

In Future Rotorcraft Acquisition, Services Working to Avoid Mistakes of Past Joint Programs

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V-280 Valor artist's rendering and SB-1 Defiant artist's rendering

The history of joint aircraft is littered with failures, and when programs do come to fruition, they oftentimes are marred by schedule delays and cost overruns. Case in point, critics say, is the uber-expensive F-35 joint strike fighter program.

Even that hasn't deterred the U.S. military from trying to develop aircraft that can be used by multiple services. The Army, Navy, Air Force and Marine Corps are all potential customers of an upcoming acquisition effort called future vertical lift, which aims to develop a family of rotorcraft scheduled to begin fielding in the mid-2030s.

It is yet to be seen if all of the services will buy into FVL, which is spearheaded by the Army. But officials involved in the program are taking steps to not repeat past mistakes, said Dan Bailey, the Army's program director for future vertical lift and its technology demonstrator effort, joint multi-role.

"We're doing everything from looking at legacy programs and lessons learned there to current programs like the joint strike fighter ... that have some of the same kinds of aspirations and characteristics that we're looking at," he said.

Future vertical lift has not yet been established as a program of record, but the services already have created multiple joint organizations to help guide the FVL effort, from a flag officer-level steering group to integrated product teams that collaborate on science and technology, commonality, requirements and acquisition, he said.

The military uses rotorcraft to carry out one of four missions: attack, utility, cargo and reconnaissance, Bailey said. Instead of each service having its own helicopter for each mission, the thrust of future vertical lift is to create multiple rotorcraft with different lift capabilities — light, medium, heavy and ultra-heavy — that can be adapted by any service for many roles.

Program officials currently envision each FVL variant sharing a common airframe and avionics architecture, he said. They may also establish similar infrastructure for supply chains, training and maintenance.

The major difference between a Navy medium-lift FVL aircraft and an Army one will be the subsystems and mission-specific equipment on board. For instance, a pilot in a Navy helicopter today has the ability to listen to public radio frequencies, while an Army pilot does not, Bailey said. A future vertical lift aircraft would have the capacity to accommodate the antennas and other equipment needed for the Navy to retain that capability, even if other services don't use them.

"When you think about what the Navy does with their [SH-60] Seahawks in terms of anti-submarine warfare, which is one of their primary missions, that's a very similar mission ... to an Army attack/recon mission," he said. "They might need different subsystems to perform the task, which is the difference in terms of requirements."

Building a multi-service rotorcraft program from the ground up is a fairly new undertaking. Most similar military helicopters were built as a single service platform first, and then developed into a product for another service's use. The most famous example is the Army's UH-60 Black Hawk, which became the Navy's SH-60 Seahawk, the Coast Guard's MH-60T Jayhawk and the Air Force's HH-60G Pave Hawk.

However, the FVL program shares the same basic appeal as other joint aircraft programs, such as those for fighter jets, said Ray Jaworowski, senior aircraft analyst at Forecast International. If multiple services buy the same aircraft, in theory the government would save money by sharing development resources and by garnering economies of scale once an aircraft was in production. "In practice, it has never really panned out as a cost saver," he said.

"The problem with these joint aircraft designs is that essentially they result in design compromises because you're having to account for the requirements of the different services, and no one service really gets everything it wants," he added. "There's a penalty associated with building in these differing requirements and it could be a penalty in terms of weight or in terms of performance or something along those lines."

Most historical joint fighter jet programs eventually became single service or were canceled altogether. Of the 11 joint fighter programs proposed from 1962 to 1996 — before the joint strike fighter — only four progressed from the proposal stage to development and procurement, said a 2013 report by the RAND Corp. titled, "Do Joint Fighter Programs Save Money?"

"From the tactical fighter experimental (TFX)/F-111 program in the 1960s through the JSF program today, the attempt to accommodate multiple operating environments, service-specific missions and differing performance and technology requirements in joint fighter designs has increased programmatic and technical complexity and risk, thus prolonging [research, development, test and evaluation] and driving up joint acquisitions costs," it said.

TFX originated as an Air Force-led effort to acquire for itself and the Navy a fighter jet with a high level of commonality. The Navy left the program during the RDT&E phase because of cost growth and developed its own aircraft, the F-14.

The Air Combat Fighter program in the 1970s similarly aimed to develop a joint fighter for the Navy and Air Force. The effort evolved into two separate competitions that eventually procured the Air Force's F-16 Fighting Falcon and Navy's F-18 Hornet.

Only two programs resulted in joint production and deployment — the A-7 Corsair II and F-4 Phantom introduced in the 1960s.

Both of those acquisition efforts were never intended to become joint programs, Jaworowski said. "They were designed and developed by the Navy, and it was later on during the production phase that the Air Force took a look at them and bought their own versions."

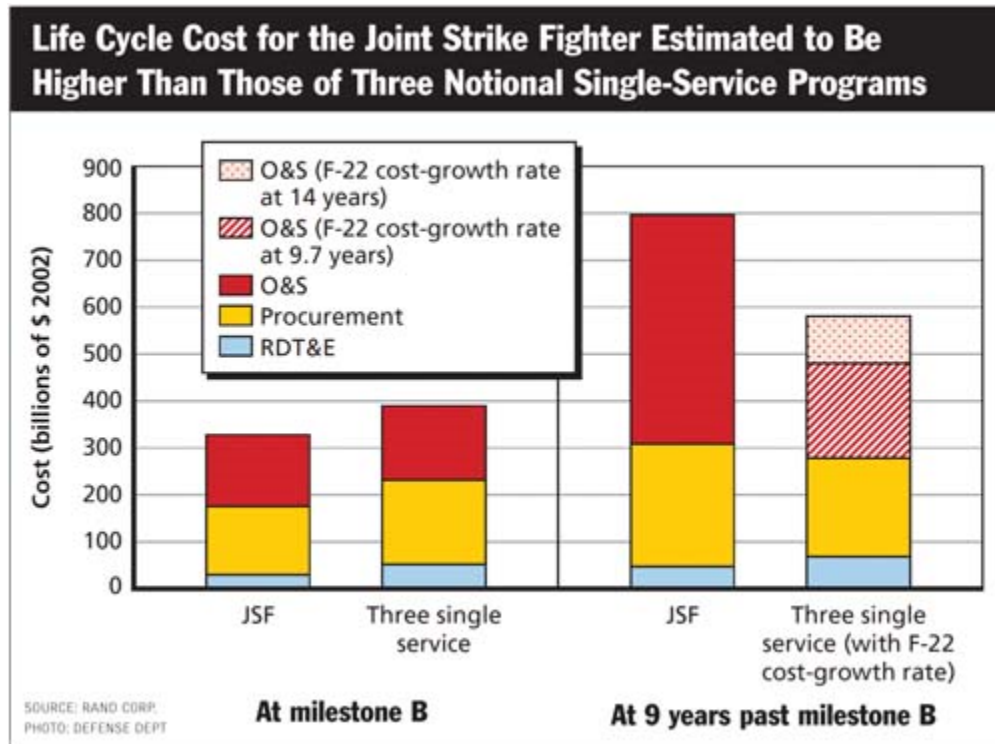
The F-35, then, is the first truly joint fighter jet that has made it to production. It is experiencing many of the same cost growth issues as historical programs and is not on the path to achieving the expected cost savings, the RAND study said.

In order to determine cost growth, RAND looked at F-35 selected acquisition reports from milestone B from

2001 to 2010, the last report available when the analysis was done. It then compared those numbers to three notional single service platforms.

RAND assumed that RDT&E for three single service fighters would cost 67 percent more than the F-35, and assigned the F-22's cost growth to those three faux programs. Even so, the lifecycle costs of those programs show lower growth than that of the F-35 as defined in the 2010 selected acquisition report.

"Our analysis suggests that increased technological and programmatic complexity and declining commonality are significant drivers of the [F-35's] RDT&E and procurement cost growth described in this report," it said, noting that it was not immediately clear why estimated operations and sustainment costs had grown so much.



Furthermore, "analysis indicates that the joint strike fighter may cost the services the same or more in total [life cycle costs] than if they had pursued separate single service programs, which might have produced differing designs better optimized to meet their unique individual service operating environments and requirements," it said.

The F-35 program has even more complexity than other past joint fighter programs, Jaworowski said.

"You're asking one basic design, albeit different models of that design, to do a very wide variety of tasks. For the Air Force it's going to replace F-16s and A-10s. For the Marine Corps it's going to replace Harriers and early F-18s. For the Navy, it's also going to replace early F-18s," he said. "The idea back at the beginning of the program was that you were going to have a relatively high level of commonality among these different models but what has happened over time ... [is] a lower level of commonality than what was originally hoped for."

At first glance, the future vertical lift program looks very similar to the F-35, Jaworowski said. The medium-lift variant could replace a wide variety of aircraft, including multiple versions of the H-60, AH-64 attack helicopters, UH-1 Hueys and AH-1 Cobra attack helicopters.

FVL director Dan Bailey asserted that program officials are making an effort to learn from past mistakes. They have sought advice from both the F-35 joint program office and the RAND analysts responsible for the joint fighter aircraft study to try to glean lessons learned and opportunities for cost savings.

"We have met with the [F-35] program office to discuss their perspective of commonality, how they measure commonality, and then how it has either worked or not worked," he said. They learned that officials working on the FVL program have a different definition of commonality than the F-35 joint program office.

The JPO also offered advice on how to create and integrate a common cockpit, he said. "We learned a lot from that perspective."

After meeting with RAND analysts, Bailey determined that the findings of the "Do Joint Fighter Programs Save Money?" study could not be applied to rotorcraft programs, he said. "You can't look at issues associated with fixed wing" and ascribe them to vertical lift and rotorcraft, he said.

Every joint fighter program "has had cost growth and schedule increase over history," he said. However, RAND did not use any data from joint rotorcraft or non-fighter programs. "There are thousands of other joint product programs, and I would say not all of them have the same result. I don't think it's an apples-to-apples [comparison]."

Still, some analysts believe that the services' requirements and operating environments are too varied to make a common airframe practical.

The two offerings for the joint multi-role technical demonstrator program — a science and technology effort to build innovative, high speed prototypes ahead of FVL — seem to be a departure from the Army's legacy platforms, which prioritize low cost and payload over speed and range, said Richard Aboulafia, vice president of analysis at the Teal Group. Bell Helicopter's V-280 Valor tiltrotor and Sikorsky-Boeing's SB-1 Defiant, a compound helicopter with coaxial rotor blades, will make their first flights in 2017.

"What's baffling to me about JMR/FVL is that ... the customer that has been the most enthusiastic about creating this new architecture is also the customer that has been the least enamored with new rotorcraft technologies in the past," Aboulafia said. The Army in 1988 decided against purchasing the Marine Corps' V-22 Osprey tiltrotor, which is faster and more expensive than the helicopters in the Army's fleet.

The result of the FVL effort could be a situation where the Army has invested its money into cutting edge rotorcraft technologies that are more in line with the priorities of the Marine Corps, only to reject those new platforms and upgrade legacy designs instead, he said.

"My feeling is that [industry is] going to develop something, and the Marines will thank them profusely, and the Army will say, 'My God, what have we done?'" he said.

Photo Credit: Bell Helicopter/Sikorsky-Boeing

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<http://www.nationaldefensemagazine.org/archive/2015/January/Pages/InFutureRotorcraftAcquisition.ServicesWorkingtoAvoidMistakesofPastJointPrograms.aspx>