



vertiflite Commentary

The Crisis in U.S. Army Aviation

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The U.S. Department of Defense operates the most advanced fleet of military rotorcraft in the world, and they have been among the keys to the success of combat operations in Iraq and Afghanistan. U.S. Army aircraft, primarily rotorcraft, have flown over 4.5 million combat hours in the 10 years of conflict.

The latest model aircraft are state-of-the-art in mission systems capabilities. The AH-64D Apache Block III had its first production aircraft delivery in November 2011, and incorporates dozens of technology insertions, including improvements to the avionics, communications, engine power, transmission and rotor blades. The CH-47F Chinook, fielded in 2007, is similarly much advanced over its non-upgraded siblings, with a digital cockpit, a digital automatic flight control system, etc. The UH-60M Black Hawk, with hundreds delivered to the Army since 2006, also incorporates improvements to the engines, blades and cockpits. The upgrades to each of these frontline aircraft were made possible by the funds freed-up from the cancellation of the RAH-66 Comanche in 2004.

But there is a crisis brewing. These modernized aircraft are limited updates to old aircraft designs. The Chinook just celebrated its 50th anniversary. The prototype for what would become the OH-58 Kiowa first flew in 1962, the Black Hawk first flight was in 1974 and the Apache in 1975. The Army has not developed a new rotorcraft since, and there are no new starts in the acquisition system. (Even the off-the-shelf UH-72A Lakota – the military version of the EC145 – is a derivative of the BK117, which first flew in 1979.)

While these upgraded aircraft are desperately needed, the gap between operational needs and existing capabilities continues to widen.

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The Army has the majority of rotary wing aircraft – over 4,000 of the 6,000 DoD fleet – and have historically been the lead military Service in developing new platforms, but they are not alone in their path towards growing shortfalls. The Navy is introducing the new MH-60S and MH-60R Seahawks stuffed with state-of-the-art avionics, but they are also based on older model Hawks.

The V-22 Osprey is the only new combat rotorcraft that DoD has fielded in more than 25 years. It was a clean-sheet design that developed a fundamentally new architecture. Although it just became operational in 2007, even its technology base is aging, with the first Osprey prototype having flown in 1989, over 20 years ago. The Marine Corps is also modernizing its other aircraft, benefitting from high level leadership, constancy of purpose, and lower fleet production costs (due to their relatively smaller quantities). But although the UH-1Y, AH-1Z and CH-53K sharing little commonality with previous generations, they are still limited by constraints from the original aircraft

designed in the 1950s and 60s.

In 1992, the “Tri-Service Science and Technology Reliance,” or Project Reliance, designated the U.S. Army as the lead for rotorcraft S&T efforts – however, no additional funding came with this and the other military Services curtailed their science and technology efforts. S&T budgets have been starved for the past two decades with the average since 1992 about half of what it was during the previous two decades (adjusting for inflation). Furthermore, the Army soon focused much of its S&T efforts to support the Comanche in the 1990s, as well as unmanned systems in the 2000s. After ten years of war and the Services forced by necessity to solve critical near-term problems, development of next generation technologies and designs have atrophied. Rotary wing aircraft have been doing tremendous work in theater, but they have not gotten the priority with investments for future capabilities.

All of the aircraft designs are old, and many in-service airframes are old as well. The archetypical example is Chinook prototype #8 – its first flight was in 1963. It was then configured as CH-47A model, upgraded to a B model in 1966, a C model in 1978, and then a D model in 1992. It served multiple tours in Vietnam, as well as Haiti, Bosnia and Afghanistan. It is still flying today with the 101st Aviation Regiment, with over 3600 flight hours since its last reset. Current plans have it flying for another two decades or more – 75 years of service. And aircraft like this are not just old – they’re also tired. The extremely high operational tempo’s impact on rotorcraft airframes is somewhat akin to “dog years.”

During the Vietnam War, the Army built huge numbers of UH-1 Huey and AH-1 Cobra aircraft to compensate for operational gaps. More importantly for the future, however, critical S&T investments were also made that led to next generation aircraft – the UH-60 and the AH-64 – despite declining budgets. They provided tremendous leaps in capability over the prior generation, but modern combat has exposed the limitations of today's fleet: over 400 aircraft and nearly 600 lives have been lost in the past decade of conflict. Sadly, DoD sent hundreds of rotorcraft into combat without complete or effective aircraft survivability equipment – and only the Comanche cancellation and high operational losses started the rectification plan. In addition, the lack of performance in the extreme environments of Iraq and Afghanistan precipitated more losses in non-hostile accidents than from enemy fires. The power losses from high temperatures and high altitudes, as well as sand-induced brownouts, could all be remedied with technology.

A detailed Pentagon study, the Future Vertical Lift (FVL) Capabilities Based Assessment (CBA), identified 55 significant gaps between operational needs and existing capabilities. This and previous studies – as well as 10 years of war – have shown the need for improvements in speed, range, payload, endurance and altitude, as well as situational awareness and automation, survivability and supportability. Without strong leadership to develop next generation capabilities, these gaps will continue to grow.

At the Army Aviation Symposium by the Association of the United States Army (AUSA) in January, Major General Tony Crutchfield, commanding officer of the Army's Aviation Center of Excellence and Fort Rucker in Alabama, stated that the Army had "the best equipment in the world" but each system was headed for obsolescence by 2040. General Crutchfield laid out his *Vision 2030* to address the continued cycle of block upgrades and modernization efforts, saying it "has to be a revolutionary change, not an evolutionary one."



The Chinook first flew in September 1961. A half-century later, the CH-47F has been completely modernized, but visually remains virtually unchanged.

So, where is the revolutionary capability? The FVL Strategic Plan lays out an overarching vision, to replace essentially all DoD rotorcraft with next generation systems over the next 25-40 years. Once signed by the Deputy Secretary of Defense, industry will have a clear roadmap of DoD's intent for development of future vertical lift aircraft. This will enable industry to align Independent Research and Development (IRAD) budgets with the goals and timelines set forth. It also allows the Services and US Special Operations Command to pool their resources to mitigate the gaps that the FVL CBA has identified. But the Strategic Plan has to be signed. The commitment has to be made. The DoD leadership must take a "big picture" view and exercise the leadership needed to emplace and execute the Strategic Plan. Without this, individual Service efforts will likely be insufficient to reach a next generation capability, leaving a crisis of perpetual evolutionary upgrades.

The FVL vision begins with the medium class of aircraft – next generation replacements for the Apache, Black Hawk, Seahawk, Huey, Cobra, etc – which has the largest number of existing aircraft (around 4,500). The Army has already stepped out along this objective, with the Navy, Marine Corps, and Special Operations also participating. It has already produced a draft joint Initial Capabilities Document (ICD), awarded four contracts for Joint Multi-Role (JMR) studies, and

plans to award one or more contracts next year for technology demonstrators to fly in the 2017 timeframe. The Navy is investigating the opportunity to invest as well – which could allow three completely separate vertical lift technology paths to be pursued. The challenges of Joint Service designs are considerable – significant power margins for high altitude operations, large payloads, long ranges, high speeds and the ability for the aircraft to operate from ships. But Joint solutions will be the key to successfully developing next generation platforms in the constrained budgets of the foreseeable future.

FVL/JMR is the future. Sustained leadership from the Army, Navy, Marine Corps, Special Operations Command and the Office of the Secretary of Defense is crucial to avert a crisis of future obsolescence. Reaching an operational capability of a next generation rotorcraft by 2030, when our current systems begin to reach obsolescence, requires vision today and two decades of constancy of purpose. DoD, the U.S. Congress, industry and academia must remain united in their vision for the future. We can't afford another Comanche, with decades of development that don't result in a product. We must succeed. We cannot afford to fail to act now, with conviction, commitment and competent execution. The lives of our sons and daughters depend on it.

