

Issue Paper

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Formulating Strategies for International Collaboration in Developing and Producing Defense Systems

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For decades, policymakers in the United States and Europe have advocated greater international weapon-procurement collaboration among allies as a means of controlling burgeoning development and production costs, and achieving equipment rationalization and standardization. Advocates argue that, by sharing R&D costs for common systems, pooling R&D resources, rationally dividing up work tasks, and taking advantage of extended production runs, international collaboration can significantly reduce the costs of common weapon systems for each participating government. In addition, collaborative programs have often been advanced as a means of attaining greater operational integration of allied forces and greater political integration through shared training and doctrine based on common equipment.

As the first section of this paper demonstrates, it is historically unclear whether international procurement collaboration can deliver these benefits without unacceptable costs. Some say that new trends render the Cold War experience irrelevant and lend new promise to collaboration. But we believe these trends—with one exception—do not warrant such hope, as the second section illustrates. The one valid motivation for further international collaboration is to advance broad foreign policy objectives. In the third section of the paper, we propose some strategies for fulfilling that goal while minimizing collaboration's inevitable costs. In the final section, we summarize our conclusions.

This Issue Paper was written because there was significant interest among our clients in having our views on international collaboration. It draws on RAND inputs to the Defense Science Board's Task Force on International Arms Cooperation¹ and is part of RAND's continuing efforts

¹This task force was chaired by Dr. Jacques Gansler; one of the authors, Michael Rich, was a member. The task force's final report, entitled *International Armaments Cooperation in an Era of Coalition Security*, was published by the Department of Defense, Washington, D.C., in August 1996.

to synthesize the results of previous research for issues being debated within the defense community. This paper was written within the Acquisition and Technology Policy Center of RAND's National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, and the defense agencies.

A DISMAL RECORD

Despite a long record of international procurement collaboration among European partners and between the United States and its allies, the outcomes of past programs have been, at best, rather mixed. Attaining many, if not most, of the potential economic, operational, and political benefits that theoretically should flow from joint R&D and production programs has proven difficult, as the following examples show:

- Some French officials claim that the French share of the cost of the collaboratively developed Anglo-French Jaguar fighter/attack aircraft was greater than the total development costs of the Dassault Mirage F1-C, a more complex all-French fighter developed at about the same time.
- The cooperatively developed and produced Japanese F-2 single-engine fighter (FS-X) has performance capabilities roughly comparable to those of the U.S. F-16 but costs over three times as much and about the same as the larger two-engine F-15 developed by the United States and produced under license in the same Japanese facility as the F-2 (FS-X).
- Collaboration doesn't necessarily mean standardization and interoperability. National versions of collaboratively developed aircraft—older programs such as the Jaguar, and newer programs such as the Tornado and EF-2000, both fighter/attack aircraft collaboratively

developed by the British, Germans, and Italians²—often differ significantly in subsystems and equipment. At other times, one or more participants have been forced to dramatically compromise on their original national performance requirements to make collaboration on a single system possible—for example, the Franco-German Transall tactical transport and the Anglo-German-Italian Tornado fighter bomber.

- Most past programs have not led to an economically rational division of work tasks or R&D assets. Almost all past and current programs, from the earliest such as the Transall to the most current such as the EF-2000 and the F-2, have inefficient multiple production lines, multiple test facilities, and other economic redundancies.
- Many collaboration programs have caused severe political friction among participating allied governments. Examples include the FS-X/F-2 program, the Advanced Short Range Air-to-Air Missile (ASRAAM) program, and the EF-2000 program.

These examples are not isolated cases. In spite of a long history of such programs, “studies of historical cases indicate that—in all programs studied—the joint programs have cost more and taken longer than they would have if each country had individually pursued the effort.”³

NEW ERA—NEW PROMISE?

Most U.S. experience with collaboration dates from the Cold War. Since then, the world economic, strategic, and military orders have changed significantly. Have these changes had the effect of making international collaboration potentially more desirable? Some observers believe so. They cite such factors as

- dramatically lower R&D and procurement budgets, requiring the United States to seek partners to share ever-growing system R&D and procurement costs
- the globalization of advanced technology, requiring the United States to acquire critical dual-use technologies from foreign partners
- the continued political need to fortify important U.S. security relationships with key allies.

However, these are just *assumptions* and need careful evaluation with regard to budget, technology, and international politics.

Budget

Does the significant decline in U.S. R&D and procurement imply that the United States must seek and rely on foreign partners for critical defense needs? Of course not. The U.S. defense community must creatively think through such alternative strategies as radical reform of procurement regu-

²The Spanish are also partners in the EF-2000.

³Jacques S. Gansler, *A Transatlantic Defense Industrial Capability Model for the 21st Century*, Arlington, Va.: U.S.-CREST (Center for Research and Education on Strategy and Technology), March 1995. Also see Mark Lorell and Julia Lowell, *Pros and Cons of International Weapons Procurement Collaboration*, Santa Monica, Calif.: RAND, MR-565-OSD, 1995.

lations and approaches, greater dependence on the commercial sector, and more civil-military integration of technologies and capital assets. More international collaboration is only one possible avenue to explore; it may not be the most cost-effective means of achieving U.S. policy goals, given the mixed outcomes in cost, schedule, and performance registered by past programs.

Technology

The United States clearly no longer leads the world in all advanced technologies that may be used in future U.S. weapon systems. Some observers believe that collaboration is a means for the United States to gain access to superior foreign technology. Yet the more-important questions are these: Does the United States still lead in those technologies that are critical for its national defense? If so, should those technologies be shared with allies? Is the development of any such technology being led by the civilian sector? If so, which country has the advantage?⁴ Where the United States no longer has the advantage, what can be done to regain it? Is a military collaboration program necessary to gain access to commercially available technology?

Little definitive research has been done on most of these questions, and the long-term security implications for the United States are not well understood. What is known from hard experience, however, is that genuine access to important foreign technologies, and diffusion of those technologies to the relevant U.S. industries, can be very difficult to achieve in the real world through international collaboration programs.⁵

Perhaps the commercial industrial base has indeed become internationalized, and perhaps it is true that important critical dual-use technologies will emerge only from the commercial sector. Even so, more-efficient access to such technologies for U.S. defense purposes might be gained through greater integration of the U.S. military and commercial industrial bases, rather than through government-initiated international collaboration programs.

Politics

The United States may, however, find international collaboration to be a useful tool for advancing broad foreign policy objectives.⁶ In the post-Cold War environment, those objectives are likely to include

- **Engagement.** The U.S. government cannot fulfill its responsibilities without influencing events and decisions beyond its borders, e.g., by underwriting balance and stability in those regions where the United States’ most important interests are at stake.

⁴There is also the perspective that commercial and military technology thrusts are diverging rather than converging; stealth technology is one example.

⁵See Mark Lorell, *Troubled Partnership: A History of U.S.-Japan Collaboration on the FS-X Fighter*, New Brunswick, N.J.: Transaction Press, 1996. This RAND book publishes the results of an extensive research project on international collaboration.

⁶See President Bill Clinton, *A National Security Strategy of Engagement and Enlargement*, Washington, D.C.: The White House, February 1996, for a discussion of the high priority the current administration places on fostering and enhancing active U.S. engagement abroad and its strong commitment to those activities.

- **Alliance Leadership and Management.** Together, the United States and its allies constitute most of the world's economic, political, and military power. Sustaining, strengthening, and adapting the framework of relationships among the world's leading democracies will remain the key to advancing U.S. interests.

It is in the context of these objectives that international collaboration may be of greater importance and benefit to the United States than it was during the Cold War. Historical evidence suggests that it is in the area of alliance-building that weapon collaboration has shown its only real successes. For example, Franco-German political reconciliation after World War II benefited from an extensive series of collaborative weapon-development programs.

The criteria for U.S. involvement in international collaboration programs for military procurement, we believe, should be viewed within the context of these broader foreign policy goals. The U.S. government should be prepared to accept possible penalties in cost and schedule, as well as compromises in system requirements, for the sake of advancing broader security objectives such as those listed above. Expectations of significant cost savings or the acquisition of important foreign technologies may be unrealistic. Disappointment over the failure to achieve such objectives could cause friction with partners and could undermine the central foreign policy objectives motivating collaboration programs.

EASING THE PAIN

Thus, without an appropriate framework for policies and practices, the U.S. government may have to accept potentially large penalties in cost and schedule, as well as compromises in system requirements, for the sake of advancing broader security objectives. However, important mitigating actions can be taken, particularly in three areas: program selection, requirements generation, and program structuring. Where possible, DoD should attempt the following:

- Avoid collaboration on large programs or critical systems.
- Seek cooperative modification, licensed production, or co-production of U.S. systems, as opposed to equal-partner development and production of new systems.
- Consider alternatives to R&D and procurement collaboration, such as maintenance or support contracts.

Whether these objectives can be met or not, penalties in system cost, schedule, and performance should be mitigated if DoD selects and structures collaboration programs in accord with the following principles:

- Ensure mutuality and equivalence of interests on both sides.
- Move as much program-structuring and decisionmaking as possible down to the industry level.
- Guarantee competition.

We now expand on these guidelines to illustrate the concrete specifics of how they might work.

Program Selection: The Importance of Mutuality

First, the U.S. government must establish and define a clear set of criteria for selecting collaboration programs in which to participate. Key selection criteria should focus on mission priorities, context, and support. Thus, collaboration programs should be linked to shared military missions that are high-priority, are likely to be undertaken within an alliance, and are supported by the military and defense industrial sectors in the participating countries.

For example, a crucial U.S. and European NATO mission is to underwrite and foster regional stability in Europe, and possibly elsewhere. Such peace-keeping entails a wide variety of military tasks that must be performed in an alliance context, including enforcing no-fly zones, resupplying civilians, identifying and disarming combatants, avoiding and clearing mines, and maintaining surveillance of selected areas. High collaboration priority should be attached to procurement programs that develop equipment for directly enhancing the capabilities of alliance partners to cooperatively carry out these types of missions.

The Requirements Process: The Locus of Decisionmaking

Second, the U.S. government should modify and reform the requirements process for international programs. Once mission areas of mutual high interest are identified, requirements should be stated in terms of mission need, not in terms of technical minutiae that limit the flexibility of those involved. Such a focus on mission requirements has often been advocated by procurement reformers—and was actually carried out on the highly successful Lightweight Fighter program, which produced the YF-16 and YF-17 (F/A-18). It provides industry with far more latitude for conceptual and technical innovation, enterprising organizational structures, and substantial cost savings.

Thus, using the examples cited above, alliance partners might select avoiding and clearing mines as an important military mission to serve as the basis for collaborative hardware development, procurement, and support. Interested governments could then establish a joint program office. Participants would generate a common requirement based on a detailed mission statement, but would exclude any specific technical hardware requirements or descriptions. The collaborative program office would set broad program objectives, such as general performance goals and unit costs. Industry teams would then be invited to develop proposals in response to the mission statement. Using this new paradigm, which “tells the contractors what is wanted, not how to do it,” the participating firms would work out the necessary hardware designs.

Program Structure

They would also work out the program structure. The available evidence clearly indicates that collaboration programs based on voluntary-cooperation arrangements, negotiated at the industry level, are the most likely to succeed in terms of traditional measures of procurement efficiency (i.e.,

delivered on time, within cost, and meeting performance specifications). Thus, the only inflexible requirement imposed on industry by the participating governments would be that teams be made up of at least one leading firm from each of the sponsoring countries.

The interested governments would propose a recommended *range* of workshare percentages based on the anticipated government financial contribution to R&D and the likely scale of procurement. But the specific structure of each teaming arrangement—including the details of allocating specific work tasks and work percentages—would be left entirely to the firms. The participating governments would agree to these conditions before the proposal process began.

Overhaul, repair, and other issues of logistics-support requirements should also be addressed collaboratively by the firms, especially since the support function will probably continue for decades, unlike the development and production phases, which have much shorter time horizons. Overhaul, repair, and other logistics areas, which have often been overlooked in collaborative efforts, could also be important tools for providing economic and technological equity to team members—furnishing the participating countries' firms with an enduring business base, modern facilities, and access to the latest management techniques and process technologies. But, again, the specifics of such arrangements would be negotiated on the industry level in accordance with best business practices.

Competition

Lastly, several international teams would form and generate proposals for equipment concepts and designs, as well as for program structure and teaming arrangements. Competition among the proposals would lead to the selection of more than one team to demonstrate the concept, and the winner of the concept-demonstration phase would be given the final production contract. Selection criteria would be derived as much as possible from traditional measures of merit and recognized concepts of best business practices. On the basis of the work task allocation as determined by the

winning industry team participants, each country would contribute an R&D funding share equal to the percentage of the work performed by that country's firms.

CONCLUSION

We conclude that international collaboration remains a risky procurement strategy for DoD. There are few indications that the historic impediments to cost-effective collaboration have declined significantly in the post-Cold War environment. Unless conditions change dramatically, U.S. participation in future collaboration programs is likely to lead to penalties in cost and schedule, as well as to compromises in system requirements. In terms of the traditional measures of procurement efficiency and cost-effectiveness, DoD interests would probably be best served by avoiding collaboration programs altogether, especially those having a large dollar value or deemed critical to national defense.

However, the decision to participate in international programs is not likely to be dictated solely or even primarily by questions of cost-effectiveness or efficiency. U.S. national security strategy in the post-Cold War environment will be guided by several major objectives, two of the most important of which are engagement, and alliance leadership and management. Equipment collaboration with allies is one of many possible tools available to U.S. policymakers that is likely to be used to help accomplish these goals. Therefore, to help lessen the likely cost, schedule, and performance penalties that have characterized most earlier programs, DoD, the services, and industry need to prepare new strategies now.

The strategy set out above generates new concepts to perform a needed military task, forces involvement of firms from multiple nations, maintains competitive forces, and has each country financially supporting the share of the work performed by its industry. A paradigm such as this, based on the principles of mutuality of alliance interests, competition, and industry-level innovation, may represent the best path toward minimizing the inevitable penalties inherent in international procurement collaboration.

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