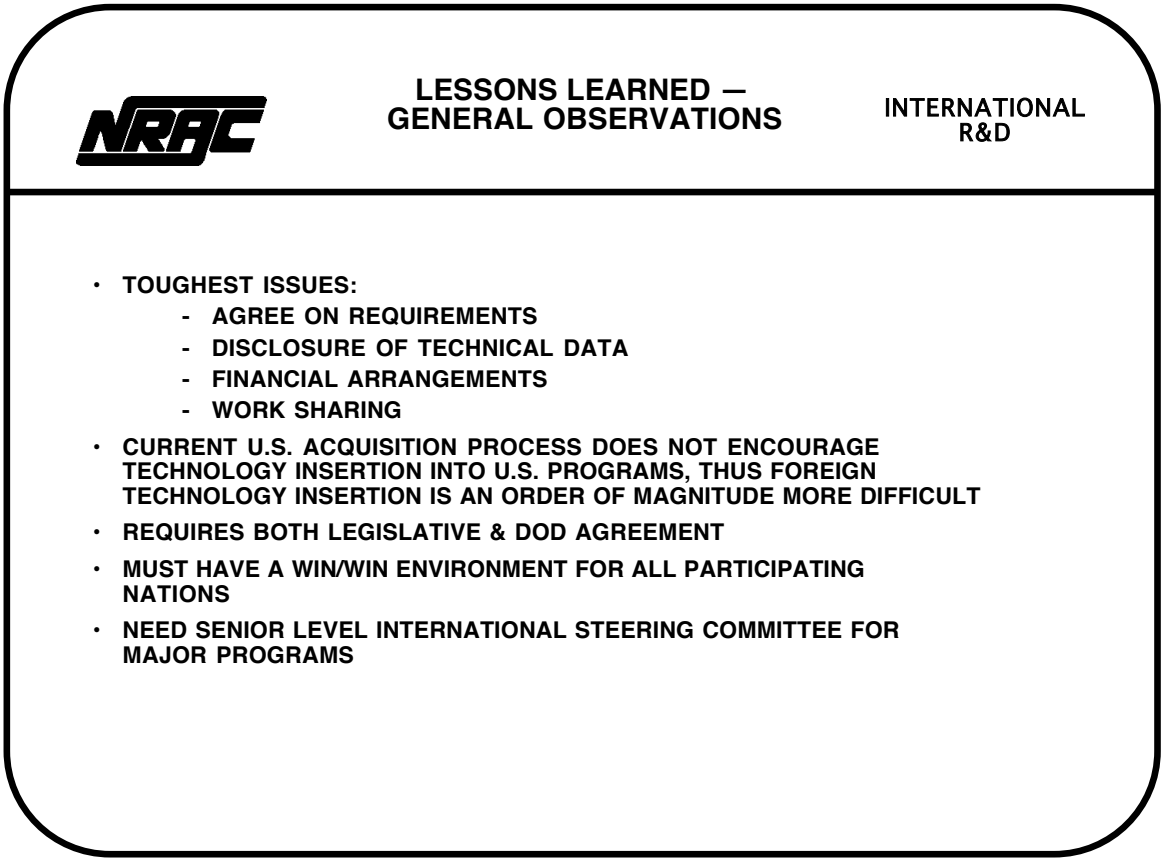
- Bilateral and multilateral Coproduction (Rolling Airframe Missile, NATO SEA SPARROW)
- NATO NAVY ARMAMENTS GROUP (leadership and active participation)
- Reverse Technology Flow (Office of Naval Research, London)
- The Technical Cooperation Program (Participation)

- Senior National Representatives (Leadership)
- Data Exchange Agreements/Information Exchange Programs (All Labs and Centers-Participation and Leadership)
- Foreign Weapons Evaluation/NATO Cooperative Test Programs
- Codevelopment (modest efforts to date)

Moreover, one negative factor hindering efficiency is the large number of offices (Navy, DoD and elsewhere) which must be involved in the selection, approval and initiation of cooperative R&D programs. The average time for processing an MOU, from initial discussion to signature by signatory nations, is about 18 months. With recent Congressional direction to involve the Department of Commerce, the MOU review and approval process may represent one of the most serious challenges to entering into a cooperative project. It should be noted, however, that the bureaucracy in many of the allied nations is equally ponderous, also contributing to a lengthy MOU process.

Another observation, which merits consideration and affects the Navy's entering into and conduct of cooperative R&D programs, is the ultra-conservative position that the Navy has historically taken on licensing equipment for use/sales overseas.

Finally, after briefings from cognizant Navy procurement officials, the panel concluded that the Navy is not sufficiently sensitive to protecting the viability of the U.S. industrial base.



LESSONS LEARNED — GENERAL OBSERVATIONS

The NRAC panel held discussions with U.S. and international managers of current Navy IR&D programs to ascertain lessons learned from recent successes as well as problem programs.

These collective experiences demonstrate that the four issues which are most likely to impede progress on any cooperative international program are:

- Agreement on requirements
- Disclosure of technical data
- Financial arrangements
- Work Sharing (Division of Effort)

Of these four items, perhaps the most persistent difficulty is the disclosure of technical data over the life of the program. The company which has developed the data will generally require compensation and dissemination safeguards before any release of that data. The desire to protect intellectual corporate property spans the gamut from ideas

through processes to production — including hardware and software for both proprietary and classified data.

Other safeguards are implemented by security constraints for classified data, and by technical data transfer restrictions for unclassified data, by the U.S. Navy, the DTSA and the National Disclosure Policy Committee. Often only partial disclosure is permitted. When such a situation occurs, harmonizing of requirements may become very difficult. For example, specifications and the rationale for specifications may have very different levels of protection for release; the U.S. Navy is very conservative on the licensing of technical data.

The continuing technical dialogue required for cooperative R&D programs will present many opportunities for the problem to become "too hard to work." For these reasons, the definition of the limits of technical data transfer should receive considerable attention and decision making during the requirements definition phase of each program.

Recognition of the historical problems with financial arrangements can provide a basis for eliminating these problems in new starts. Problems stem from fundamental issues such as budget cycle timing, the ability or inability to make multi-year commitments and contingency planning.

A problem related to financial arrangements is work sharing assignments. Truly cooperative programs should have a reasonable division of effort among the participants. The division of effort should be based upon competency, the ability to access technical data for the assignment, the available resources to execute the work assignment and upon equitable financing. It is important that the effort be partitional so that effective independent effort can be expended. As in the case of financial arrangement, the responsibilities of each participant need clear definition at the outset.

It is the panel's belief that effective resolution of these issues will have far-reaching impact in enabling a successful IR&D program.

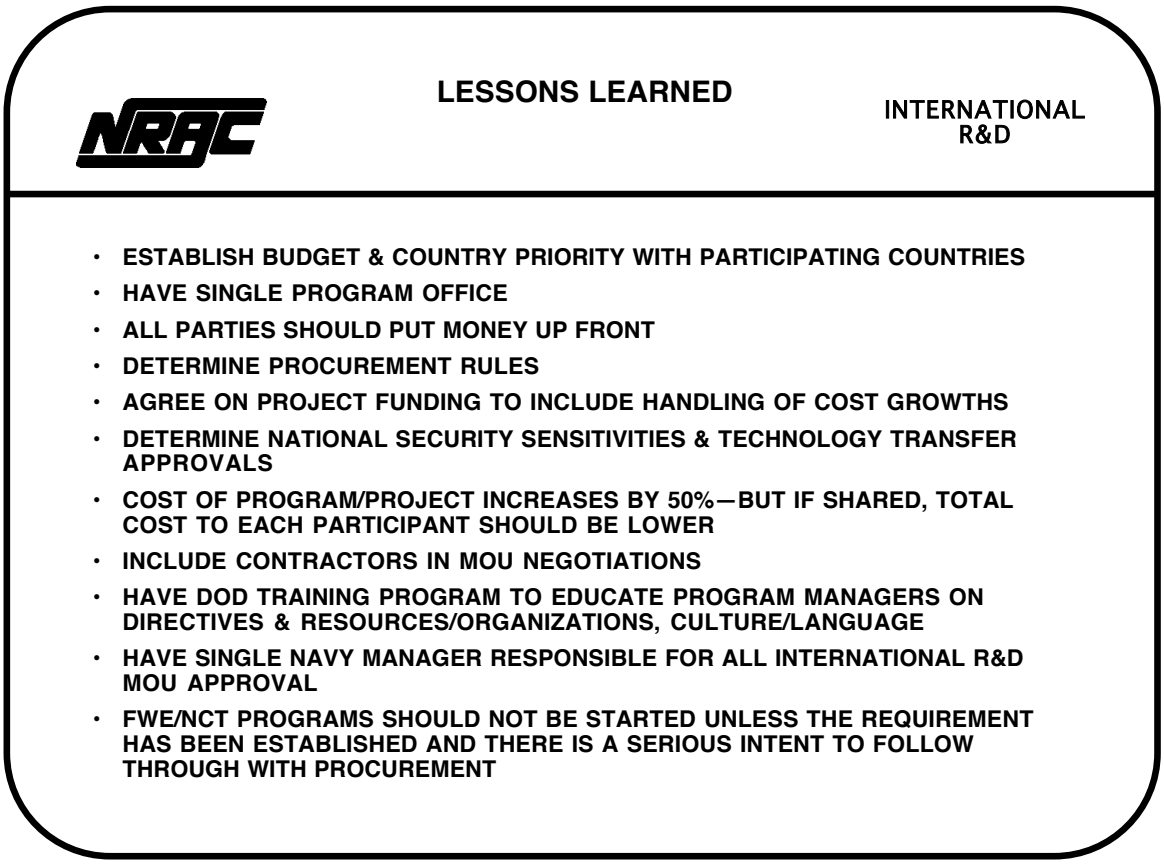
An argument could be made that an ideal situation for cooperative IR&D would include foreign technology insertion into an existing system. Such programs would provide the opportunity to develop technology data exchange channels, provide the arena for understanding management philosophy and demonstrate the cooperative agenda — with minimum risk.

If technology insertion were an ongoing objective of the procurement process, it would expand the breadth of the U.S. technology base suitable for cooperative programs. However, the current acquisition process does not encourage technology insertion into U.S. programs. Thus, it is

the panel's opinion that foreign technology insertion into U.S. programs is an order of magnitude more difficult, and therefore probably not a viable approach.

Technical data transfer issues and the need for stable funding clearly demonstrate that the support of both the DoD and Congress is essential to cooperative R&D programs. In addition, the environment must provide a win/win situation by some definition and to some degree for all participating nations.

IR&D programs harbor considerable promise; however, because of difficult issues, both startup and continuing, two management elements are essential. First, there must be a single program office with a single manager and joint participative support. Second, establishment of a senior level international steering committee, to solve problems which lie outside the program execution arena, is essential.



LESSONS LEARNED

Most of the "lessons learned" are statements of the obvious. Nonetheless, the principles they represent have been overlooked in a number of prior cooperative international efforts. Two lessons that deserve illuminating discussion are:

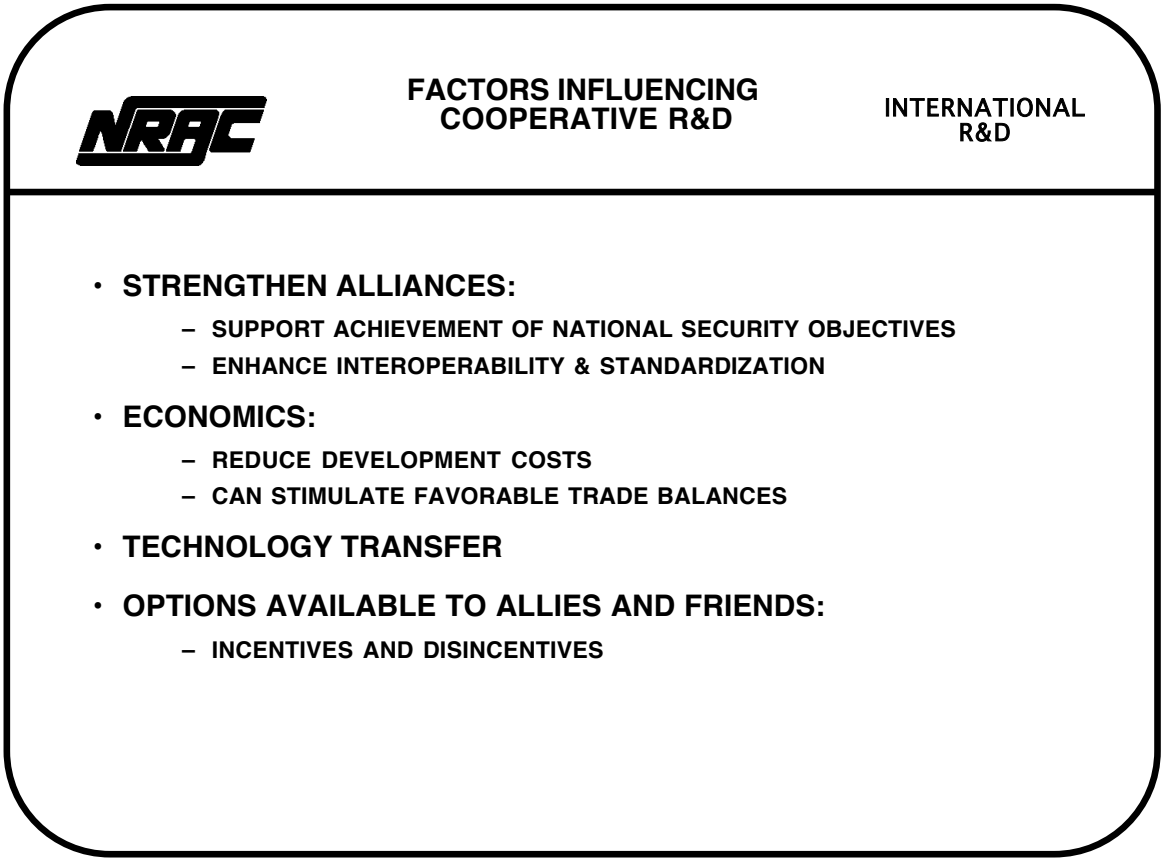
- Determining the procurement rules
- Including contractors in MOU negotiations

These two interrelated factors are critical to "leveling the playing field" as described below.

There are major differences between the government/industry interfaces in countries which might be candidates for cooperative R&D and the U.S. government/industry interface. For the most part, these differences grow out of the competitive environment and the laws dictating formal, defensible communication with industry during the procurement process in the U.S. For many of our allies the procurement process consists of "assignment" of the effort to a designated contractor. This situation creates an environment where the foreign govern-

ment is acting in concert with their industry in order to attain their national team objectives. At the same time, the U.S. industry team members generally are excluded from reviewing and providing expert inputs to the MOU.

For these cooperative international programs, a set of rules is required allowing the U.S. government and a specific contractor(s) to act in concert to produce an agreement which is in our best national interest. Enacting a legal mechanism permitting U.S. government/industry cooperation is essential.



FACTORS INFLUENCING COOPERATIVE R&D

There are various factors influencing the degree and ultimate success of cooperative R&D. A number of disincentives are in place which, if not resolved, will continue to work against the objectives and benefits of allied cooperation in development and coproduction programs. The following background is provided to focus on specific issues and disincentives for which corrective action is necessary.

Warming relations between the Western alliances and the Warsaw Pact nations are being greeted with increasingly popular support throughout much of the world. The corresponding perception of an easing in East-West tensions has already produced significant gains for the Eastern bloc, both in political and economic terms.

Through demonstrated new tolerance for democratic reforms, although lacking some degree of eagerness, the Eastern bloc has captured the hopeful attention of Western leadership at a pinnacle point in history — and at a time when most governments (East and West) are groping for both Federal spending relief as well as improved trade balances. Since the Eastern bloc has the most severe trade vacuum and the most

critically ill economies in the equation, they will not likely miss an opportunity for meaningful trade concessions and guarantees (in the context of *perestroika* goals) in exchange for their part in helping to mitigate the threat of armed hostilities on the continent.

Meanwhile, the European Economic Community (EEC) continues on a determined plan for economic unity by 1992. Whether or not fully realized by 1992, the sought after market unity is a politically supported notion within the EEC. The "trading club" the EEC desires has one central theme — to ensure the membership has exclusive privileges, including the aggregate political and industrial base clout to discriminate world trade considerations in their favor.

The impending and progressively harsher defense budget cuts within the Western alliances will likely follow patterns similar to postwar eras; i.e., scrap or mothball older assets, reduce acquisition of new equipment, reduce manpower, and scale back on R&D. Although a very complicated set of political and industrial base viability issues come to bear on this dilemma, there are a number of relevant considerations to be weighed in developing a strategic consensus for enhancing R&D cooperation with allies and friendly nations.

The climate in the Western alliance, particularly in Europe, is such that the East could succeed over time in establishing major gains in trade with the West, perhaps even in defense markets. Our allies are each spending less than the U.S. in areas of critical technology R&D. However, aggregate allied spending in R&D is considerable; yet their motivation is more often to cooperate with one another rather than with the U.S. Consider our restrictive policy concerning third party sales, and the fact that the U.S. has held to a consistent policy of restricting access to certain U.S. developed technologies from friends and allies. Through such policies/actions, we have denied the U.S. certain military interoperability advantages, as well as export potential to U.S. innovators. Sometimes, we eventually lose the technology through illicit channels.

In the Navy's pursuit of reasonable and effective policy change (to foster an improved framework within which the alliance can be assured of viable cooperative R&D and corresponding economic advantages) we must focus attention on how our Export Control policies have adversely affected the defense trade interests of our friends and allies. We must deal directly with why we may not be perceived by many of our allies as a safe investment for their scarce R&D funds. Unique among all its trading partners, the U.S. has the most to offer in defense related technologies. However, before the allies will entrust significant R&D funds to the U.S. for codevelopment, they must be convinced that our

intentions are backed by a solid policy which will ensure technology transfer as well as codevelopment and coproduction work sharing — absent the restrictive disincentives now in place.

We cannot continue to act in ways which justify allied suspicions and still expect to be in a strong bargaining position to attract their R&D investments. The following summary recommendations are offered in the context of the issues and concerns mentioned above.

STRENGTHEN ALLIANCES

Among the advantages inherent in expanded RDT&E cooperation between the U.S. and its allies is that of "strengthened alliances." There are important mutual benefits to all parties in RDT&E cooperation, including:

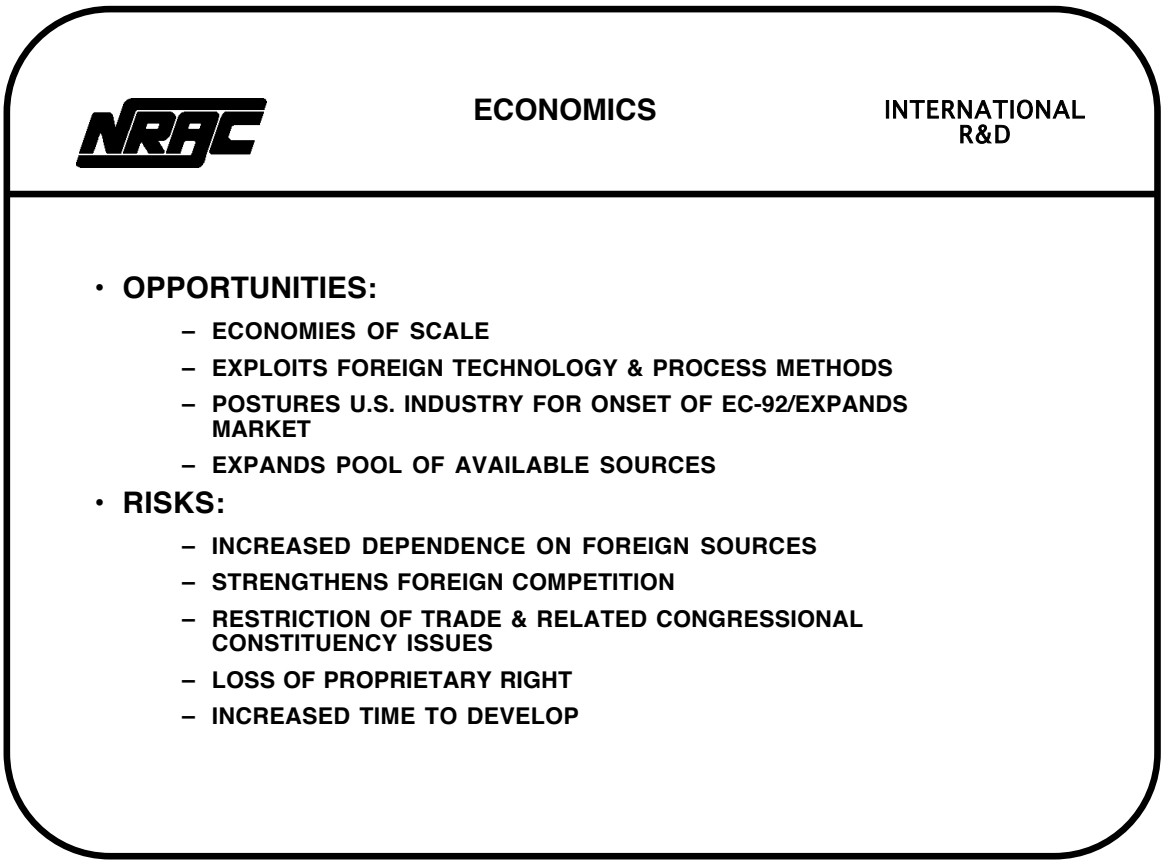
- Improved Warfighting Capability
- Standardization and Interoperability
- Economies of Scale
- Enhanced Products
- Interdependence
- Technology Transfer and Synergy
- Increased Political Solidarity
- Market Access

These incentives, favoring expanded R&D cooperation, are not "risk free." There are certain challenges which must be reconciled, to the satisfaction of all parties participating in R&D cooperation, in order to optimize the probabilities of program realization and success. These challenges and risks include:

- Third Party Sales
- Security Problems
- Offshore Industrial Dependence
- Compromise of Requirements

U.S. policy regarding "third party sales" needs to be reconsidered in the context of defense priorities and related spending trends as well as market realities. Allies are less likely to cooperate with the U.S. in important RDT&E initiatives if the U.S. enforces unreasonable "third party sales" restrictions which would not be a stipulation by an alternative RDT&E collaborant (i.e., the allies cooperate exclusively among themselves, leaving the U.S. to "go alone" or buy offshore).

The U.S. should foster a policy on requirements "harmonization" which protects against "upscaling" requirements. An increased or "upscaled" set of requirements is often the result of "coordinating requirements" to ensure both parties involved in a cooperative RDT&E initiative achieve specification satisfaction. This can result in overspecified requirements which unnecessarily drive both technical and financial risks beyond the level of mutual acceptance. Moderation and compromise are key considerations in developing a coordinated statement of requirements.



ECONOMICS

Expanded allied cooperation in RDT&E initiatives, by definition, promises favorable economic results. Implicit are such considerations as greater leverage from focused RDT&E resources and pure technology transfer. Perhaps even more important, however, are the more lasting values to the U.S. industrial base through the promise of reverse transfers of factory modernization expertise and related process methods technology.

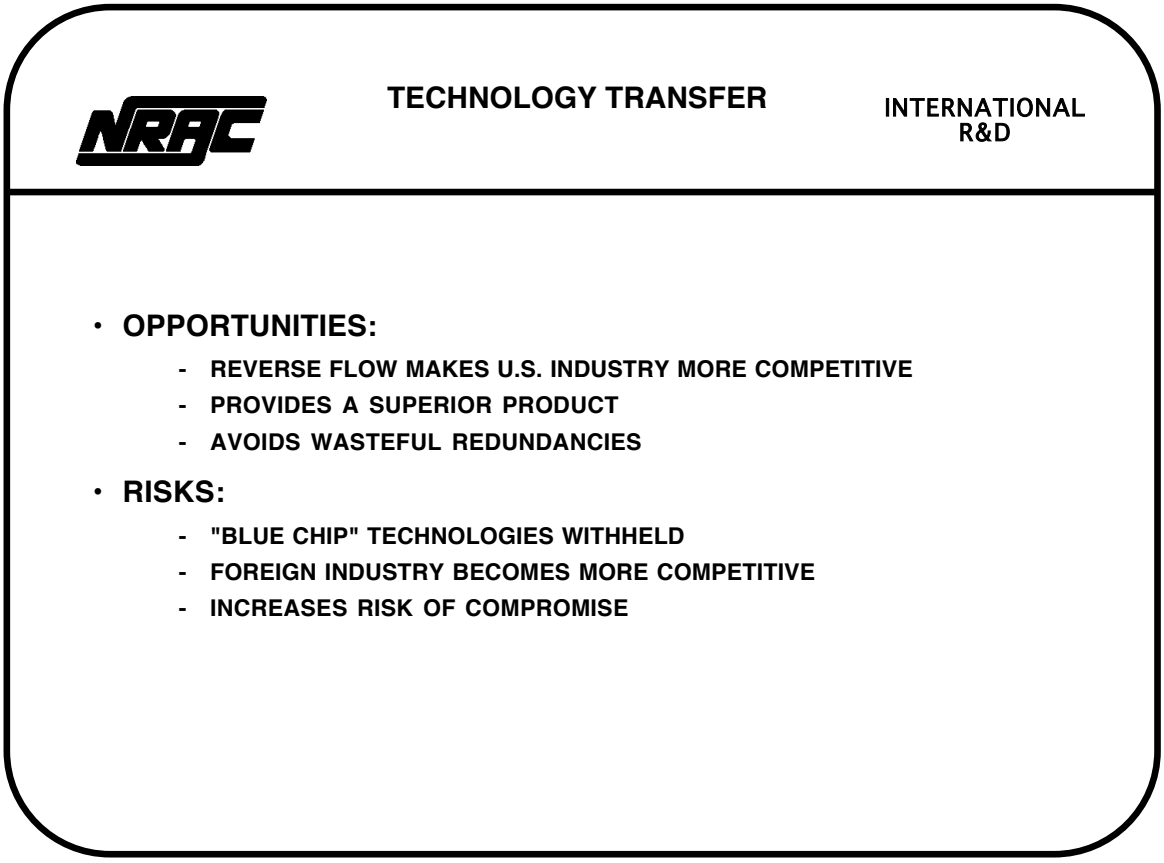
The U.S. has not kept pace with producibility gains achieved elsewhere in the Western alliances and stands to be seriously outproduced by the year 2000 and beyond — unless strategic initiatives are activated and well implemented.

In addition, U.S. industry is now facing the EC-92 market unification initiative — which may further erode its access to Western European markets.

The economic downsides to cooperative RDT&E are few, and for the most part border on protectionist. They include:

- Increased dependence on foreign sources
- Strengthened foreign competition
- Trade restriction concerns and related Congressional constituency issues
- Loss of proprietary rights

With respect to "trade restriction concerns and related Congressional constituency issues," attention is directed to the position of second tier sources of supply. Their ability to compete in an environment of "international cooperation" may be diminished substantially where the allied partner in a development initiative is assigned certain development and co-production responsibilities.



TECHNOLOGY TRANSFER

The U.S. is outspending and outdeveloping its allies in the majority of leading edge defense technologies. However, we continue to pay a high premium for the results, since we have not focused our development initiatives to ensure complementary gains in producibility and quality. We are unmatched in driving basic research and technological evolution, yet the U.S. industrial base is beginning to lag seriously behind certain allies, specifically Japan and West Germany in the areas of producibility and factory modernization. Selective RDT&E cooperation should include a strategic focus on the reverse transfer to the U.S. of key modernization and production process methods.

In addition to the promise of improved efficiencies and enhanced products, parties to technology transfer will benefit from significant cost avoidance by minimizing redundant pursuit of similar developments.

Meanwhile, the necessity to safeguard against the transfer of "Blue Chip" technologies cannot be sacrificed in the quest for a greater degree of IR&D cooperation. At the same time, however, the U.S. must

strengthen its awareness of offshore development alternatives. We must avoid erring on the side of overprotection, only to later discover another ally (and its industries) is in a position to replace the U.S. (and its industry) in a cooperative development program.

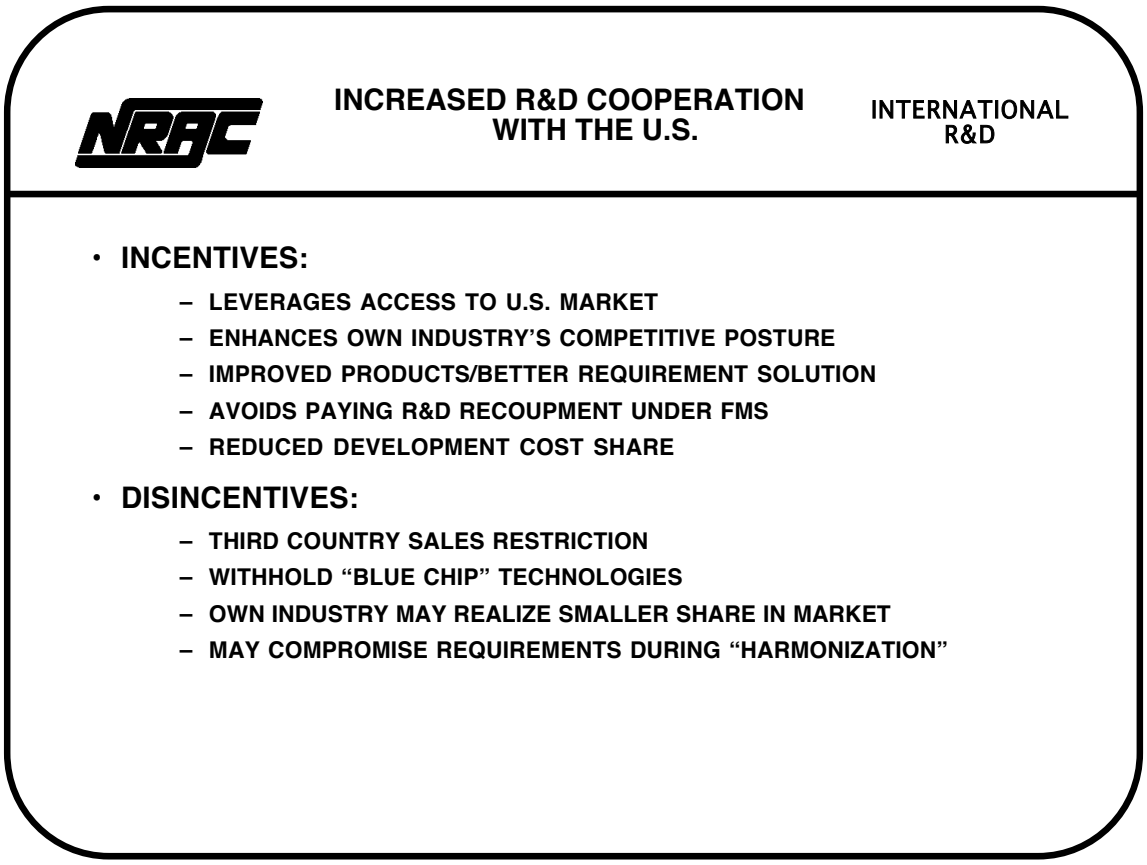
It is most often preferable to participate in (thus, to some extent, control) a development initiative than to simply "observe from afar" the cooperative developments of others.

OPTIONS AVAILABLE TO ALLIES AND FRIENDS

In the presence of declining defense budgets, there is a growing need for cooperative RDT&E in order to achieve development objectives within shrinking affordability limitations. By definition, this trend should result in an increase in the numbers and types of RDT&E programs available for cooperation.

Within the concept of RDT&E cooperation, the assumption of cost and risk sharing is implicit. In this context, the U.S. should carefully consider that the allies have a series of alternatives (for RDT&E cooperation) which are often more attractive than the U.S. codevelopment option.

The range of R&D options available to the allies, together with a brief review of the motivating forces of each option, follows.



INCREASED R&D COOPERATION WITH THE U.S.

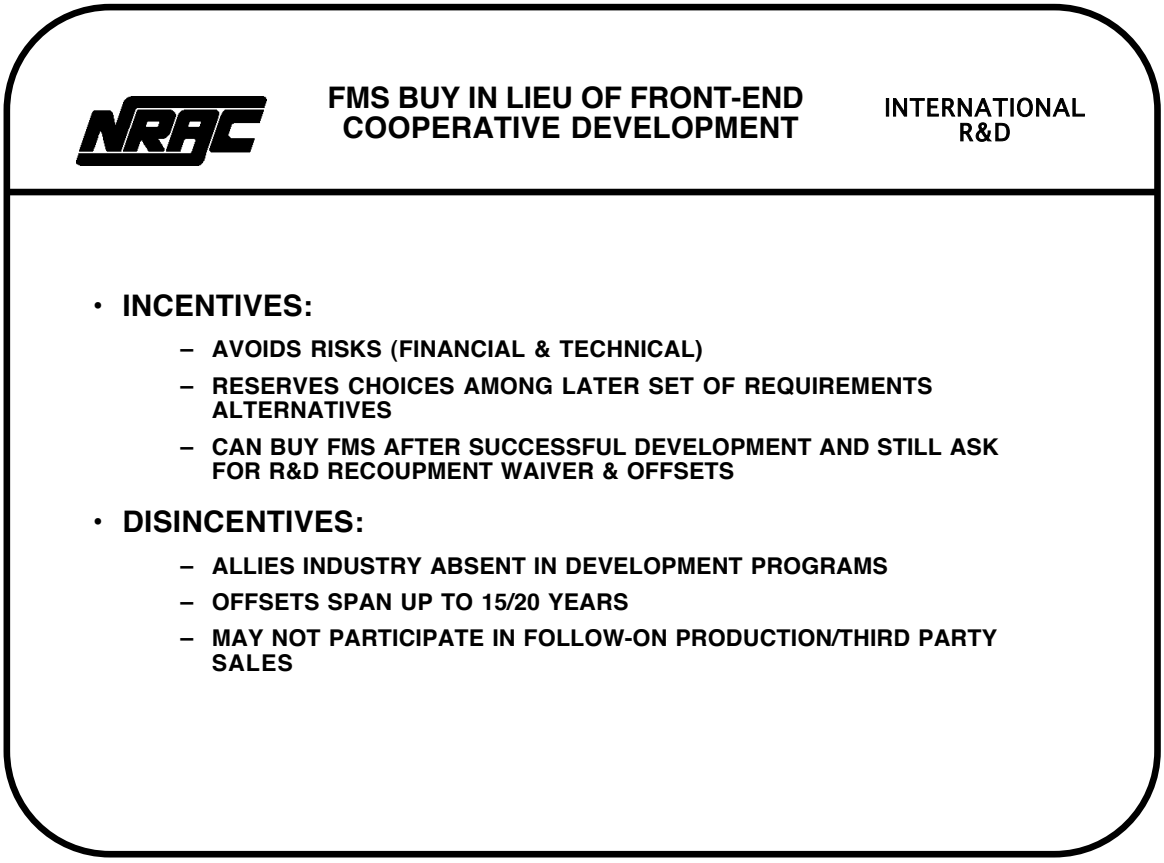
One of the most important biproducts of RDT&E cooperation with the U.S. is the leverage such cooperation ensures an ally in terms of U.S. market access. Moreover, once an ally completes a cooperative development effort with the U.S. and enters into coproduction, the ally's equipment may qualify for dual use in other endproducts and applications, including foreign or third party markets. Access to "third party sales," however, is often restricted by the U.S. The allies believe many such restrictions are both unnecessary and to the disadvantage of national industry.

In the presence of "industrial globalization," RDT&E cooperation is an essential element of industry's strategic repositioning process. Developed countries that fail to be involved in the synergistic process of R&D cooperation in the 90's and beyond surely invite economic decline.

In addition to the favorable effects of pure economies of scale, parties to mutually advantageous cooperative RDT&E initiatives expect other important gains, such as better products and requirements solutions.

Notwithstanding these significant incentives for RDT&E cooperation with the U.S., there are a number of "risks," or disincentives, which an ally must face.

These include concerns over U.S. "third party sales" restrictions and the fact that the U.S. tends to be overly protective in withholding release of "Blue Chip" technologies. Further, a prospective RDT&E collaborant must also weigh the impact of cooperation with the U.S. on the competitive posture of its own industry; i.e., smaller market share and some technology "dependence" on the U.S.



FMS BUY IN LIEU OF FRONT END COOPERATIVE DEVELOPMENT

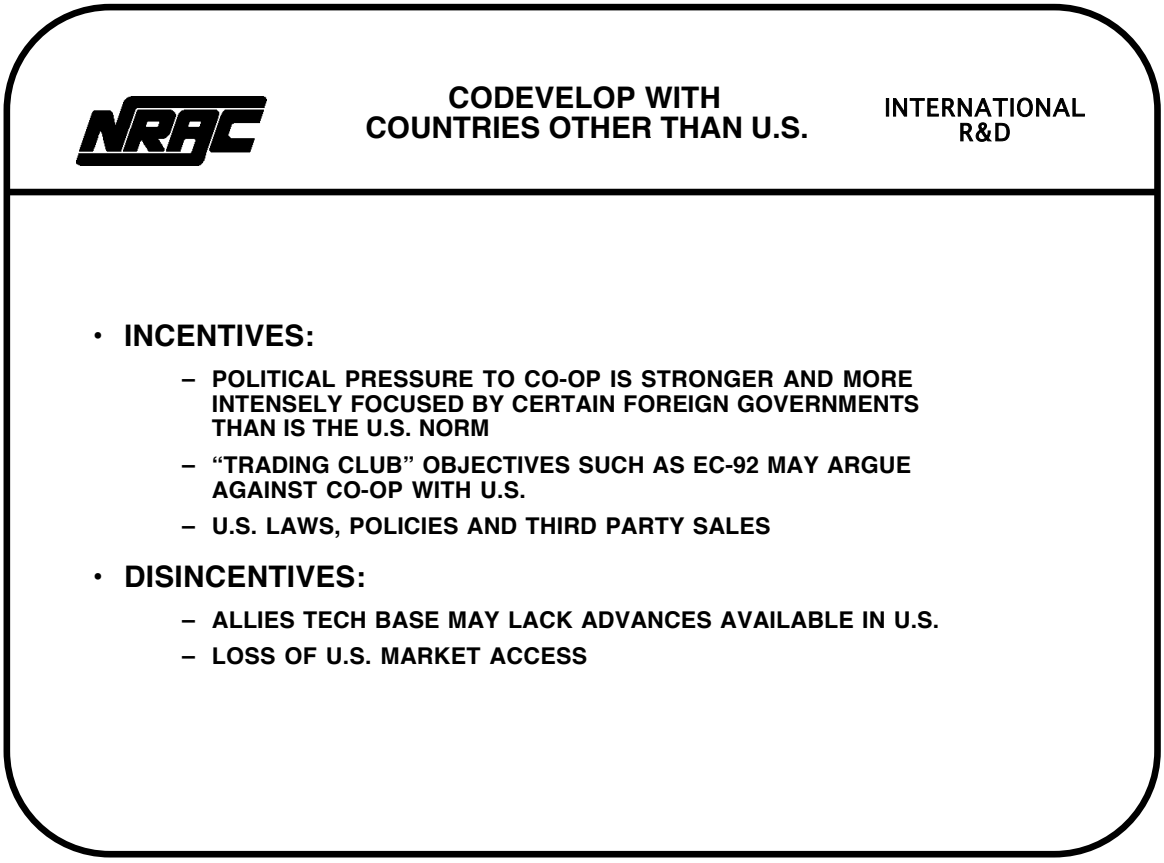
Inadequate attention is being given to the Foreign Military Sales (FMS) acquisition alternative available to the allies. While DoD is posturing for increased RDT&E cooperation, the FMS option is the single most significant disincentive to cooperation. Consider the FMS option from the ally's perspective:

- The ally can avoid front end risks such as financial and technical demands and challenges.
- The ally is able to re-examine requirements later in the RDT&E/acquisition cycle when knowledge is more complete as to other options and technological considerations.
- The FMS option can be risk free, since it follows successful development and service introduction. Further, the ally may still request RDT&E recoupment waivers and industry offsets. Often, the offset demands are made directly with U.S. industry; direct program participation is a high priority.

Unless the U.S. effects FMS policy change, the allies will more often find it to their advantage to defer in favor of FMS procurement.

There are a few considerations which may argue for the ally to cooperate with the U.S. For example, if an ally selects FMS instead of RDT&E cooperation:

- The ally's industry will be absent in the RDT&E and co-production process.
- Indirect offset programs span 15/20 years and often include marginally outdated technology.
- The ally will not participate in follow-on coproduction and sales to third countries.

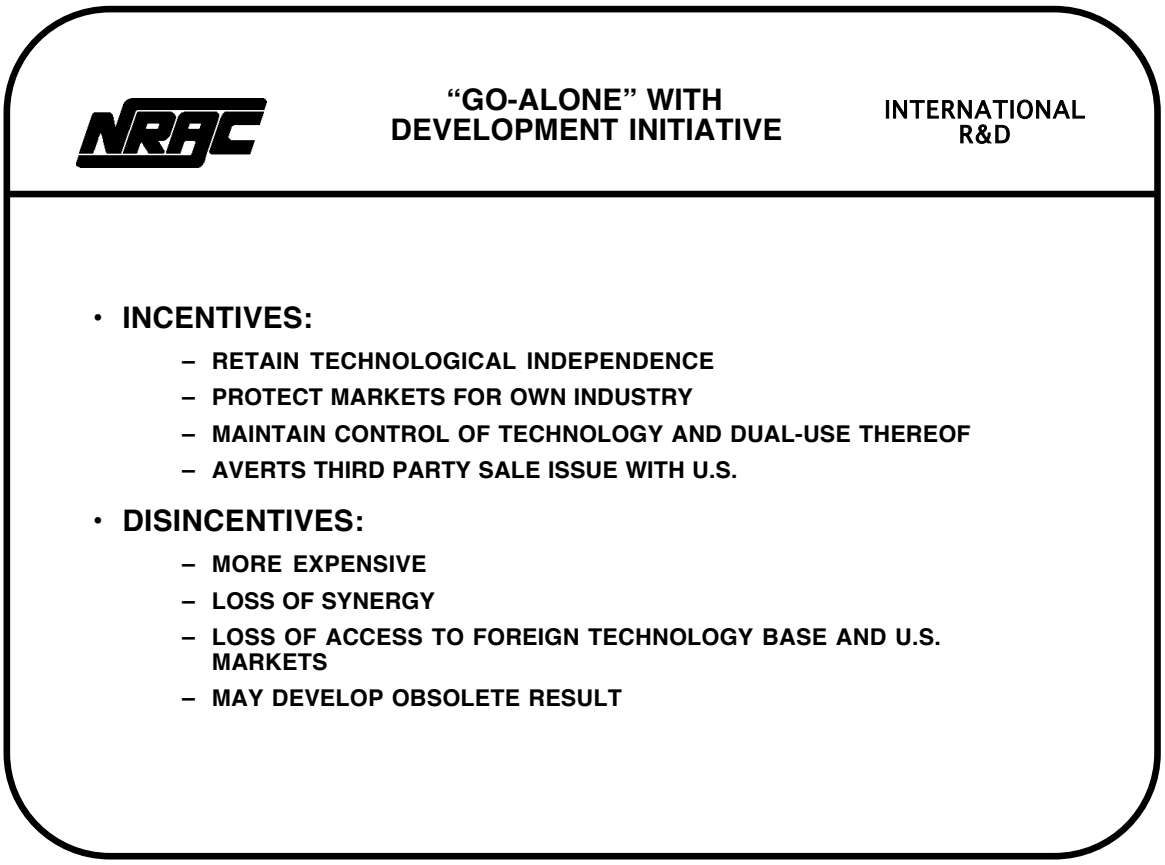


CODEVELOP WITH COUNTRIES OTHER THAN U.S.

The U.S. can be a poor partner in a cooperative development effort which drives many countries, particularly our NATO allies, into codevelopment programs with partners other than the U.S. The Europeans have had considerable experience and success in cooperative programs with one another. Their governments, economic systems and philosophies are similar, and European politics have often provided the impetus for cooperative programs. EC-92 is already forging many economic alliances and consortia that are almost totally European. Finally, the complexities and rigidity of U.S. laws and policies have frustrated many eager partners in the past, and have convinced some allies that cooperation with the U.S. is the option of last resort.

It is apparent to our allies and friends that the U.S. technology base, although not now preeminent in every field, is still the richest in the world. Even more important than loss of technology infusion from the U.S., however, is the great disadvantage of not being able to effectively

compete in the huge, lucrative U.S. market. This last factor, perhaps more than any other, encourages cooperation with the U.S.



"GO-ALONE" WITH DEVELOPMENT INITIATIVE

The "go-alone" option offers considerable advantages to an ally, particularly if the development lies in a technology area where the foreign country has capability. Time can be saved in avoiding the lengthy negotiation process. Decision making is unilateral and respects only the interests of the involved country. Requirements need respect only those specific to the developer or expanded in anticipation of Third Party Sales. All work will be performed in-country, thus no competitive edge need be exported to a cooperating partner's industrial base. In this regard, the developing country can retain technological independence, protect markets for its own industry and maintain control of its unique technology and any dual-use thereof. Finally, little foreign leverage (particularly by the U.S.) can be brought to bear on the lucrative Third Party Sales market.

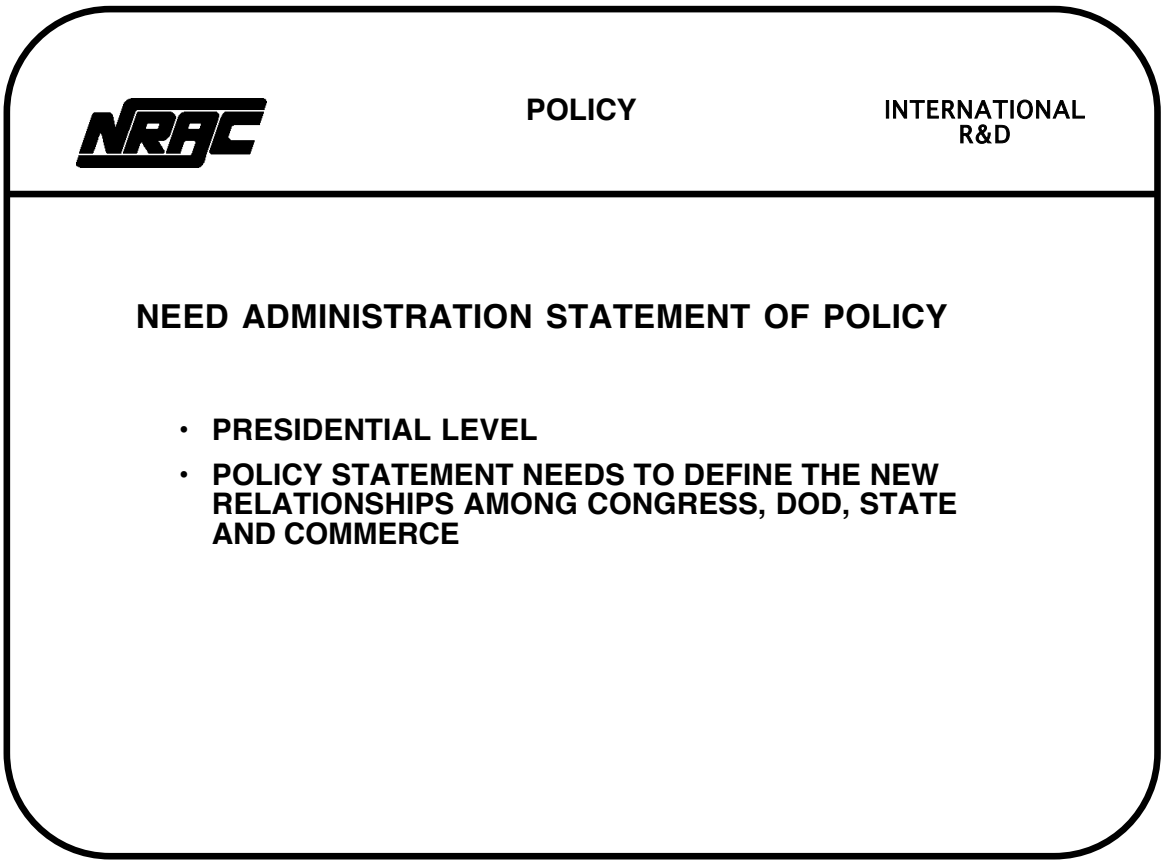
Of course, there is a down side to this go-alone approach. The developing country must foot the entire bill of development, forego access to the technical base of potential cooperating countries, and especially, loses ready access to the large U.S. market. The synergy that results

when different people with different ideas and methods cooperate on a common project is lost. Finally, if a foreign competitor or cooperative program develops a superior product, the go-alone country runs the risk of substantially losing its entire investment.

RECOMMENDATIONS

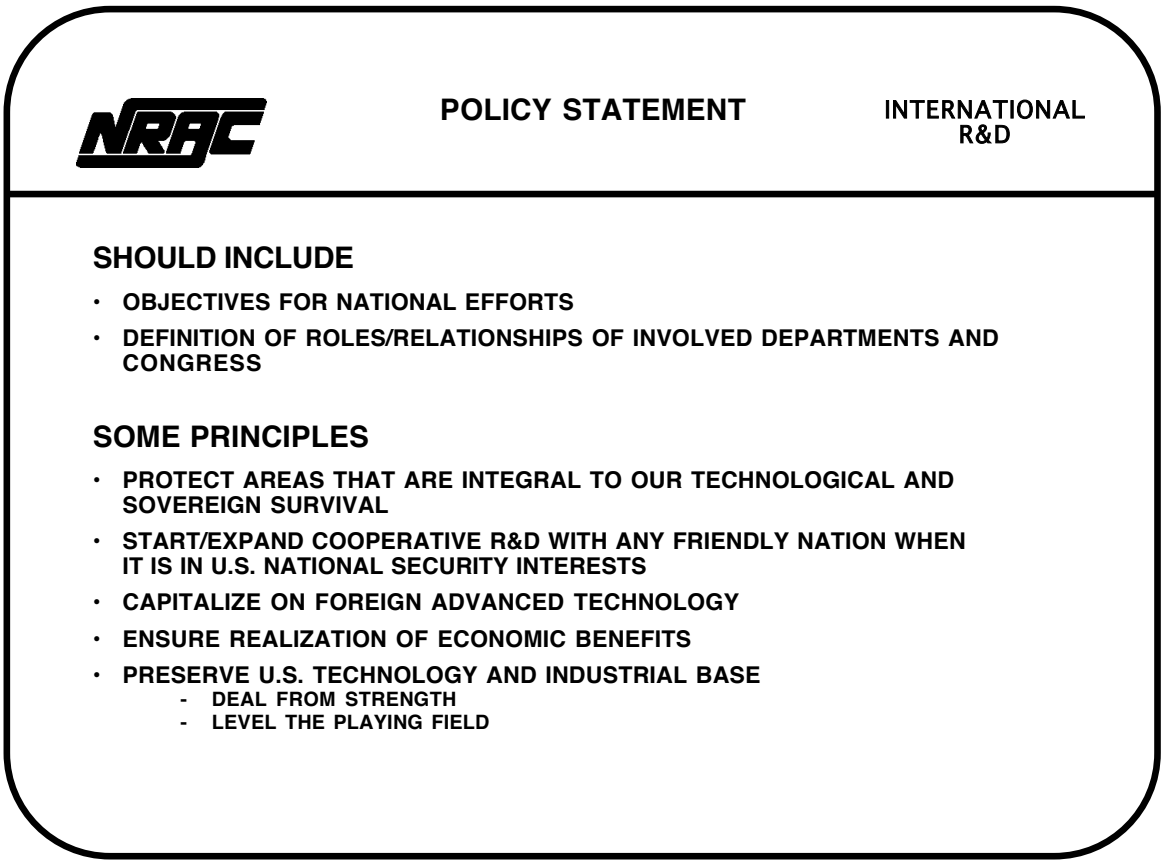
INTERNATIONAL R&D

- POLICY
- POLICY STATEMENT
- NAVY POLICY IMPLEMENTATION
- PROGRAM ORIGINATION
- WARFARE AREAS FOR CONSIDERATION
- SCIENCE & TECHNOLOGY
- PROGRAM IMPLEMENTATION
- INCENTIVES



POLICY

There is a great need for a national policy statement to clearly define interdepartmental relationships and delineate the objective and priority of international armaments cooperation. Even with the many directives, Congressional amendments, and guidance memoranda, there is still significant ambiguity concerning the national direction and priority for armaments cooperation. This policy directive must be done at the Presidential/National Security Council level, or it will not be possible to get all the diverse departments (DoD, State, Commerce, NASA and their agencies) moving in concert with the Congress — in the positive direction necessary to make international armaments cooperation really work to our nation's advantage.



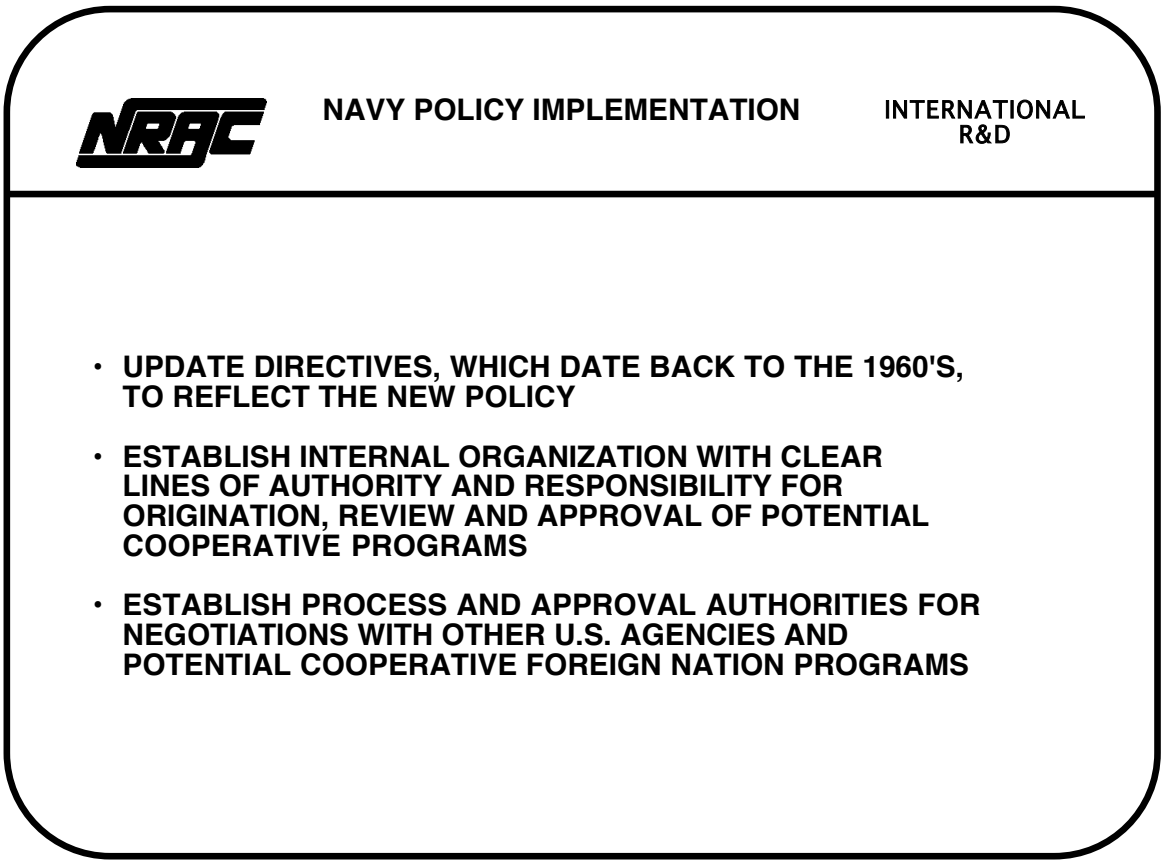
POLICY STATEMENT

A national policy statement for international armaments cooperation should include a clear delineation of the national objectives and priorities to guide the many executive departments and their agencies involved in this activity (e.g. DoD, State, USTR, Commerce, National Aeronautics and Space Administration, National Oceanographic and Atmospheric Administration, etc.). Further, it is essential that the critical role of Congress be recognized in a clear and unambiguous manner.

Some principles, which the panel advocates for the preparation of the policy statement, include the following:

- Protection of areas, such as stealth, acoustic technologies, and nuclear weaponry, that are integral to our technological and sovereign survival.

- Initiation or expansion, as appropriate, of cooperative R&D with any friendly nation when it is deemed to be in the U.S. national security interests (e.g. shallow water Anti-Submarine Warfare (ASW) with Korea, or surface ship gun/ammo/fuze cooperation with Italy).
- In the past our allies and we (to a lesser extent) have been able to capitalize on each other's technological developments. The U.S. should make special efforts to ensure that our government and industries have access to foreign advanced technologies.
- Ensuring the achievement of the economic benefits which cooperative R&D and follow-on production can bring to the U.S. and its allies. This includes not only lower unit cost and lifetime operation and maintenance of equipment, but also the third party sales and favorable trade balance which a successful multilateral or bilateral program can generate.
- Preservation of the U.S. technology/industrial base is essential if the DoD is to attract partners and realize the benefits from cooperative R&D projects. We need to deal from a strong technology, engineering and industrial base position as we enter into a project and negotiate agreements for follow-on production. The U.S. government should be prepared to assist U.S. industry in its international endeavors; foreign governments do this with their industries. The panel believes that a "level playing field" is fundamental to success.

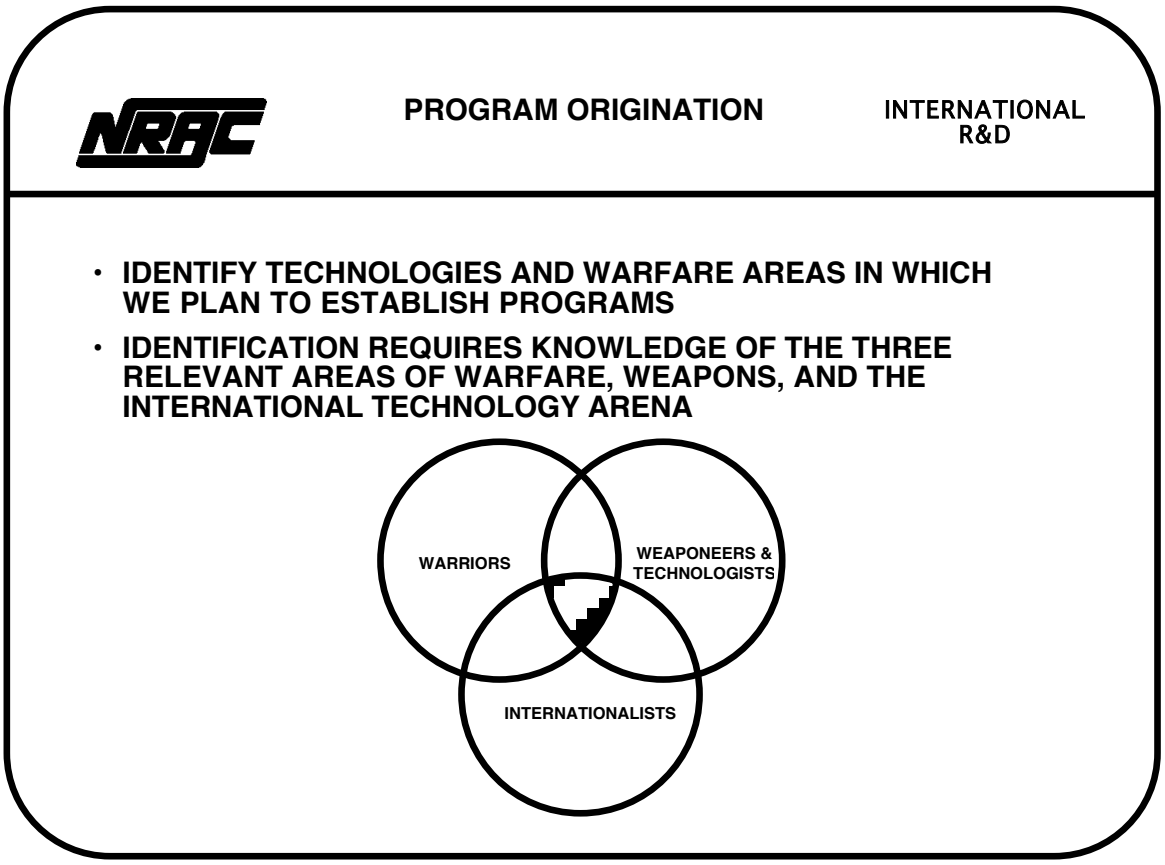


NAVY POLICY IMPLEMENTATION

As a follow up to the policy statement, it is equally important to issue new Navy directives which reflect the current climate with respect to cooperative R&D. The existing directives date back to the 1960's, and a number present conflicting guidance.

Perhaps the most critical implementation directive for the Navy is one which establishes an internal organization with clear lines of authority and responsibility for organization, review and approval of potential cooperative programs. Navy program managers and industrial representatives should be able to submit problem areas to a single, action oriented office.

In addition to the organization directive, it will be necessary to establish processes for negotiations with potential cooperative foreign nations and other U.S. agencies such as State, Commerce, and the DoD.



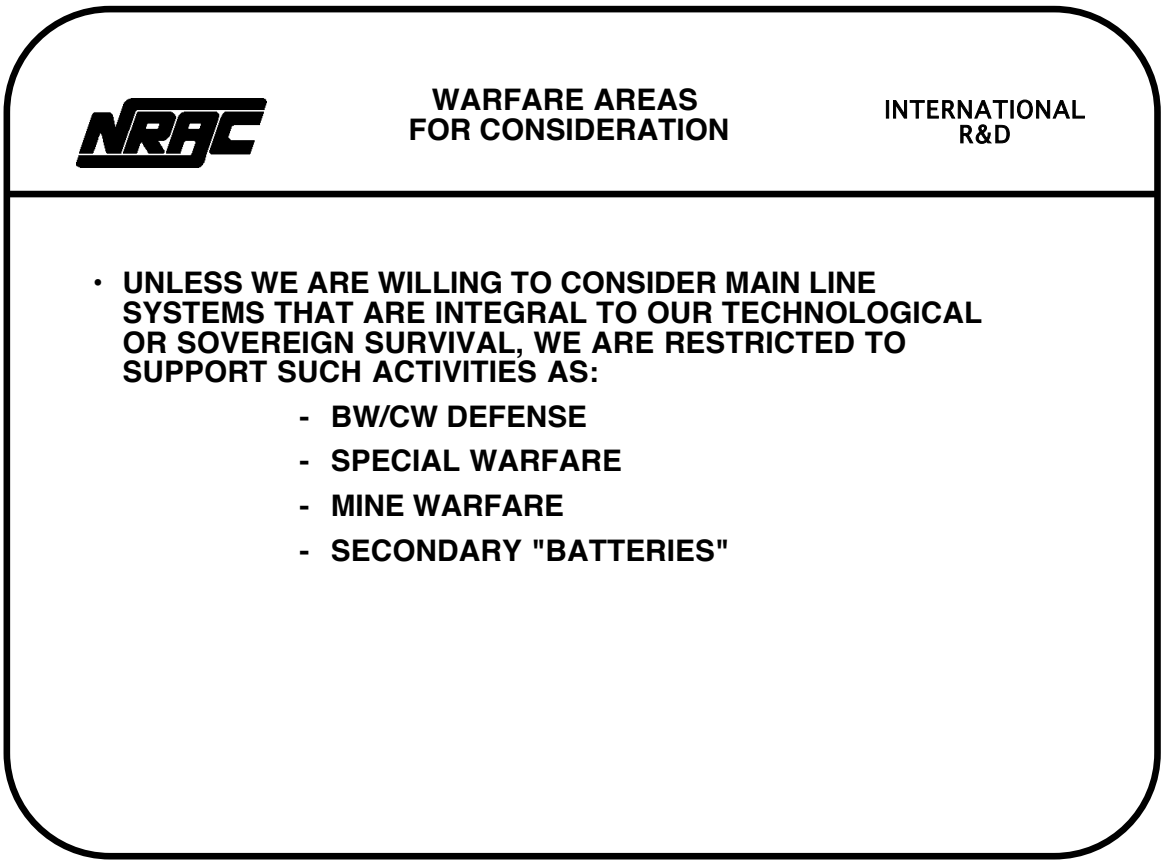
PROGRAM ORIGINATION

Discussion to this point has centered on policy and administration. Determining the technologies and areas of warfare in which to develop programs presents a different set of problems.

Such determination requires people who understand how to fight a war and develop weapons, yet possess in-depth understanding of IR&D, laws and procedures. The officer development process of the Navy provides people who know how to fight war. The R&D centers, the systems commands and industry provide people who know how to develop weapons. The overseas offices of the Office of Naval Research (ONR), exchange scientists from the laboratories and some members of private industry are sources of people who know the state-of-the-art in IR&D.

The problem is that these are disparate groups having no systematic vehicles of communication. The Deputy Assistant Secretary of the Navy for International Programs should establish a balanced team, with membership from these three communities, to identify the technology and warfare areas with the highest potential for successful cooperative

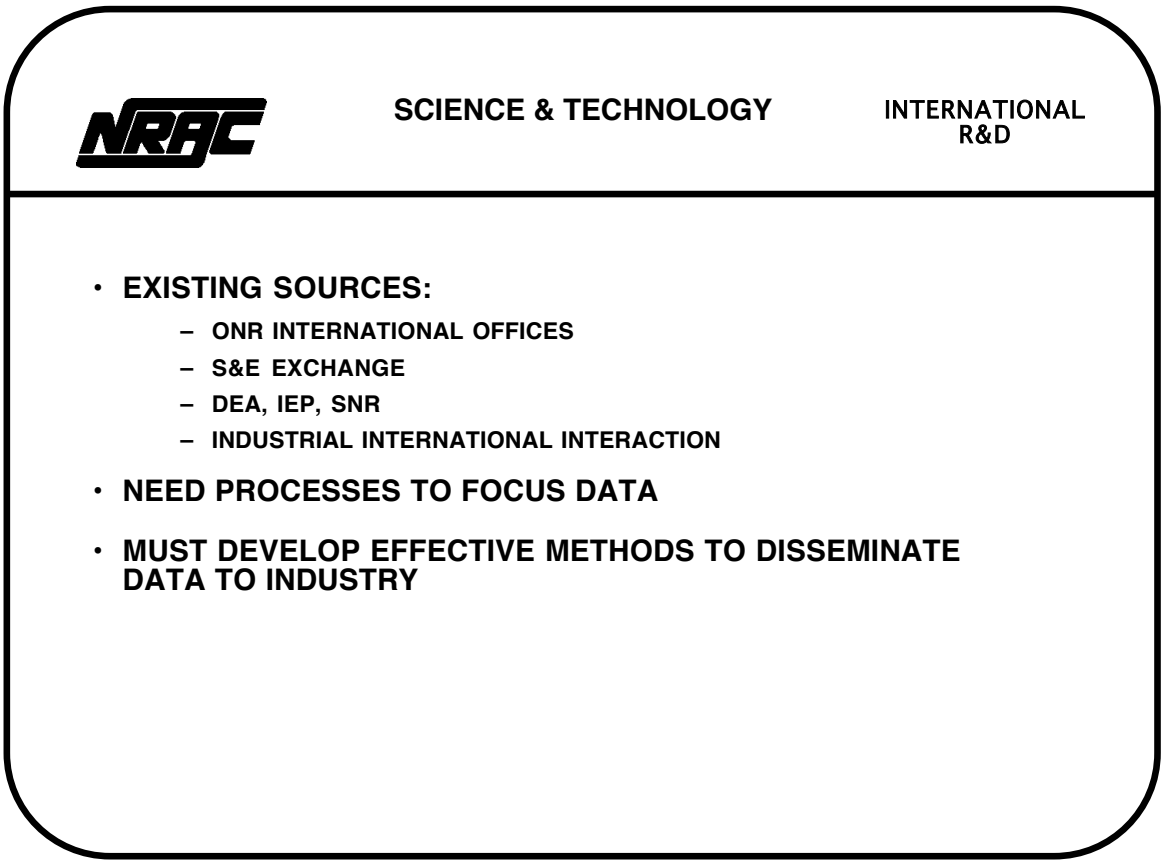
R&D programs. Further, the Navy should pay attention to developing and utilizing people who can effectively interact with all three communities. The paucity of individuals possessing this expertise is a problem.



WARFARE AREAS FOR CONSIDERATION

The Navy has historically not been willing to cooperate with any nation in those areas of technology or in those systems that it considers critical to executing its mission. This is a fundamental part of the concept that the nation and the Navy, as an institution in the nation, must be able to control its technical destiny and maintain its sovereignty through defending itself. The centrality of this precept to defense thinking makes cooperative R&D a secondary part of the defense effort.

Unless this thinking is modified, we are restricted to cooperating in secondary areas of naval warfare such as: BW/CW defense, special warfare, mine warfare and those weapon systems which represent “secondary batteries” such as the Rolling Airframe Missile (RAM) and NATO Anti-Air Warfare (AAW).

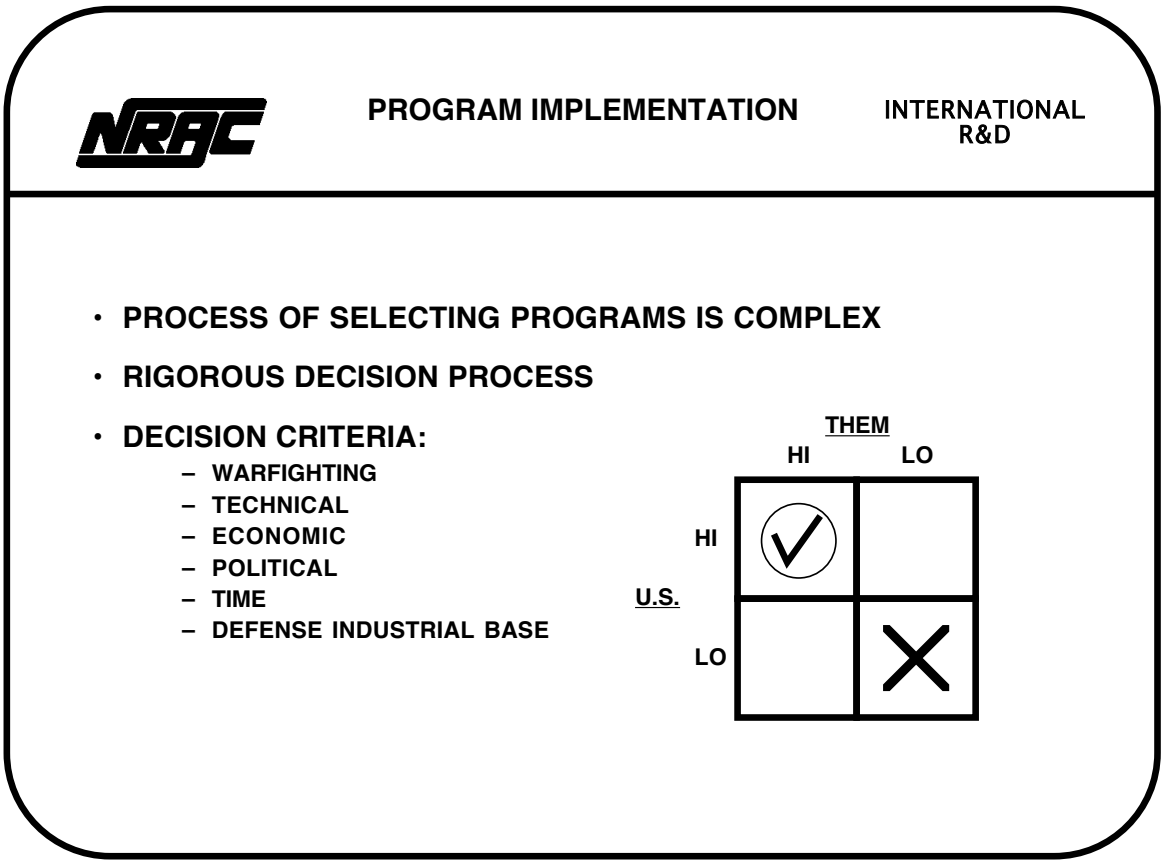


SCIENCE AND TECHNOLOGY

Several mechanisms exist to provide insight into state-of-the-art IR&D — some of the more productive sources for this data are listed above. For the most part, these sources provide an excellent assessment of individual basic and applied research in foreign countries with the potential for cooperative programs. It is important to note, however, that we do not have complete access into all of the leading edge technologies that exist in these countries. This, of course, is to be expected since we, in turn, do not export information on our highly classified advanced technology. Probably the best insight into these special areas is to be gained from the Senior National Representative (SNR) meetings, which are held annually with thirteen allied (or friendly) countries.

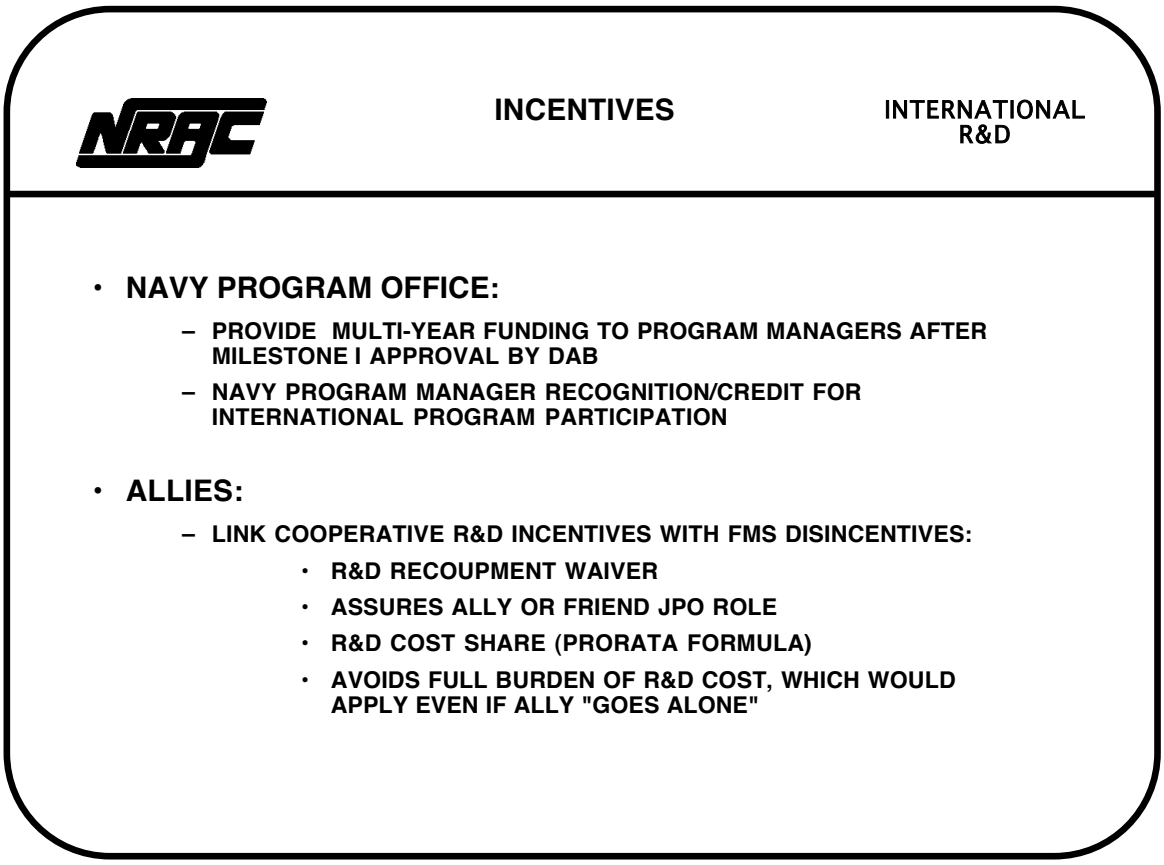
Notwithstanding these excellent sources of data, it is the panel's opinion that the evaluation and focus of this information for potential naval applications requires improvement. In fact, one of the key roles for the "Cooperative Program" organization should be to develop such a

process, as well as to direct the dissemination of the resultant information to industry.



PROGRAM IMPLEMENTATION

It would appear that, more often than not, the selection process used for past cooperative programs has been flawed. Consequently, we believe that it is necessary to develop a rigorous decision analysis process which will include a whole spectrum of advantages (and in some cases disadvantages). In order to help highlight the importance of this decision making process, we have included a simple two by two matrix, which could be used to evaluate the relative advantages for the U.S., as well as those for the potential foreign partner. Obviously, a win/win (Hi/Hi) situation is desirable, but it is highly unlikely that such a simple result will develop over the entire set of advantage matrices. This, in fact, is the point of the figure — the final decision should be made only after all the advantages and disadvantages have been weighed. Certainly, in some cases, a single screening advantage could be overriding, such as a strong political necessity.

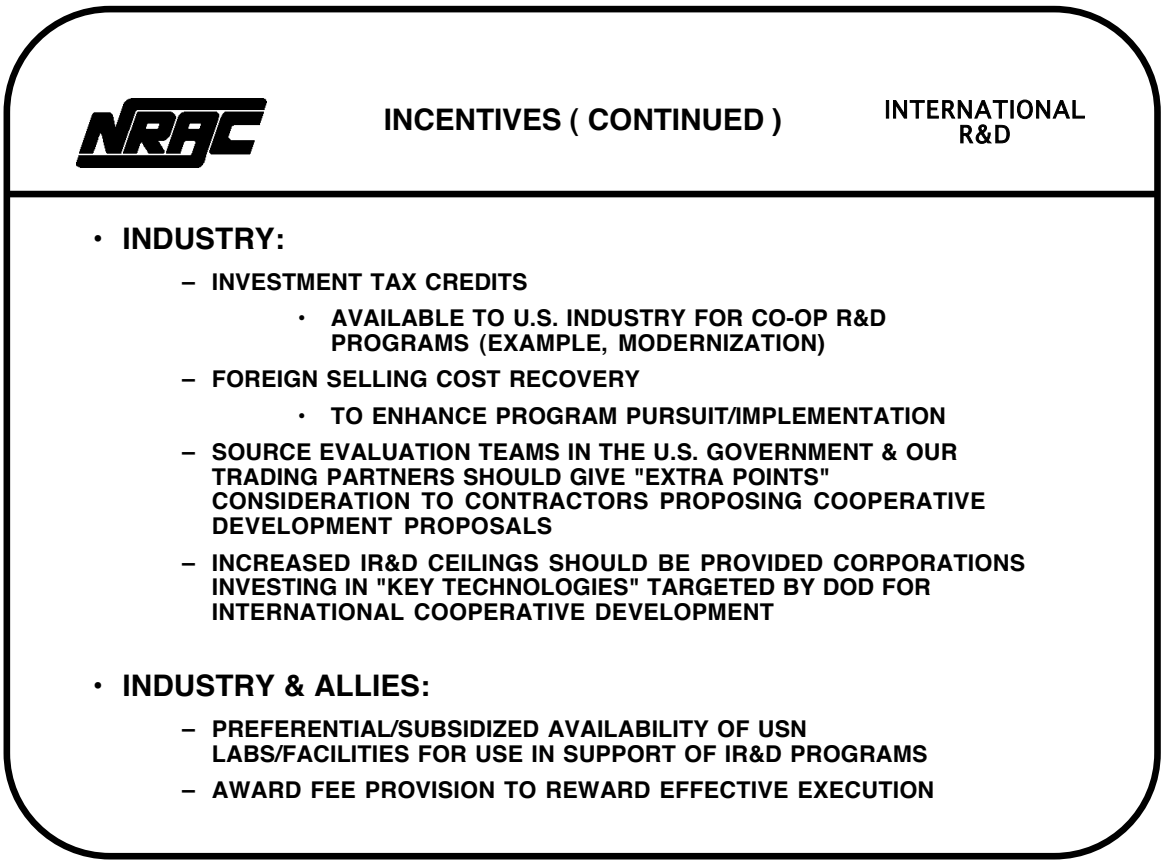


INCENTIVES

The success of IR&D should have, as a top priority, an incentive program that addresses each group of participants involved in cooperative R&D: the Navy Program Office, U.S. industry and the allies.

Navy program management service could be incentivized by a commitment for multi-year funding, as well as personal incentive of recognition for top talent, thus inducing high quality personnel into the IR&D community.

It is important that we provide distinct incentives for our allies. The current set of perceived incentives, arguing for an increase in cooperative R&D, is weakened by the presence of significant disincentives. For example, an ally may opt to forego R&D cooperation in favor of an FMS buy after the U.S. completes the development and service introduction cycle. The ally is spared the technical risk and associated cost burdens, but can still get the product required (with each item's technology transfer value in place). The ally can also request offsets from involved U.S. industry as a separate concession.



INCENTIVES (continued)

When motivated, industry can provide strong leadership for invoking IR&D initiatives — even when risks are involved. This study defines several incentives which are attractive to industry. It will also signal the importance the U.S. Government is placing on cooperative international weapons development.

Investment Tax Credit could be allowed for capital investment into facilities and equipment modernization for IR&D programs.

Regulations must be changed to allow the recovery (by U.S. industry) of selling costs to foreign governments for U.S. approved IR&D programs.

A strong motivational factor would be to modify source selection guidelines to include the allocation of contractor evaluation “points” to those bidders proposing cooperative R&D activities with allied country industries. These guidelines must be reciprocal and also apply to our ally trading partners. For example, if a U.S. corporation includes a foreign corporation headquartered in an allied country on a bid for a U.S. approved IR&D program, and the ally has agreed to invest and reduce

the program cost, then the U.S. prime contractor would receive favorable consideration during source selection.

U.S. industry should be able to negotiate higher IR&D ceilings if the funding is being used to invest in DoD approved “key technologies” targeted for international cooperative R&D. This implies that a “key technologies” list be generated and maintained by the DoD and U. S. Navy.

An incentive that can support industry and our allies exists in the USN laboratories. Key laboratory research and test facilities could be made available to those contractors and allies that perform approved IR&D programs. This will both reduce overall program costs as well as incentivize industry involvement in these programs. An extra benefit is the increased involvement and leadership to be gained from U. S. Navy laboratories.

SUMMARY

- SECNAV SUPPORT INITIATIVE THROUGH SECDEF TO DEVELOP AND PROMULGATE A NATIONAL SECURITY POLICY PROMOTING INTERNATIONAL COOPERATIVE RESEARCH AND DEVELOPMENT TO INCLUDE COPRODUCTION. IT SHOULD BE RECOGNIZED THAT THIS REQUIRES CLOSE LINKAGE BETWEEN DOD, STATE, COMMERCE, AND CONGRESS.
- SECNAV/CNO/CMC SHOULD IDENTIFY CLASSES OF PROGRAMS TO BE CONSIDERED PRIME CANDIDATES FOR COOPERATIVE DEVELOPMENT/PRODUCTION.
- FOSTER ENVIRONMENT WHICH ENCOURAGES INTERNATIONAL COOPERATIVE R&D TO ENHANCE NATIONAL SECURITY OBJECTIVES:
  - SUPPORT EXISTING PROCESSES AND MECHANISMS FOR BASIC RESEARCH AND APPLIED TECHNOLOGY SHARING BETWEEN ALLIES.

SUMMARY (CONTINUED)

- IN COOPERATION WITH INDUSTRY, FACILITATE IMPROVEMENT AND EXPANSION OF COOPERATIVE ENDEAVORS FOR DEVELOPMENT AND PRODUCTION
- PROVIDE A STRONG SET OF INCENTIVES TO ENCOURAGE DOD PROGRAM MANAGERS AND INDUSTRY TO PURSUE INTERNATIONAL COOPERATIVE DEVELOPMENT PROJECTS

- **PROVIDE A SINGLE ORGANIZATIONAL FOCUS IN THE NAVY WHICH INTEGRATES THE COMBINED SKILLS REQUIRED FOR INTERNATIONAL R&D (TECHNICAL, MANAGEMENT, WEAPONRY AND INTERNATIONAL EXPERIENCE).**
- **CONSIDERING THE COMPLEXITY OF IMPLEMENTING INTERNATIONAL R&D PROGRAMS, ATTAINING THE OSD FISCAL GOAL OF 25 PERCENT TOWARD COOPERATIVE DEVELOPMENT BY 2004 IS UNREALISTIC.**
- **SECNAV SUPPORT AN EFFORT WITH OSD TO IMPLEMENT PROCEDURES FOR INTERNATIONAL R&D PROGRAMS AND ESTABLISH MUTUALLY ACHIEVABLE FISCAL GOALS CONSISTENT WITH NATIONAL POLICY.**

APPENDIX A - GLOSSARY

AAW	Anti-Air Warfare
ASN (RE&S)	Assistant Secretary of the Navy (Research, Engineering and Systems)
ASN (S&L)	Assistant Secretary of the Navy (Shipbuilding and Logistics)
ASW	Anti-Submarine Warfare
BW/CW	Biological Warfare/Chemical Warfare
CNO	Chief of Naval Operations
CMC	Commandant of the Marine Corps
DAB	Defense Acquisition Board
DEA	Data Exchange Agreement
DoD	Department Of Defense
DTSA	Defense Technology Security Administration
EEC	European Economic Community
FMS	Foreign Military Sales
FWE	Foreign Weapons Evaluation
IEP	Information Exchange Program
IG	Inspector General
IR&D	International Research And Development
JPO	Joint Program Office
MOU	Memorandum Of Understanding
NASA	National Aeronautics And Space Administration
NATO	North Atlantic Treaty Organization
NAVOTTSA	Naval Office Of Technology Transfer And Security Assistance
NOAA	National Oceanographic And Atmospheric Administration
NCT	NATO Cooperative Test
NRAC	Naval Research Advisory Committee
OASN	Office Of The Assistant Secretary Of The Navy
ONR	Office Of Naval Research
OPNAV	Chief of Naval Operations, Staff
OSD	Office Of The Secretary Of Defense
OUSD	Office Of The Under Secretary Of Defense
OUSD (TSP)	Office Of The Under Secretary Of Defense (Trade Security Policy)
PM	Program Manager
RAM	Rolling Airframe Missile
R&D	Research And Development
RDT&E	Research, Development, Test And Evaluation
SASC	Senate Armed Services Committee

SECDEF	Secretary Of Defense
SECNAV	Secretary Of The Navy
SNR	Senior National Representative
TOR	Terms Of Reference
UK	United Kingdom
USN	United States Navy
USTR	United States Trade Representative