Opinion: Has The U.S. Army Thought Through Future Vertical Lift?

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Richard Aboulafia

Whether it's a bank, a defense program or a rescue effort for a nation's economy, we have become used to hearing the phrase "too big to fail." After using that phrase, people shrug, feeling powerless to stop a *fait accompli.* Yet few lament the creation of something that's too big to fail; they seem only to use the term after it's too late to do anything about it.
With the Army's Future Vertical Lift (FVL) program, we have a chance to witness this dynamic in action. While heavily hyped, the program's aims are immodest, to say the least:

•First, reinvent the very idea of rotorcraft, with a new propulsion concept.

•Second, reinvent Army aviation, with 2,000-4,000 production aircraft to replace the AH-64, UH-60, CH-47 and other helicopters. The new models probably would help reinvent Navy, Marine, and Air Force rotary-wing aviation, too.

•Finally, FVL would precipitate restructuring of the vertical-lift industrial base, as selecting one or two contractors would not leave much room in the market for the losers.

Studies identify the FVL compound and tiltrotor concepts as the most promising. Credit: U.S. Army Concepts

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Yet there are solid reasons to think FVL will go the way of Future Combat Systems, another overambitious too-big-to-fail Army concept. First, there are serious doubts about the Army's willingness to pay a large premium for speed. For a half-century, helicopters have traveled at a maximum of about 150 kt. FVL, through its Joint Multi-Role Technology Demonstrator (JMR-TD) precursor competition, aims to create a new rotorcraft architecture to achieve speeds of about 230 kt.

Unfortunately, the acquisition and operating costs associated with these new technologies are likely to be 40-70% greater than for current helicopters. Looking at the V-22 tiltrotor, the only fast new rotorcraft to be procured and fielded, the cost premium has been about 100% greater than for a traditional helicopter. The Marines and Special Operations Command consider this a worthwhile expense because amphibious and special operations benefit greatly from range and speed.

But most Army missions emphasize payload over other features. And that's a problem. Assume a fixed procurement budget. If the Army buys a faster system with a 50% cost premium (half that for the V-22), it will get only two-thirds as much lift as with traditional rotorcraft. The requirements process involves accountants and engineers. With FVL, as with many aerospace programs, these two groups may not communicate.

Even if the Army considers the cost premium worthwhile, will export customers agree? Will the U.S. lose its rotorcraft export edge if it creates only high-end systems?

Second, the time allowed for the reinvention of vertical flight is highly unrealistic. JMR-TD is considering divergent design approaches, such as new tiltrotor or coaxial rotor concepts. In 2013, the Army awarded JMR technology development contracts to Bell Helicopter, Sikorsky Aircraft, AVX Aircraft and Karem Aircraft. In the next few months, two companies, and two different approaches, will be selected for prototype contracts, with flight tests starting in fiscal 2017. The acquisition program is expected to start in 2019.

Yet during the past four decades, there have been many false starts on the road to faster rotorcraft. The V-22 has been a limited success, but there have been many failures, too. It is quite unlikely that the correct way forward for a new rotorcraft concept can be determined in the next five years.

Third, the gap between the current generation and FVL will have profound consequences for Army Aviation and the industrial base. The current generation of rotorcraft programs peaked a few years ago, with procurement of the AH-64E, CH-47F/G, UH-60M, MH-60R/S and V-22 decreasing by about half between 2011 and 2018. Most of these programs will be dead by the next decade, so what will the Army, and the industry, do until FVL deliveries start?

FVL echoes the past few decades, when the Army spent billions on the doomed RAH-66 scout/attack helicopter. In the aftermath of its cancellation, derivatives of every legacy platform represented the only ways forward. Then, as now, subsystem improvements offered strong gains in performance and efficiency. That dynamic explains why the military is enthusiastically procuring platforms from the 1960s and 1970s.

Thus, by 2020, we will have better turboshafts, cockpit displays, and sensors and self-protection systems. Inserting these components onto existing platforms will offer much better performance with minimal cost penalty, creating a better way forward than FVL.

Advancing rotorcraft technology with JMR-TD represents a good use of several hundred million dollars. But FVL will require billions more. And, like most other too-big-to-fail ideas, FVL has no fallback plan. If the technology, economics or time frame don’t work, the U.S. will wind up procuring derivatives of existing platforms. The billions spent on FVL will be lost.