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DOD ACQUISITION

Case Study of the Navy V-22 OSPREY Joint Vertical Lift Aircraft Program

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Preface

The Chairmen of the Senate Committee on Governmental Affairs and its Subcommittee on Oversight of Government Management asked GAO to examine the capabilities of the program manager and contracting officer in weapon systems acquisition. As part of this study, GAO examined 17 new major weapon system programs in their initial stages of development. These case studies document the history of the programs and are being made available for informational purposes.

This study of the Joint Services Advanced Vertical Lift Aircraft Program describes the role of the program manager and contracting officer in developing the acquisition strategy Conclusions and recommendations can be found in our overall report, DOD Acquisition: Strengthening Capabilities of Key Personnel in Systems Acquisition (GAO/NSIAD-86-45, May 12, 1986).

for Frank C. Conahan, Director
National Security and International
Affairs Division

Joint Services Advanced Vertical Lift Aircraft

Origin of the Program

Genesis of the Joint Services Aircraft Program can be traced to a August 27, 1981, Under Secretary of Defense (Research and Engineering) memorandum to the service secretaries suggesting that the Army's electronic warfare mission, the Marine's assault mission, the Air Force's special operations mission, and the Navy's search and rescue mission requirements might best be met with a single, advanced but mature technology, such as an operational derivative of the XV-15 Tilt Rotor experimental aircraft.

Tilt rotor technology was first successfully demonstrated in the 1950s using Bell Helicopter's XV-3 research aircraft. Later, a joint NASA/Bell/Army effort resulted in the successful testing of the XV-15 research aircraft in the 1970s and 1980s.

A Deputy Secretary of Defense memorandum to the service secretaries on December 30, 1981, formally established the Joint Services Aircraft program. The services regarded this memorandum as approval for concept formulation, waiving the need for a Justification for Major Systems New Start, the formal need statement. The Deputy Secretary endorsed the Army as the executive service and a Marine officer as the program manager The Joint Services Aircraft program was to be executed according to Army standard development and acquisition procedures. The Office of the Secretary of Defense directed that the Army, Navy, and Air Force each reprogram approximately $1 5 million to conduct a joint technical assessment of the technology available for the Joint Services Aircraft system

Responding to the December 1981 Deputy Secretary of Defense initiative, in February 1982 the services assembled a joint technical assessment group of experts to develop preliminary point designs and tradeoff options for the Joint Services Aircraft.

Program Developments

The joint technology assessment group completed its assessment in May 1982 and concluded that the application of tilt rotor technology offered the best potential for a common multi-service aircraft. The group also concluded that other technologies such as conventional helicopters, compound helicopters, the advancing blade concept and the lift/cruise fan concept were less attractive in terms of speed and worldwide self-deployability for combined Joint Services Aircraft applications than the tilt rotor aircraft.

In May 1982 two aircraft manufacturers, Bell Helicopter Textron and Boeing-Vertol, anticipating a request for proposals for the design and development of the Joint Services Aircraft, teamed together for the Joint Services Aircraft competition. Both these companies had prior experience with tilt rotor technology The teaming agreement calls for joint production of the Joint Services Aircraft through at least the fifth year from initial production delivery

Program Manager Appointed

In June 1982 the Army Chief of Staff formally announced the selection of the Joint Services Aircraft program manager. The program manager holds a Bachelor of Science degree in Electrical Engineering and a Master of Science degree in Management The Joint Services Aircraft is the program manager's first assignment as a program manager. He became involved with the Joint Services Aircraft program in June 1981, as the manager of the Navy forerunner of the Joint Services Aircraft program. His previous experience had been primarily operational and included duty as a naval aviator, instructor pilot, attack helicopter squadron commander, and operations officer for a Marine aircraft group His formal Navy acquisition training consisted of the 3-week Executive Refresher Course and the 20-week Program Management Course at the Defense Systems Management College.

A Memorandum of Understanding concerning the Joint Services Aircraft program was signed between the Army, Navy, and Air Force on June 4, 1982. This memorandum established the Joint Services Aircraft program objectives and the funding approach. The services agreed to provide $167 million in fiscal year 1984: The Army's share was $78 million, the Navy's share was $70 million, and the Air Force's share was $19 million. Funding shares for the remainder of the Joint Services Aircraft program agreed to at this time were: Army, 46 percent; Navy, 42 percent; and Air Force, 12 percent. The memorandum designated the Army as the executive service, and it required achievement of the earliest practical initial operational capability

Acquisition Strategy Approved

The Deputy Secretary of Defense approved the Joint Services Aircraft acquisition strategy (Army-originated), number P42-37-0-30, on December 8, 1982, and Naval Air Systems Command officials signed the strategy in January 1983 The acquisition strategy states that "advanced, but mature technology based on existing demonstrator aircraft will be exploited." Risk reduction techniques mentioned in the strategy include

- using design, wind tunnel, and flight test data already developed during the Army/NASA XV-15 Tilt Rotor Program;
- encouraging industrial teaming to exploit a broader technology base; and
- competing the preliminary design effort

The strategy called for competitive development up to full-scale development. It also stated that:

"As the Joint Services Aircraft program does not require a discrete demonstration and validation phase, approval of the acquisition strategy by the Defense Acquisition Executive precludes the requirement for a formal review as required by Department of Defense Directive 5000 1"

The strategy also allowed for the Defense Acquisition Executive to make the Milestone II program review if the program was within cost and on schedule

On December 13, 1982, the Secretary of the Navy approved an addendum to the Memorandum of Understanding This addendum designated the Navy as the executive service for the Joint Services Aircraft program, replacing the Army According to the program manager, the Navy became the executive service because the Army had allowed the initial operational capability date to slip and the Marines (considered as a part of the Department of the Navy) had the most pressing initial operational capability date

The program manager wrote the part of the strategy regarding schedules and delivery requirements and the Army contracting officer wrote the sections regarding business and contractual matters The Navy contracting officer did not play a role in preparing the acquisition strategy until the program was transferred to the executive leadership of the Navy. At that time the contracting officer provided input into contracting matters to have the strategy comply with Navy contracting philosophies

Joint Services Operational Requirement Approved

The joint services operational requirement was approved on December 14, 1982. The requirements document called for an aircraft with a continuous cruise speed of not less than 250 knots and, to meet worldwide self-deployment objectives, a minimum range capability of 2100 nautical miles, unrefueled Anticipated acquisition quantities were approximately 1100 for all three services.

The requirements document favored a tilt rotor design. It stated that the coventional helicopter could not meet Joint Services Aircraft cruise speed and worldwide self-deployment requirements stipulated by all three services It also stated that the tilt rotor configuration could perform all of the Joint Services Aircraft missions, using a common, basic air vehicle with special mission configurations and equipment to meet specific service requirements.

Under Secretary of Defense Memorandum

In a memorandum issued on December 27, 1982, the Under Secretary of Defense (Research and Engineering) directed the Navy to take the executive service lead for the Joint Services Aircraft airframe, while the Army continued as the executive service for the development of the modern technology engine to be used in the Joint Services Aircraft. The memorandum also reapportioned the funding shares previously established in the Memorandum of Understanding. The cost-sharing formula for the development of the Joint Services Aircraft common airframe was changed, as shown in Table 1.

Table 1: Funding Shares for Joint Services Aircraft

Figures in percent

	Formula as of December 27, 1982	Formula from June 4, 1982
Navy	50	42
Army	34	46
Air Force	16	12

According to a Navy official, after the Navy took over as the executive service of the Joint Services Aircraft program, the Naval Air Systems Command contracting officer, Assistant Commander for Contracts, and legal counsel changed the preliminary design request for proposals contracting strategy from a fixed-price level of effort to a cost-plus-fee arrangement

First Navy Contracting Officer Appointed

The first Navy contracting officer for the Joint Services Aircraft program was appointed in December 1982. She had a bachelor's degree in business, a Master of Business Administration degree in contracts and 8 years of contracting experience at the time of her appointment. According to a program official, because of the short time frame between when the Navy was appointed and when it took over as the executive service for the program, the contracting officer was appointed on a temporary basis until a permanent contracting officer could be

appointed. She was the contracting officer for three other programs at that time and had been the contracting officer for the program that was the Navy forerunner of the Joint Services Aircraft program.

Source Selection Started

The Joint Services Aircraft program followed formal source selection procedures On January 5, 1983, the acting Secretary of the Navy signed the document which designated the Commander, Naval Air Systems Command, as the source selection authority. The source selection authority then appointed the members and chair of the source selection advisory council The program manager and the Deputy Assistant Commander for Contracts were both designated as advisers to the source selection advisory council In addition, the source selection authority established an evaluation board of which the contracting officer was a member, and the program manager was an adviser

Source Selection Plan

The source selection plan was approved by the source selection authority on January 10, 1983. The program manager did not have an active role in the plan development, whereas the contracting officer provided contractual input into and reviewed the plan.

Request for Proposals Released

The program manager released a draft request for proposals for preliminary design to industry for comments in late July 1982. About 269 comments were received and about half of these were incorporated into the second draft which was released in October 1982. The final request was released on January 17, 1983, in accordance with the December 1982 Secretary of Defense Decision Memorandum The contracting officer developed and issued the request, with advice from the program manager

Second Contracting Officer Appointed

The second contracting officer for the Joint Services Aircraft was appointed in February 1983. At the time, the contracting officer possessed 17 years of procurement experience, but did not have a college degree.

Contract Award

On April 26, 1983, the contract for preliminary design was awarded to the Bell-Boeing team Their proposal was the only one received in response to the request for proposal

For the contract award, the program manager assured regulations were followed. The contracting officer evaluated the proposals, conducted the negotiations, and issued the contract. The contract for Joint Services Aircraft preliminary design was awarded on a cost-plus-incentive-fee basis, with incentives on cost only.

The Navy anticipated two contractors would compete during the preliminary design stage which would end with a competitive wind tunnel "fly-off" to select the winning contractor This plan had to be modified because only one proposal was received, even though the preliminary design phase had been extended from 15 to 23 months before the request for proposals was released in hopes of further stimulating interest and competition for the contract.

Opinions on Why Only One Bid Was Submitted

According to program officials, Sikorsky Aircraft actively considered competing for the preliminary design, but at the last minute decided not to submit a proposal, leaving Bell-Boeing the only contender. According to Sikorsky officials, they did not submit a bid because the preliminary design stage did not allow them sufficient time to evaluate the technical risks of the program Sikorsky believed they needed approximately 34 months instead of 23 months for preliminary design

However, according to the contracting officer, Sikorsky notified the Navy at the last minute that they would need more time for the preliminary design stage even though the preliminary design stage had already been extended from the original 15 months to 23 months. Until this time, the contracting officer expected Sikorsky to submit a proposal.

Grumman Aerospace officials indicated that, although competition was bred into the early stages of the program, it was lessened in the later stages as a result of the requirements driving the design toward the tilt rotor concept. Grumman did not fault anyone for this, calling it a "matter of service priorities."

A statement by the then Commander of the Naval Air Systems Command also addressed the question of why only one proposal was received:

"As to why no other proposal was received, it can only be surmised Even with the expansion of the initial effort to 23-months work, other industry management may have perceived that the Bell-Boeing's lead and prior experience with tilt rotors was insurmountable Even though NASA's complete tilt rotor data package had been

made available, they apparently felt that, without a further expansion of the effort, i e , 33 months, the probability of winning was low The Bell-Boeing team had put their company sources at risk and formed working teams while the program was still in the formative stages No one else made a comparable commitment "

The program manager believes a fair competition for the Joint Services Aircraft's preliminary design was held.

- The request for proposals for preliminary design did not specifically preclude use of alternative concepts.
- Full access to data from the tilt rotor research aircraft, the XV-15, was provided
- Pilots from competing firms were allowed to fly the XV-15 demonstrator aircraft.
- The draft request for proposals was sent to the contractors twice for their review and comment.

Officials said that although the joint technology assessment concluded the tilt rotor was a mature technology with relatively low risk, other types of designs such as an improved version of a conventional helicopter conceivably could have challenged the tilt rotor concept.

The program manager stated that any proposal submitted would have been independently and objectively evaluated on its own merits, regardless of the particular concept it proposed. Program officials believe, however, that the tilt rotor concept was the only "available and mature" concept that could satisfy the operational requirements of the Joint Services Aircraft program, particularly its speed and worldwide self-deployability requirements

Army Withdraws From the Program

In May 1983 the Army withdrew from the Joint Services Aircraft development program but reentered the program following a September 1983 Defense Resources Board meeting. The Defense Resources Board approved continuation of the joint program, with full funding for Joint Services Aircraft common development within the Navy's total obligation authority It deleted the Air Force combat search and rescue mission and substituted an assault need for the Army's special electronics mission aircraft need.

The Army plans to use the Marine assault version of the Joint Services Aircraft for its medium cargo lift and medical evacuation needs, while

the Air Force plans to use the Joint Services Aircraft for its special operations forces needs

Funding Decisions

The House and Senate conferees agreed to provide the Joint Services Aircraft program with $88.6 million for fiscal year 1984 All funding was consolidated under Navy Research, Development, Test and Evaluation The funding consolidation was intended to strengthen the program by assigning control of the funds directly to the service with executive leadership.

The Congress appropriated $188.5 million for fiscal year 1985 and $580 million for fiscal year 1986

Revised Acquisition Strategy Approved

The Commander, Naval Air Systems Command approved the Joint Services Aircraft revised acquisition strategy (No. A-42-37-0-40) in June 1984 and the Chief of Naval Materiel approved the strategy in August 1984. The revised strategy reflected plans to have Bell-Boeing develop the aircraft as a joint effort.

In November 1984 the Commander, Naval Air Systems Command and the Commander, Aeronautical Systems Division, signed the program manager's charter for the Joint Services Aircraft and the Secretary of the Navy selected "OSPREY" as the Joint Services Aircraft's popular name In January 1985 the Joint Services Aircraft (OSPREY) was designated the V-22.

The first flight for the Joint Services Aircraft has been rescheduled for June 1988, and the initial operational capability is planned for December 1991.

Production Costs and Quantities

In acquisition strategy A-42-37-0-30 (dated December 8, 1982), the Navy estimated the average unit costs for the 913 aircraft in the program to be $14.6 million, in fiscal year 1983 dollars. An official in the Joint Services Aircraft program office indicates that Joint Services Aircraft unit costs are now $15 6 million in fiscal year 1984 dollars for the 913 aircraft.

Production Competition

According to the program manager, the current Joint Services Aircraft acquisition strategy outlines a competition between Bell and Boeing,

beginning with production lot one. Both the Secretary of the Navy and the Commander, Naval Air Systems Command, strongly support this strategy to split the team.

To ensure that both companies are qualified to compete with each other after the pilot production lot, they will be required to submit—as a full-scale development contract deliverable—a production plan that includes a technology transfer plan and certification that each of their production processes are equivalent for aircraft delivered under the pilot production lot. This contracting strategy is still subject to negotiation between the Navy and the contractor.

Evaluation of Acquisition Strategy

The program manager developed a Joint Services Aircraft contracting strategy driven by operational requirements that, according to some officials, could realistically be met only by the proven tilt rotor technology. As a result, the only response to the request for proposals was from the team with prior experience with this technology. And although the acquisition strategy called for competitive development up to full-scale development, the teaming of the technology leaders resulted in early curtailment of the competition Navy top management initially accepted the contracting strategy proposed by the program manager and contracting officer. Recently, however, top Navy management has expressed a desire to change the terms of the production schedule to one in which the Bell-Boeing team will begin competing with production lot one. (The teaming agreement calls for joint production through at least the fifth year from initial production delivery).

The program manager said that both Bell and Boeing are supporting the Navy's strategy to split the team. Boeing stated in a letter that the team recognizes the Navy's right to split the team at its discretion.

Current Status

During 1986, the program was also restructured to provide for a fixed-price incentive contract. On May 2, 1986, Bell-Boeing was awarded a full-scale development contract for the Joint Services Aircraft airframe with a target price of $1.714 billion. A firm fixed-price contract was also awarded to Allison Gas Turbine Division of General Motors for $76.4 million for engine development.

Chronology of Events

1950s	Bell Helicopter's XV-3 demonstrated tilt rotor technology in-flight.
July 1979	The XV-15 tilt rotor research aircraft made the first full conversion to horizontal flight, demonstrating the successful marriage of helicopter and fixed wing aircraft.
March 1981	Naval Air Systems Command Notice 5400 of March 23, 1981, established the HXM Helicopter Weapon System Project Office as the forerunner of the Joint Services Aircraft.
June 1981	First program manager assigned to HXM Program
August 1981	Under Secretary of Defense (Research and Engineering) memorandum to Secretary of the Navy and Secretary of the Air Force suggested a common solution be developed for a number of service rotary wing requirements
December 1981	Deputy Secretary of Defense established the Joint Services Aircraft Program in a Decision Memorandum. This decision was regarded as approval for concept formulation, waiving the requirement for a Justification of a Major Systems New Start.
February 1982	The services (Army, Navy, Air Force, Marines) convened a joint technology assessment group to consider alternative designs for the Joint Services Aircraft.
May 1982	The joint technology assessment group concluded the tilt rotor design was the most attractive of the alternatives. Pre-bidders conference held. Bell Helicopter Textron, Inc. and Boeing-Vertol Company signed a teaming agreement.

June 1982	A Memorandum of Understanding signed by the Army, Navy, and Air Force concerning the Joint Services Aircraft The Army is designated the executive service. First program manager designated for the Joint Services Aircraft Program.
September 1982	Chief of Naval Materiel memorandum approved the Joint Services Aircraft acquisition strategy
December 1982	The Deputy Secretary of Defense approved the Joint Services Aircraft acquisition strategy (Army-authored) and established full-scale development as the next Secretary of Defense decision point. The Navy replaced the Army as executive service, with the Air Force and Army retained as participating partners Joint Service Operational Requirements issued which stated that the tilt rotor design can perform all of the Joint Services Aircraft missions, using a common, basic air vehicle with the use of special mission configurations and mission equipment to meet specific service requirements. First Navy Joint Services Aircraft contracting officer appointed. The Navy changed the Joint Services Aircraft contracting strategy from Army's fixed-price level of effort to a cost-plus contract type Deputy Secretary of Defense Decision Memorandum directed the Joint Services Aircraft program to go through a Defense Systems Acquisition Review Council review for full-scale development approval
January 1983	Acquisition strategy approved by the Commander, Naval Air Systems Command. Request for proposals for preliminary design issued.

February 1983	Second contracting officer appointed Bell-Boeing submitted the only proposal for Joint Services Aircraft preliminary design
April 1983	Bell-Boeing awarded contract for the preliminary design phase of the Joint Services Aircraft program.
May 1983	Army withdrew from the Joint Services Aircraft development program
September 1983	A Defense Resources Board meeting approved continuation of the joint program, with full funding for common development within the Navy total obligation authority.
November 1983	House and Senate conferees agreed to provide $88.6 million for the Joint Services Aircraft program in fiscal year 1984 and consolidated all funding within Navy Research, Development, Test and Evaluation budget
June 1984	The Commander, Naval Air Systems Command approved the modified acquisition strategy No A-42-37-0-40.
August 1984	Chief of Naval Materiel approved strategy No A-42-37-0-40
September 1984	Request for proposals N00019-84-R-0076 released to Bell-Boeing for aircraft full-scale development.
November 1984	Program manager's charter for Joint Services Aircraft signed. Secretary of the Navy selected OSPREY as the Joint Services Aircraft popular name
January 1985	Joint Services Aircraft (OSPREY) designated V-22.

April 1986	Defense Systems Acquisition Review Council Milestone II review held
May 1986	Secretary of Defense approves full-scale development
	Full-scale development contract signed with Bell-Boeing team

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