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Key Points

A fleet of 300 light combat aircraft will equip the US Air Force with a much-needed increase in combat capacity at a time when the service is stretched thin to meet combatant command requirements in a world dominated by burgeoning threats. These aircraft would efficiently and effectively execute mission objectives in a variety of low-intensity operations, missions currently serviced by a constrained supply of high-end fourth and fifth generation aircraft.

The Air Force faces a breakdown between resources and demands. The service's existing combat assets are flown hard, with airmen executing a nonstop combat tempo. Aircraft and aircrews face crippling readiness challenges with training and maintenance resources in short supply.

Adding a low-cost light combat aircraft will help Air Force leaders rebuild service capability by injecting needed capacity at low acquisition and operating costs. The Air Force can then reduce the wear and tear on its fourth and fifth generation aircraft and increase reliability and readiness rates—especially in low-intensity operations. Aircrews would instead optimize training for peer-oriented threats where fundamental US interests are at stake, while ensuring requirements in low-intensity missions are met and achieved in a more cost-conscious fashion. This can be done with additional funding, to preserve existing aircraft modernization programs.

Light Combat Aircraft: Looking at O/A-X and Beyond

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Abstract

For decades, a US Air Force seeking to survive an austere budget environment and a generation's worth of wartime demand has bled down capacity and struggled to retain core capability. Aircraft designed for combat against highly capable, near-peer adversaries have been continuously engaged in low-intensity conflicts. Unable to adequately train to their primary missions, aircrews have lost key facets of their highly perishable skills. Their aircraft meanwhile have been used at higher rates than intended and designed, prematurely shortening service lives. Alternate solutions to help alleviate this situation were deemed unaffordable.

Equally alarming is the growing shortage of fighter pilots. As experienced pilots retire and younger pilots are lured by the airlines, the fighter force has become too small and too busy to groom enough replacements. The Air Force is now at a point where this equation must change if the service is to meet the national security requirements levied upon it—from countering low-intensity threats to maintaining an edge against rising near-peer adversaries. Failing to add sustainable capacity and capability will see crucial policy options fall off the table—with traditional backup solutions costing far more in dollars and risk.

Meanwhile, over the last three decades, potential adversaries have increased their military capabilities with the intent to exert influence over regions vital to US national interests. Enemies and potential adversaries understand the challenges facing the Department of Defense (DOD), and are opportunistically accelerating their actions with full knowledge that America lacks the capacity to respond. A solution to this challenge lies—in large part—with the acquisition of light combat aircraft, which would enable the US to address lower threat environments and free high-end assets to focus on complex, capable threats. However, such a solution will require upfront investment to protect existing priorities, as the Air Force budget is stretched too thin to accommodate both new aircraft and investment in essential high-end modernization efforts.

Introduction

The United States Air Force faces a crisis in meeting requirements dictated by current national security strategy. The list of challenges runs long, with regions such as the South China Sea, Ukraine, the broader Middle East, the Korean Peninsula, the Arctic, and major sections of Africa presenting significant security challenges for the US. Threats range from potential nuclear conflict and nation-state competitions, to terrorists and non-state actors engaged in all forms of warfare. These are not empty words in a government document—the world is an increasingly dangerous place on multiple levels and US interests stand at extreme risk.

Across the past seventeen years of combat operations, a significant percentage of missions flown could have been executed with an LCA rather than grinding down the service life of high-end aircraft that are expensive to acquire, fly, and maintain.

Straining to provide a robust set of options, the US Air Force faces both capability and capacity shortfalls. Since the fall of the Iron Curtain, the service has worn its aircraft fleet thin in non-stop combat operations. Numerous efforts to modernize have been unwisely cancelled or curtailed, with remaining airframe inventories slashed to deal with continued budget shortfalls and competing priorities related to the wars in Iraq and Afghanistan. The service's present aircraft inventory has not been this small since the Great Depression, nor has it ever been so old, with some models dating back to the 1950s.

The enormous scale and scope of operational challenges facing the US Air Force in the next two decades can be best appreciated by considering the global environment at the turn of the century—the contrast is stunning. Near-peer nations were not aggressively seeking to dominate their respective regions through overt power projection, the present voracity of terrorism had yet to manifest itself in a large scale, and the threat posed by Iran and North Korea was in its infancy. The Arctic was not on the radar of national security concerns, and cyberspace was barely considered a warfighting domain. Most notably, few predicted that the US would become obligated to engage long-term in permissive environments against a global spread of virulent insurgencies unbound by rules of engagement, national boundaries, moral code, or hesitation about use of terror, destruction, and slaughter.

Gaps in vital Air Force capability and capacity have expanded in a starkly transformed security environment brimming with new challenges. Among those voids, there is one that, if filled, can meet a key portion of operational demands while concurrently addressing a host of other challenges. Namely, reducing wear and tear on high-tech aircraft, improving full spectrum readiness across the service, building counterinsurgency partner capacity, and alleviating the pilot shortage crisis.

The tool required to address these challenges is a new Light Combat Aircraft (LCA) effort to rapidly field low-cost attack capability via a light observation/attack aircraft (O/A-X) and to develop the potential of a light reconnaissance/attack aircraft (R/A-X) for affordable tactical intelligence, surveillance, and reconnaissance (ISR). Across the past seventeen years of combat operations, a significant percentage of missions flown could have been executed with an LCA rather than grinding down the service life of high-end aircraft that are expensive to acquire, fly, and maintain. Aircrew readiness could have been preserved in a more balanced fashion, and mission requirements would still have been met. Although procuring a smartly balanced fleet of capabilities requires upfront investment, it will more effectively fill capability gaps in permissive, low-end operations. At the same time, an LCA delivers strategic savings essential for Air Force modernization and readiness investments that have been deferred far, far too long—which is why the service must commit to a significant element of LCA.

Crisis of Force Structure Shapes the Requirement

At the conclusion of Operation Desert Storm in 1991, the US military projected that it had no viable, credible peer competitor. Force structure was slashed precipitously. For perspective, by the end of the Cold War, the US Air Force had an air superiority force structure that stood at 3,212 fighters. In the years following Desert Storm, this number was nearly cut in half, with the air superiority force falling to 1,814 F-15s and F-16s.

In the wake of the September 11 attacks in 2001, the security environment grew more complex and associated demands on the US Air Force grew. However, resource constraints for aerospace assets continued as money was funneled to increasingly

land-based capabilities. To free up funding for wartime accounts, airpower weapons systems were further reduced. Many of the cuts, like the Fiscal Year 2010 Combat Air Forces Reduction Plan (also known as the "CAF Redux") that retired 112 F-15C/Ds and 134 F-16C/Ds, were supposed to be temporary, but the lower baseline has now been normalized after passage of the Budget Control Act (BCA) in 2011—and its "sequestration" automatic cutback mechanism. Modernization efforts like the F-22 Raptor were prematurely cancelled before reaching the full level of recapitalization—owing to policymakers believing high-end warfare was now an anachronism, and that the air superiority mission was not a preeminent mission that supported US military power. The sole remaining tactical combat aircraft recapitalization effort, the F-35, was continually moved to the right after the F-22 cancellation and acquisition rates were reduced to meet budget targets. This dynamic presents a "normalized anomaly" that should create concern across the Air Force, has been long ignored, and must now be addressed.

In addressing low threat mission demands with top end resources, the Air Force has degraded its ability to effectively respond to high-end threat scenarios, ones where truly existential interests are on the line.

Challenges were not isolated to the fighter inventory, with the same patterns repeated throughout the bomber fleet's post-Cold War history. The F-111B was wholly retired, the F-117 stealth strike aircraft was divested, the B-52 inventory was chopped by more than half, and B-1B numbers were cut. On top of this, only 21 B-2s were procured in the 1990s—less than a quarter of the stated military requirement. When the US Air Force lost one B-2 in a 2008 crash due to technical malfunction, it saw the fleet reduced by five percent. Such small fleets do not even begin to account for future potential combat losses.

In permissive environments like Afghanistan, Africa, much of the Middle East, certain regions in the Asia-Pacific, and elsewhere, operations have required reaching into the top tiers of the combat air force inventory. Alternatives better aligned to the demands presented by low-intensity operations were retired years ago. In struggling to meet mission demand with a limited toolkit, the US Air Force has been facing a tough set of pragmatic realities. Aircraft designed to fly in the high end of the threat spectrum are expensive to operate. Years' worth of low-intensity missions have burned through finite aircraft service lives, and the crews flying these aircraft have seen their higher end mission skills erode. In addressing low threat mission demands with top end resources, the Air Force has degraded its ability to effectively respond to high-end threat scenarios, ones where truly existential interests are on the line. It has also traded funding that could have been used for lasting capital investment and used it for basic sustainment dollars whose long-term effect is exceedingly fleeting.

Trading near-term priorities for a balanced set of future capabilities is no longer sustainable in the present threat environment. As US Air Force Chief of Staff Gen David Goldfein recently explained to an international audience: "Our militaries have a responsibility to bring military options to our civilian leaders. And those options have to be credible, they have to be executable and we have to be able to articulate any risks associated with executing those options."[1] Advanced capabilities need to be protected to ensure they are ready to engage in crises where existential interests are at stake. Missions on the lower end of the spectrum also need to be executed, though, as wishing away these requirements is not an option. Failing to address threats while they are more manageable often yields far more complex, unwieldy challenges. A light aircraft program initiating the LCA paradigm is a major step to deliver a more effective, efficient, and prudent set of options amidst such circumstances. While many argue that resources do not exist to pursue this effort, it is important to look at the problem from an enterprise-wide perspective. Acquiring a system that can yield operational efficiencies will yield budget savings necessary for investment elsewhere in the inventory. These aircraft can also reduce the burden shouldered by key elements of the force, while helping rebuild readiness and saving lifespan on high-end assets like bombers and fighters.

Light Combat Aircraft Today

Most light combat aircraft variants presently fielded in other air forces have a crew of two, a pilot and a systems operator. Around thirty-five feet long, light combat aircraft are roughly 75 percent the size of an F-16. They can carry a

weapon load up to about 4,000 pounds—about 80 percent of an F-16's load. LCA also field many of the same weapons as an F-16, including precision GPS and laser-guided bombs. An F-16 cruises at around 450 mph; a light combat aircraft average about 300 mph. While a jet fighter has the added advantage of being able to throttle up to high speed and rapidly respond to contingencies across a wide area—something an LCA is not designed or intended to match—such capabilities comes at a cost. Frontline fighters use powerful jet engines, whereas most light combat assets are turboprops, producing significantly better fuel economy. LCA variants carry about 400 gallons of fuel, roughly twenty percent the capacity of an F-16. Yet with that fuel they can stay aloft three times as long, as much as five to six hours without aerial refueling. More so, twin-engine F-15Es and F-22s burn fuel at twice the rate of a single engine F-16, making light combat aircraft even more efficient by comparison for the same missions.[2] This comparison is not intended to pit one set of technologies against the other, but it is important to realize that specific mission sets demand unique capabilities. High performance afterburning jet engines are vital in air-to-air combat. The ability to loiter for long periods of time without air refueling support in austere, low-intensity environments with minimal logistical footprint is a different set of circumstances and thus has different requirements and solutions.

The attributes of light combat aircraft—tremendous endurance, respectable weapons loads, high weapons delivery accuracy, ability to operate from austere locations, and low acquisition and operational costs—make them an excellent choice for today's low-intensity conflicts.

The innovation of a light combat aircraft is not a new concept. Many were used with great success throughout the Vietnam War in the southern portion of the country, and in neighboring Laos and Cambodia. These portions of the conflict were marked by a near absence of enemy air-to-air threats, few advanced surface-to-air defenses, and the need to strike small, fleeting targets on the ground—circumstances well suited for light, agile combat aircraft.[3] Aircraft such as the A-1, A-37, and B-26K were all far less technologically advanced than aircraft such as the F-4 or B-52. However, given the threat environment and mission requirements, they attained desired effects in an effective, efficient fashion. Those same conditions exist today in ongoing operations. The attributes of light combat aircraft—tremendous endurance, respectable weapons loads, high weapons delivery accuracy, ability to operate from austere locations, and low acquisition and operational costs—make them an excellent choice for today's low-intensity conflicts.

What most distinguishes today's LCA from their Vietnam War-era ancestors is their modern ability to gather, process, harness, and disseminate data. The combination of advanced sensors, GPS accuracy, and the ability to network with joint force or coalition partners on land, at sea, and in the air, will act as a force multiplier, transforming LCA from lone aircraft into members of a fully integrated team, with all players sharing a common operating picture via a maturing information network across the battlespace. This concept is termed the "Combat Cloud."

That common picture will inform these new light combat aircraft of current threats, enhancing their survivability in volatile environments. It will also enable LCA to find, fix, track, target, engage and assess—and finish—threats to friendly ground forces faster than ever before by serving as both sensors and shooters. Individual entities in a conflict can fuse information into a shared operating picture that is far more robust than any individual assessment. Overlaying mission goals on this robust sight picture enables assets to decide how to best attain desired effects, maximizing strengths and minimizing potential vulnerabilities. As Goldfein explained: "The future of warfare in the age of cognition is going to be about networks and data. Does it connect? Good. Can it share? Even better."[4]

US Air Force Lt Gen VeraLinn "Dash" Jamieson, currently the Air Force's deputy chief of staff for ISR, stated in 2015 that the goal is to link and synchronize actors in the battle space, "harnessing all data, using it together, making it discoverable to all in what we refer to as the Combat Cloud."[5] Instead of individual platforms with individual objectives, the Combat Cloud creates a joint force team where the sum of the whole is far more powerful than the individual parts. Goldfein

highlighted that a future light combat aircraft must follow the Combat Cloud construct: "We're looking at a relatively inexpensive aircraft and sensor package. Can I connect that into a network of sharable information that allows us to better accomplish the strategy as it's been laid out?"[6]

Source data for the Combat Cloud comes at a cost as well. Operational planners are constantly challenged to be more efficient and effective in providing this data for combat identification, especially in complex operational environments. Fielding a Combat Cloud capable force demands thinking far past buying the physical aircraft, and focusing on what is apparent when looking at the outer mold line. The key attributes of an information-enabled aircraft are much harder to see, for they reside in data centric cockpits, processing capability, sensors, and a robust set of data links. It is also important that the system be engineered with flexibility and adaptability as a design imperative.

The Necessity for Open Mission Systems

The necessity for an information-enabled aircraft in this scenario requires an asset baselined to open mission systems (OMS) standards—affording the ability to plug and play sensors, radios, data links, new software packages, and other components—with an LCA aircraft serving as an agnostic truck, able to receive mission-specific modules in a quick turn, low-cost, easily upgradeable fashion. A light combat aircraft should be able to return from a mission and have sensors swapped without significant hassle to execute a different range of mission functions. No single vendor or incumbent provider should have a propriety lock on a system. This will yield a competitive, dynamic development environment—not one in which the status quo is the norm and obsolescence is a constant reality.

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This focus on information is especially important, for in today's world, combat is no longer just about kinetic force. Understanding the battle and knowing where and when to take precise action to maximize desired effects is crucial. That's why ISR stands as one of the highest demand, lowest density mission sets in most regions around the world. Secretary of Defense James Mattis recently noted the global shortage of US airborne ISR capability, especially in Africa, where only 20-30 percent of ISR requirements have been met: "There's a finite amount of ISR assets and we deal them out, frankly, like gold coins to the various commands."[7]

Proof of the insatiable drive for data lies in the rapid and hugely successful ascent of the MQ-1 Predator and MQ-9 Reaper Remotely Piloted Aircraft (RPA); the non-stop utilization of ground moving target indicator (GMTI) assets such as RQ-4 Block 40, E-8 JSTARS, and the Navy's P-8 Poseidon; tremendous usage of other ISR assets such as the U-2, RQ-4 Block 30, and associated space-based platforms; as well as the ubiquity of sensor pods on fighters and bombers. The problem is that even with all of these assets, a huge number of mission demands for ISR go unmet—especially in theaters that are not at the forefront of high profile combat operations.

If LCA is going to be a value-additive proposition, it must orient itself to these mission demands—bringing high demand, low density capabilities to stressed combatant commands, not demanding support that does not exist. That is why the LCA will take to the sky as a sensor-shooter. The targets of strike missions are often high value individuals exposed only briefly in urban settings that require timely, but careful employment of low-yield precision munitions to avoid collateral damage and potential non-combatant casualties. Air Combat Command's staff lead for the light attack portfolio, US Air Force Col Michael Pietrucha, notes that the speeds of light combat aircraft are perfect for such missions: "It's good to move at 180 knots. It's very handy in viewing ground items. Within 'urban canyons' the line of sight rate is much slower. The time of fall for a weapon is the same from a given altitude, but there isn't as much trouble dealing with visual obstructions, thanks to the slower speed."[8]

As a sensor-shooter platform tapped into the data-rich Combat Cloud, LCA reduces response time from detection of a target opportunity to weapons impact. While its design concept creates self-contained sensor-shooter value, light combat aircraft will leverage standard strike platforms.

US Air Force Maj John Duray, an experienced MQ-9 evaluator pilot and former U-28 pilot, explains that networked light combat aircraft will bring great efficiency to the low-end fight, when other strike platforms are being employed. "If the fighters need to find the target, build area awareness, plan the attack, and then execute, that whole process can take twenty to thirty minutes," Duray said. "With an O/A-X already overhead, the 'find' and 'fix' portions are already complete, and the fighters can use the O/A-X's data-linked information to fly in and 'finish' the target in a single pass. This process may take only three to four minutes, and that's a game-changer."[9]

Potential Capability Beyond O/A-X

When seeking to understand what an LCA is, it is important to realize the concept expands far past any single airframe. This includes the Air Force's current contender, the O/A-X. A successful program would eventually yield multiple paths to a range of solutions. As Pietrucha explains, if successful "the O/A-X could pave the way for follow-ons."[10] He envisions a series of LCA to follow the specific O/A-X procurement, recapitalizing the US Air Force attack fleet via rapid, cost-effective development effort. "We start with O/A-X, which is simply 'off the shelf,'" says Pietrucha. It would fill a well understood, documented requirement and help address known challenges throughout the Air Force enterprise. However, the notion of executing a sizable portion of missions in an effective, efficient fashion should not stop with the mission O/A-X will underpin.

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A LCA is also exceedingly well positioned to directly speak to the insatiable demand for ISR, and not as a secondary effort. The model to consider lies in a little-known Air Force Special Operations Command aircraft, the U-28. Harnessing the Pilatus PC-12 civilian aircraft design, the US Air Force developed an incredibly agile information-centric asset. With OMS as a fundamental baseline, the U-28 is capable of rapidly fielding a variety of sensors, communications nodes, and can even laser designate targets for precision guided munitions. The aircraft are in tremendous demand throughout operations in the Middle East, Africa, and beyond.

Proof of their positive effect can be found in many areas, but cooperative engagement with the AC-130 gunship community stands forth as a lead example. Prior to the U-28's fielding, gunship crews would spend significant time and energy looking for targets, aiming the aircraft for effective fire, and then resetting for another target. Taking upwards of ten minutes to acquire an aim point and to effectively sight the target was a common timeline for gunship crews. Given the number of complex fleeting targets, this delay presented a major problem. When U-28s entered the theater, they were able to radically enhance the effectiveness and speed of gunships by harnessing the attributes of information. These U-28s would study a region in question with their long-dwell capacity, carefully analyzing the context below. When a target of interest appeared, they could instantly communicate the information to the gunship via a data link. The shot could be taken in rapid order. Minutes were reduced to seconds and positive effects were netted rapidly. The same held true with U-28s providing targeting information to strike platforms such as the F-16 and B-1B. With the target identified, the most critical step in kinetic engagements, munition-dropping aircraft could directly employ munitions without having to find, fix, and target the aim point in question. This collaborative approach allowed a very low-cost aircraft, whose hourly operating expense is well under $10,000 per hour, to radically enhance the mission effectiveness of an entire strike force. The only limiting factor is that the U-28 is a sensor platform, without the ability to engage targets directly.

Turning an incredibly successful design like the U-28 into an even more powerful asset requires developing the concept into a sensor-shooter—in other words, a reconnaissance/attack aircraft (R/A-X). Both the O/A-X and the R/A-X would be sensor-shooters, but each would have different respective strengths. The O/A-X would first and foremost be a shooter. The R/A-X would prioritize the ISR mission. Different missions demand respective attributes and it is smart to align mission assets to account for this. They are both dual capable to simplify operations, reduce steps

in the kill chain, and maximize available options.

The R/A-X could look like a cross between a U-28 and an F-15E Strike Eagle that can operate in a permissive-to-medium threat environment where high-end assets are not required. The capability gap in manned strike assets for this sort of integrated approach is well understood. Strike aircraft such as the A-10 predominately rely on ISR assets—especially in urban close air support (CAS) environments—to find fleeting, low-contrast targets and establish combat identification to meet rules of engagement. That is why a platform such as U-28 is so important—it is a shooter's eyes. The R/A-X would seek to unify the sensor-shooter mission in one package, picking up the mission tasks of ISR aircraft and "own the kill chain," greatly increasing mission capability while reducing total timelines and overall cost. Using the Textron Scorpion jet as an example to highlight positive mission attributes for whatever may ultimately become the R/A-X, Pietrucha notes that the aircraft "uses efficient business jet engines, carries lots of fuel, and has excess electrical power in an internal ventral sensor bay, in addition to the radome and any pods. It is a multi-mission aircraft, capable of hauling sensors that attack aircraft cannot carry."[11] It also epitomizes the notion of an aerial truck that is incredibly modular—able to plug and play sensors at will thanks to OMS.

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While the R/A-X is not a formal program of record today, the attributes afforded for a low-cost airpower solution suggest now might be the time to begin thinking about the requirement as a natural extension of the LCA "system of systems" approach. As is the case with any piece of military hardware, if you want the capability tomorrow, it is important to begin concept development today. As Pietrucha sees it, the R/A-X "is a developmental option. Just because it is part of a continuous process, five-plus years down the road, does not mean that we cannot start now."[12] According to Goldfein, "In the fight against ISIS we're flying about ninety percent of the Intelligence, Surveillance, Reconnaissance (ISR) and Command and Control (C2) missions, and about sixty-five percent of [all other] sorties."[13] In some cases there are so few high demand/low density (HD/LD) assets that they are only meeting five percent of the combatant commander requirement.[14] There comes a point where more volume is required. R/A-X affords a very powerful, efficient solution.

Nor is the idea of rapid, successive design evolution a new concept. Pietrucha proposes a cycle of continuous development and improvement that would produce a new attack aircraft design every five years for the next twenty years, a rate reminiscent of aircraft development during the 1950s and early 1960s—a prime example being the "Century Series" of combat aircraft (the F-100/101/102/104/105/ and 106). An R/A-X could be followed by an A/T-X (a combat variant of the T-X trainer), and then the A/X-2, an A-10 replacement. The idea is to keep responding to real-world events, technological developments, and continually harness opportunities in the industrial base. There are also design savings to be harvested if an aircraft does not have to last 50 years as a frontline asset and risks can be taken in development because "good enough" is acceptable in an era where rapid innovation and implementation can address emerging challenges—something not possible in past technological models where changes to the system were tremendously costly and time intensive to implement. The case of the U-28, again, stands as the model of rapid evolution, experimentation, and solution-oriented innovation. Future success demands creating circumstances in which people can lean forward, try new ideas, and not find themselves in untenable circumstances if a new idea fails.

Covering the Low End Protects Capabilities at the High End

In an era where the US Air Force is pressed to the fiscal limits recapitalizing a broad number of platforms—from bombers and fighters to intercontinental ballistic missiles and multiple space-based systems—adding a further acquisition program to the mix may appear to be a step too far. This is especially true when one considers the vital importance of programs such as the B-21, F-35, KC-46, the combat rescue helicopter replacement, and other programs. The systems these aircraft are slated to replace are so old that failing to press forward with new procurement will see the current

inventories age out and the aircraft's associated mission sunset. These recapitalization efforts must succeed.

In considering budgetary choices, it is crucial to remember that these decisions are not just about buying airplanes, as vast sums of money are also tied to operations and sustainment accounts. Given that the United States will likely remain engaged in low-intensity combat operations for decades into the future, vast savings can be harvested by servicing these lower end requirements with aircraft that cost less to fly and maintain than an F-16 or B-52. Thus, it is crucial to find a way to deal with these mission demands in a fashion that is sustainable. As current Air Combat Command boss Gen James M. Holmes explained in 2016, when he was in charge of strategic plans and programs on the Air Staff:

> *Do you believe that this war that we're fighting to counter violent extremists is going to last another fifteen years? If you believe it does—and our chief believes it will—then you have to think about keeping a capability that's affordable to operate against those threats so that you're not paying high costs per flying hour to operate F-35s and F-22s to chase around guys in pickup trucks.*[15]

LCA via O/A-X—and an eventual R/A-X—is a key part of making that happen. Just consider the fact that, on average, US Special Operations Command Africa (SOCAFRICA) has nearly 100 activities ongoing at any time.[16] Effective operations are all about unifying the sensor-shooter mission in one package, picking up the mission tasks of ISR aircraft and working to "own the kill chain," greatly increasing mission capability while reducing total cost.

Aircraft under consideration as possible O/A-X candidates have hourly operating costs of around $2,000.[17] They also do not require vast enterprise-wide support from things like aerial refueling tankers or robust mega-bases for staging. Dollars not expended in operations accounts can be re-applied elsewhere in the US Air Force portfolio to improve training, maintain aircraft, increase overall readiness, and procure systems such as the B-21 and F-35.

Improving Readiness and Saving Wear on High-End Assets

A LCA program could also help shore up capabilities on the higher end of the combat spectrum by facilitating better stewardship of these finite assets (see Figure 1).[18] As Goldfein notes, aircraft squadrons have been asked to "bear the brunt of an incredible deployment tempo and manpower shortages which have had a direct impact on readiness in our warfighting missions… The resultant effect of these challenges is we have degraded the core fighting unit of our Air Force." [19]

Figure 1: Operating Cost Advantage Using LCA—Cost Per Flight Hour

Air Force Aircraft	Cost Per Flight Hour	Compared to LCA	Estimated Savings per 10,000 Flight Hours
O/A-X	$2,000	-	-
A-10C	$18,051	9X	$160.5 million
F-16C	$19,168	10X	$171.7 million
F-15E	$24,171	12X	$221.7 million
F-35A	$42,209	21X	$400.2 million
F-22A	$61,726	30X	$590.7 million

(Source: Air Force Cost Analysis Agency. Flying hours reflect FY 2016 data per Air Force Total Ownership Costs from fourth quarter 2016, the last full fiscal year's worth of data. All cost values are in then-year dollars.)

At any given time, a sizable portion of the US Air Force bomber and fighter inventory is deployed on six-month tours in support of overseas contingency operations, most of which are on the lower end of the threat spectrum. During those deployments crews are unable to train to the full spectrum of mission sets expected of them—especially the toughest scenarios that connect to core US interests in places such as North Korea and theoretical conflict against near-peer forces. Combat skills are perishable assets, crews either hone their skills or lose them.

Given that fighter and bomber inventories are at record low levels, it is more important than ever that available assets be exceedingly capable. A small and less capable US Air Force is a recipe for disaster, but it is exactly where the force is tracking after three decades of unrelenting use and diminishing capacity. There is an enormous difference between an hour spent aloft in Afghanistan waiting for

a call to strike, and an hour immersed in air-to-air combat training. Even then, circumstances at state-side bases are strained. At home, pilots often fly no more than two training flights per week due to budget constraints on flying hours.[20] Often only 50 percent of the aircraft on the ramp are able to fly because too many mechanics are overseas.[21] The dual impacts of deployment cycles and reduced training are alarming. In 2013, only 11 percent of fighter squadrons were considered fully mission capable, able to execute all wartime missions.[22]

US Air Force Vice Chief of Staff Gen Stephen W. Wilson aptly explained what is at stake amidst such challenging circumstances: "If Airmen are not ready for all possible scenarios, especially a high-end fight against a near-peer adversary, it will take longer to get to the fight. It will take longer to win, and it will cost more lives."[23] It is also important to point out that capacity constraints are so pronounced for aircrews and their aircraft, that a war involving significant losses would prove crippling. The Air Force does not possess war reserves from a pilot or aircraft perspective—those sorts of things were ceded years ago as "budget efficiencies." Constant combat since 1991 has come at a stark price.

On top of caring for aircrew skills, it is also important to care for aircraft service lives. Fighters such as the F-22, F-16, F-15E, and A-10 along with bombers like the B-2, B-1 and B-52 have been carrying a tremendous load as the "go to" force for kinetic force application.

On top of caring for aircrew skills, it is also important to care for aircraft service lives. Fighters such as the F-22, F-16, F-15E, and A-10 along with bombers like the B-2, B-1 and B-52 have been carrying a tremendous load as the "go to" force for kinetic force application. A finite number of highly capable aircraft have been continually strained by round-the-clock operations, longer missions, heavier weapons loads, and extreme environmental conditions. A 2013 RAND Corporation study showed that between 2006 and 2010, F-16s were flown an average of 316 hours per year while in the US.[24] In contrast, an F-16 unit deployed to Iraq in 2007 logged an average of 487 hours per aircraft in just nine months, an annualized rate of 650 hours per year.[25] As the US Air Force has been at war since Operation Desert Storm, the service lives of these aircraft have nearly been cut in half.

While LCA should never be viewed as replacements for high-end capable fighters and bombers, they can help better balance the load those aircraft are carrying. There is no reason to send an advanced fighter or bomber to a country like Afghanistan or Djibouti for counterterrorism strike missions—it is massive overkill. LCA can net similar mission effects and allow the more expensive, capable aircraft to remain home and save valuable flight hours for when it really counts. Due to the overuse of high-end aircraft in these campaigns, unsustainable cost exchange ratios have built up over time and have worn down high performance fourth generation combat aircraft unnecessarily.

Other factors could also generate savings for high-end aircraft and applications. Many LCA variants are similar aircraft to the ones used both in US and international partner undergraduate pilot training programs. Employment of LCA also offers opportunity to rebalance the pool of available maintainers towards higher end combat capabilities, such as the F-35. An LCA would offer significantly reduced maintenance man hours per flight hour, due to lower systems complexity, which would in turn shrink the maintenance and logistics footprint in forward deployments—a key attribute for savings in combat operations, as well as in critical partnership activities with allies.

Fostering Partnerships Proactively Shapes the Security Environment

There is also another important variable to consider with the LCA construct that is not always best addressed by the latest in technologically advanced warplanes, alluded to by the above example of efficiencies in undergraduate pilot training: building partnership capacity. The DOD's Defense Strategic Guidance (DSG) document envisions new partnerships in regions beset with low-intensity conflict, requiring "…innovative, low-cost, and small-footprint approaches to achieve our security objectives."[26] The idea behind this model is to empower indigenous forces, so the US can achieve desired effects without having to commit large scale forces. As Iraq and Afghanistan prove, pure mass does not win conflicts, understanding the local dynamics and prudently partnering with locals who have vested interests can be a far more successful model.

As these partnerships expand, the US needs a much more cost-effective model of operations to support them. Not only are there too few fighters and HD/LD assets to conduct strike operations globally, but the logistical "tail" required to support them is enormously expensive. LCA offer the cost-effective solution, while also better aligning with capabilities that many nations field.

Goldfein sees the value of LCA in building partnerships: "I hear from my fellow air chiefs all the time, 'Hey, I can't afford an F-16, I'm not going to get the F-35, violent extremism is coming my way, and I want to join the coalition.'"[27] Light combat aircraft are perfect for smaller partner countries, who don't have the expansive investments in fourth generation combat aircraft. Precision weapons capabilities used by the Colombians on A-29s were instrumental in turning the FARC back, Sierra Nevada executive and retired Air Force Maj Gen Thomas K. Andersen noted as a historical example, and similar capabilities could be employed by countries like Nigeria against the Boko Haram terrorist group.[28] These sorts of efforts come down to prudent and strategic relationships—empowering partners aligned with core US interests.

LCA are also the right tool for the United States' growing partnerships in regions such as Saharan and Sub Saharan Africa, as well as across the wider Middle East, which see US forces distributed around sparsely populated regions in permissive air combat environments.

LCA are also the right tool for the United States' growing partnerships in regions such as Saharan and Sub Saharan Africa, as well as across the wider Middle East, which see US forces distributed around sparsely populated regions in permissive air combat environments. "All of [these missions] need ISR," Duray notes. Combatant commands such as US Central Command (CENTCOM) and US Africa Command (AFRICOM) fly U-28 taskings frequently, he said, as these sorties are a significantly cheaper endeavor than bringing down fighters and tankers. In these isolated regions, "our ability to get in and out of small airfields is key to expanding our [ISR] reach," he added.[29] Partner nations across Africa, for example, will find that collaborating with the US to acquire and operate fleets of light combat aircraft that are compatible with an Air Force O/A-X will be of tremendous benefit, capitalizing on US training opportunities and airborne networks. Such sharing of regional security burdens will further cement those partnerships. A follow-on R/A-X program, used in coalition operations, will provide additional partner capabilities in manned ISR that will further reduce demands on high-end US combat aircraft. In addition, an R/A-X would be especially useful in nations that do not have a robust RPA ISR enterprise.

Gaining Synergy with the RPA/LCA Team

Operational concepts involving RPAs provide for long-dwell periods of precious, unbroken ISR. While RPA platforms have demonstrated the ability to act unilaterally across the complete kill chain, their leverage as an ISR platform can be lost. While an armed RPA may be diverted for hours to prosecute a target, those hours are lost to fulfilling a collection deck of ISR requirements. Retired US Air Force Maj Gen Larry Stutzriem, the deputy director of the combined air operations center (CAOC) during the opening phase of Operation Enduring Freedom, recalls how the smart use of the MQ-1 Predator created a constant struggle during his time in the operations center in the opening months of the Afghanistan air campaign. "We struggled to educate ground force commanders that chasing shadows in the short term meant loss of ISR for the long term," he said.[30] The utility of arming a Predator with an AGM-114 Hellfire Missile and the introduction of the MQ-9 Reaper created more chances for misapplication. Stutzriem adds, "Lacking good operational judgement, every soldier can be assigned a Reaper overhead just for overwatch. The result is complete loss of the high-leverage value of that asset to actually prevent the need for overwatch." The perspective of wasting airpower goes all the way back to lessons from World War II where a period of defeat of US troops in Northern Africa by German forces was credited to a policy of allocating air assets in "penny packets." Stutzriem noted that today's airmen continue to force the view that US Air Force airpower cannot be routinely diluted as if high-leverage Air Force assets were organic to Army units. "The point is high-capability ISR platforms can offer exponentially more long-term impact than simple overwatch missions. We need to meet that need with more appropriate and lower cost capabilities," he noted.

The advent of the armed RPA, such as the MQ-9 Reaper, provides an astounding ability to target high-value targets that are time critical, fleeting, or are identified with no other strike assets in proximity to respond. However, using RPA as a tool of first choice for routine light attack missions risk undermining other vital mission imperatives fulfilled by these aircraft.

Indeed, the Reaper has demonstrated the ability to provide a range of dynamic support to ground forces, but there is more to the light attack mission set—especially in the close air support arena—that RPA system designs are thus far unable and not cost effective to handle.

Dropping weapons on GPS coordinates or fixing a target and guiding a missile in to impact can certainly be beneficial in support of ground forces. However, RPAs lack the flexibility and agility of an LCA. "We had quite a spirited internal Air Force debate as to whether B-52s dropping from 40,000 feet on GPS coordinates was technically Close Air Support," Stutzriem said. That debate was misguided by a poor understanding of the CAS mission that light combat aircraft will perform. Stutzriem stresses that there is a reason A-10s, F-16s, and F-15Es are a close air support tool of choice, and that the testimony of enemy forces about fearing those particular platforms is noteworthy. "Ask those fighter pilots who do this for a living. When troops are intermingled with enemy forces, when radios are screaming, when there are no coordinates to be given, you need the big vista of manned aircraft and an airframe with flexibility, agility, and speed."

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US Air Force Lt Col David Blair, an MC-130 Gunship and MQ-9 Reaper pilot, likens RPA to snipers, taking single precision shots over long ranges; LCA are more like soldiers with M-16 rifles, rapidly firing at multiple targets while maneuvering.[31] Comparatively, RPA cannot provide the concentration of continuously applied pressure. While LCA pilots can continue to operate under jamming or broken communications, RPA are completely dependent upon a continuous link. If the link gets jammed or interrupted, the aircraft automatically recover to home base. Further, this link can lag, something incompatible with a "troops in contact" or "danger close" situation in which anyone in the engagement can call for the abort of an attack up until the time within the lag of current RPA control architectures.

Nonetheless, the proven and well-documented capabilities of RPA suggest there is powerful teaming potential with light combat aircraft. RPAs will normally be first to penetrate the battlespace to conduct ISR to enable other strike operations. While flights of fresh LCA quickly cycle into assigned zones, RPA can be gathering, assessing and passing crucial situational awareness to LCA pilots. The emerging Combat Cloud construct will also underpin extraordinary depth of team functionality.

"The design of RPAs [is] for endurance. The Reaper can quickly expend its limited munitions loads well short of its on-station time. It's preposterous to abort another eight hours of Reaper being on station just to recover and reload," Stutzriem explained. Instead, the long-loiter time of the RPA and the concurrent operations of a large reachback team dedicated to analysis can continue to build situational awareness and even prioritize actions to optimize LCA efficiency.

Importantly, the long endurance aeronautical design of RPAs has tradeoffs. Currently fielded RPA designs are vulnerable to weather conditions, to include winds, icing, lightning, and moisture. In the case where there is weather in the vicinity of friendly forces to protect or targets to strike, current RPA variants have no weather radar, and no de-icing capabilities. They are essentially a clear weather aircraft. MQ-9 Reapers currently have no ability to fly instrument approaches and have relatively low cross-wind limitations. Therefore, if the weather back at a Reaper's airfield starts to look bad, the RPA get called home. Importantly, the US Air Force weather enterprise is not about providing RPA-centric weather updates and analysis. "Air Force weather capabilities are not designed to support the age of RPA," Stutzriem emphasized. A former director of US Air Force weather, Stutzriem underscored that a manned O/A-X will be the most effective option for light attack in low

weather conditions, in most scenarios. "There is no doubt American adversaries know the limitations of RPA and would take advantage of their weather limitations," he said.[32]

Though contemporary RPA cannot operationally supplant an LCA, they can be teamed to gain a synergy reminiscent of highly coordinated ISR and strike tactics demonstrated by special operations. With the addition of a future R/A-X effort, the potential for "dash jet" speeds could be utilized to reposition assets for all-weather combat identification, targeting, and attack capabilities—to further enhance more cost-effective manned and unmanned ISR/strike teaming, denying adversaries weather-dependent sanctuaries.

Light Combat Aircraft and the Fighter Pilot Shortage

While LCA can perform well in critical mission areas, they also offer a substantial collateral benefit by helping to alleviate a worsening US Air Force pilot shortage. This is a huge problem, for as Goldfein explains, the Air Force is 1,500 pilots short, and if the service does not find a way to turn things around "our ability to defend the nation is compromised," he said. "This is a warfighting imperative." [33] In the time since he made that statement in September 2017, the number has grown to 2,000 pilots. The US Air Force is considering all and any ideas to increase its pilot production capacity.[34] However, the limiting factor in the recovery equation is the ability of operational squadrons to absorb a surge in fighter pilot production. Here too, LCA offers assistance.

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Absorption of fighter pilots is the process of bringing new fighter pilots into an operational fighter squadron for their first operational assignments.[35] Maximum absorption is defined as "the total number of inexperienced aviators that ops units can take in each year and maintain the appropriate experience mix, maintain combat capability, and develop/age the new aviator in a timely manner."[36] The goal of a newly absorbed fighter pilot is to become "experienced" by accumulating 500 hours in that aircraft type.[37] Developing as a fighter pilot requires far more than simply logging flight time. It requires pairing new pilots with seasoned aviators who provide mentoring, instruction, and feedback based on the instructor's real-world experiences. Those squadron instructor pilots put each new pilot through a series of building block training missions with specific tasks and performance levels required to progress. A pilot is declared to be mission ready (MR) once all syllabus sorties are completed to a satisfactory level. The next steps are to become a two-ship flight lead, and then a four-ship flight lead, each process requiring another long series of syllabus-driven training flights with instructors. After reaching flight lead status the pilot continues to train, adding various qualifications along the way with the help of the squadron's instructor pilots. Upon becoming experienced, pilots can finally enter a program to become instructors, often just before the end of their first operational assignments.

Eliminating large numbers of legacy fighter aircraft while failing to replace them with new ones has created a situation where there is insufficient fighter pilot absorption capacity in the current inventory. In 1990, US Air Force fighters numbered 3,170.[38] The US Air Force had planned to "recapitalize," replacing most of its fourth generation fighter force with a new generation of stealthy aircraft; 749 F-22s were to be built, along with 2,036 F-35s.[39] Instead, a mere 187 F-22s were built, and the F-35 program lagged behind its hoped-for timeline.[40] Even though the fifth generation fighters were not materializing in desired numbers, various budget constraints—including the Budget Control Act, and its resultant "sequestration" mechanism—drove a continued divestiture of fighters such that by 2013 the inventory had declined to 1,137.[41] Although the US Air Force still plans to acquire 1,763 F-35s, current production plans will add no more than 60 aircraft each year, stretching the program into the mid-2030s.[42]

A typical fighter squadron has 24 aircraft and 30 pilots; 13.5 of those pilots are inexperienced, on average.[43] Each pilot typically flies 10 times per month, averaging 1.4 hours per flight and accumulating around 14 flight hours.[44] Such a squadron can produce just five experienced pilots per year, with each pilot taking about 32 months to become experienced.[45] Raising the monthly sortie count per pilot from 10 to 14 sorties per

month could increase absorption enough to produce an additional 1,367 pilots, eliminating the expected pilot shortfall.[46] However, the increase in operational flying costs would likely be prohibitive.[47]

Pilots in a light combat squadron could fly more and longer sorties each month. With lower operating costs and reduced maintenance per flight hour, a typical LCA squadron pilot could average 14 sorties per month. Given somewhat slower operational speeds of typical LCA (250 to 280 knots), and their longer unrefueled flight endurance (on the order of four hours), it is reasonable to assume that the average LCA training sortie could last two hours.[48] Using these numbers, an LCA pilot would average 28 hours per month, reaching the 500 hour mark in as little as 15 months.[49] At that rate an LCA squadron could generate 10.8 experienced pilots per year, more than twice the absorption rate of a typical fighter squadron.[50]

Budgets for the F-35, B-21, and many other vital programs are already tight, greatly prolonging essential US Air Force recapitalization. The service cannot get any smaller. LCA cannot be acquired by reassigning funds from those programs without seriously jeopardizing the service's ability to prevail in the high-end fight.

Adding 10 regular fighter squadrons to the inventory could increase the steady state inventory of fighter pilots by as many as 1,250.[51] A 300-aircraft LCA fleet could be fielded as two training squadrons of 30 aircraft each, plus 10 operational LCA squadrons with 24 aircraft apiece. Those 10 operational LCA squadrons could generate the same pilot growth in less than half the time, and at a much lower cost. Those experienced pilots could then move on to fly a fourth or fifth generation fighter in a follow-on assignment. Pilots who are experienced in a previous fighter, including attack aircraft like the A-10, require only 100 hours in their new aircraft to become experienced.[52]

The pilot shortage will be an enduring challenge for the Air Force for the next few decades, and innovative solutions are critical for the sake of overall Air Force mission readiness. The potential of LCA to significantly increase both absorption rate and quality of combat seasoning must be carefully considered when assessing their overall value.

Acquiring Light Combat Aircraft Will Require Added Funding

"Our track record of trading force structure to get money for modernization has not worked too well so far… usually what happened is that we lost the force structure without getting the money for the modernization. As our secretary says, we are not big enough to meet the requirements the combatant commanders ask for already, so if I get smaller in anything I'm less able to meet their requirement."

Air Force Gen James M. Holmes, Commander, Air Combat Command [53]

Additional funding will be needed in order to realize the benefits of LCA to low-end operations and the leverage it affords to restoring and sustaining readiness for the high-end fight.

Budgets for the F-35, B-21, and many other vital programs are already tight, greatly prolonging essential US Air Force recapitalization. The service cannot get any smaller. LCA cannot be acquired by reassigning funds from those programs without seriously jeopardizing the service's ability to prevail in the high-end fight. A strategic decision to procure LCA must be done with an increase in the US Air Force's total obligation authority (TOA).

According to Lt Gen Arnold W. Bunch, Jr., Military Deputy, Office of the Assistant Secretary of the Air Force for Acquisition, "It's been made really clear to us that if we want to do this—get a light attack fleet of some kind—then we have to get additional money to do that. We won't take money out of our fourth and fifth generation mod lines—our upgrades—to be able to execute this program."[54] Bunch says that the US Air Force is working to convince civilian leadership that such additional funding is necessary: "We're communicating where we are on our pilot shortfall. We're communicating how important it is for readiness to spend more time training for the high-end fight, and we're carrying that message to Congress, and we're letting them know what we're doing. It will depend on how that message resonates on whether we can get the additional TOA to go forward or not."[55] When making this case for LCA to Congress, the US Air Force must emphasize the risk associated with compromising the resourcing of modernization.

Capitalizing on New Acquisition Pathways to Gain LCA

Fortunately, the 2016 National Defense Authorization Act (NDAA) contained new measures intended to help the services acquire needed assets quickly, providing "alternative acquisition pathways" and creating "streamlined contracting, budgeting, and requirements processes," bypassing much of the complex and time-consuming acquisitions bureaucracy.[56] That bureaucracy is a big reason that the recapitalization of the fighter force is well behind schedule. A series of missteps in the development of the F-35 invited onerous oversight, resulting in F-35 production rates far below planned levels. The slow creation of F-35 squadrons means that the F-16 and F-15E will remain in service far longer than originally planned, each requiring expensive service life extensions.

These alternative acquisition pathways should make the US Air Force more responsive to emerging mission requirements, such as those the O/A-X can meet. Gen Ellen M. Pawlikowski, Commander, Air Force Materiel Command, is enthusiastic about the new options that the NDAA provides "to empower service chiefs to have more authority when it came to… acquiring things, and one of those was experimentation. Experimentation provides us the opportunity to be able to "kick the tires, light the fires" of existing systems and just see what we can do with them without having this big, long process of clearly defining your requirements. We're also doing other things… to be faster at getting technology there, and leveraging some of the new authorities that have come out within the budget."[57] The new transaction authorities give acquisition officials the flexibility to tailor the terms and conditions of each agreement to the specific situation, bypassing many cumbersome standard contracting requirements.[58] The 2016 NDAA also provided funds to attract nontraditional defense contractors to demonstrate innovative prototypes "of significant scope".[59]

The speed with which an O/A-X, and the potential follow on R/A-X, can be acquired will be crucial in delivering the benefits that they offer.

Meanwhile, elected representatives have begun to acknowledge the need for additional funds to acquire a fleet of LCA. In June 2017, the Senate Armed Services Committee proposed adding $1.2 billion in funds for LCA for the US Air Force. This amount would permit the purchase of roughly the first third of a fleet of 300 aircraft.[60]

The speed with which an O/A-X, and the potential follow on R/A-X, can be acquired will be crucial in delivering the benefits that they offer. In concert with congressional funding, capitalizing on the new authorities granted by Congress will make it possible to add them to the portfolio quickly. The 2016 NDAA returned the authority for milestone decisions (such as when to begin production) back down to the level of service acquisition executives such as Bunch, creating the opportunity for much faster fielding of LCA.[61] "Congress has been very forward in trying to give us authorities for rapid fielding, rapid prototyping. We could utilize those to jump in at a "Milestone C," which is where we're going into production and buying things. The results that come out of that combat demo will determine if we're ready to go into production. Our hope is that if we go through this process, and... if we can garner the additional dollars that we need to go forward, that we could go almost immediately into production."[62]

In the past, workarounds have sometimes been necessary to delivery warfighting capabilities quickly. For example, the efforts of the Air Force Rapid Capabilities Office (RCO) were essential in turning the B-21 Raider to a program of record. Still, that experience highlighted that the acquisition system needs to be more responsive.[63] Bunch agrees: "We the Air Force, and we the acquisition enterprise, shouldn't have to turn to the RCO to procure an off-the-shelf aircraft in a timely manner. We ought to be able to use the authorities that we have from Congress, and the acquisition authorities we already have. If we get into this… we're going to look at whatever it is we can do to try to streamline it, and get it done into a build as quickly as possible... commensurate with how fast we can get all of the infrastructure set up, and get the training network set up, as well as how fast the contractors can build airplanes. We will look at whatever's right so that we can go fast."[64]

Speedy acquisition of LCA will itself serve as an incentive for industry to participate by shortening the time it takes to award contracts for production. Long-term development programs tend to discourage those contractors who lost out

in one competition from even remaining involved in defense. In contrast, establishing a pattern of multiple, near-term projects will keep industry engaged and eager to innovate with its own funds, creating an environment conducive to continuous improvement—such as integrating LCA into the combat cloud—and to continuous development of the type required to produce a follow-on R/A-X. Bunch looks forward to being creative in crafting such near-term contracts: "I'd do a unique contract method. Is it a fixed price? Is it a cost-plus? How would I incentivize?"[65] With a predictable, short duration process, contractors will be more willing to commit the resources necessary to deliver needed capabilities.

Faced with an increasingly difficult slate of force management challenges to balance, and a burgeoning set of mission requirements, the US Air Force is now onboard exploring the positive potential a light attack program might afford the service.

An R/A-X is a logical step after O/A-X. Bunch observed that "[i]f we can move forward on the light attack… we may be able to see the promise in [an R/A-X] and see how it could go forward." Pawlikowski concurs: "I think that both sides—the industry side and the government side—saw some huge potential in this methodology of experimentation. That's why you see Gen Holmes already thinking about the next one he's going to do… he's talking about looking at some of the opportunity to test those platforms as light ISR… to get more ISR, and to be able to quickly integrate different sensors on the same platform. If we can have a platform that's affordable, not just to us, but also to some of our potential allies… that will enable us to build our network."[66]

Bunch cautions against adding additional requirements to the O/A-X at this stage, but he views integrating LCA into the combat cloud as a natural path for continued improvement.

Industry, IR&D, and the 2017 Light Attack Experiment

Faced with an increasingly difficult slate of force management challenges to balance, and a burgeoning set of mission requirements, the US Air Force is now onboard exploring the positive potential a light attack program might afford the service. Proof of the concrete interest came in an August 2017 experiment at Holloman AFB, N.M. where Air Force Material Command hosted a Light Attack Experiment attended by senior Air Force leaders, including Secretary of the Air Force Heather Wilson, Air Force Chief of Staff Gen David Goldfein, and Air Combat Command's Gen James Holmes. Four aircraft participated: The A-29 Super Tucano from Brazil's Embraer via its partnership with Sierra Nevada Corporation; the AT-802L Longsword by L3 and Air Tractor; and two aircraft from Textron Aviation Defense, the AT-6 Wolverine and the Scorpion.

Criteria for the experiment included the ability to operate from a 6,000 foot or shorter runway, such as one might find at an austere location, and an average fuel flow of under 1,500 pounds per hour for low operating costs.[67] Three of the four aircraft had ejection seats, a requirement to be considered a "tier one" aircraft.[68] ACC's Pietrucha emphasized that it was an experiment, not a competition: "We had two aircraft that met all of the requirements, and two that did not, but those two were interesting enough that we waived the requirements and asked them to participate."[69]

ACC submitted its analysis of the results to USAF Secretary Wilson on December 6, 2017. The next step will be to conduct a more advanced demonstration in 2018. Service leaders originally contemplated a combat deployment in which aircraft flown by US Air Force crews would deploy to a location in the Middle East to conduct missions in lieu of frontline fighters. However, cost and schedule saw this option scaled back to a domestic round of tests to further assess LCA combat effectiveness, maintainability, and their ability to network with ground forces.[70]

Nor is the US Air Force alone in recognizing the attributes LCA could afford the nation. Commenting from a legislative perspective, Sen John McCain (R-AZ) stated, "The light attack experiment at Holloman Air Force Base, New Mexico provides an example for how rapid acquisition and experimentation can help our military procure the needed capabilities more quickly, more efficiently, and more affordably than we have in the past."[71] An important takeaway from the 2017 light attack experiment is the commitment of industry to use independent research and development (IR&D) dollars when

there is transparency, clarity of requirements, and opportunity to demonstrate their product designs. However, for such collaboration to expand, the government needs to commit to a viable path forward. Trust between industry and the services is still fraught with challenges. For example, cancelation of the E-8 JSTARS recapitalization does not incentivize industry to commit millions when the promise of a return on their investment is preempted.

A key perspective underpins the call for LCA as a specialized fleet for low-intensity conflict—LCA will have utility for decades to come in regions with threat-permissive environments. Even as the US looks to draw down forces in Iraq and Afghanistan, conflicts with violent extremists are on the rise globally. To respond to these multiplying hot spots the US Air Force needs a cost-effective, versatile tool set that does not require the use of high-end assets. Combat attributes must stand as a top priority. ACC's Holmes asserts that "…we are half way into a generational struggle" with extremist groups.[72] He does not believe that LCA will be rendered obsolete by a surge in anti-aircraft threats. "I don't think that Africa or the fringes of the places where violent extremist organizations operate is going to see an influx of sophisticated, radar-guided SAMs (Surface-to-Air-Missiles). I think there'll still be relatively permissive environments for quite a while."[73] That means aligning policy and budget decisions for the long haul—developing a set of capabilities embodied by LCA that can efficiently and effectively address the low-end fight and, in so doing, allow for operational efficiencies and added capacity.

The continuous use of scarce fourth and fifth generation fighter aircraft to support US ground forces in low-intensity conflicts has dangerously eroded US Air Force readiness.

Conclusion

The continuous use of scarce fourth and fifth generation fighter aircraft to support US ground forces in low-intensity conflicts has dangerously eroded US Air Force readiness. Although high-end platforms can employ across the spectrum of operations, there was no expectation in the 1980s and 1990s that America would embark upon a generation of low-end combat campaigns. Potential adversaries have capitalized on US preoccupation with low-intensity conflict, projecting armed influence over regions critical to US national interests.

Procuring a fleet of 300 LCA is smart strategy when evaluated from an enterprise-wide perspective. First, a fleet of 300 LCA would affordably and effectively perform many of the missions currently being carried out in low-end, threat-permissive areas across the globe by high-end fighters. LCA possess adequate speed, impressive endurance, and substantial weapons loads. Equipped with the latest air-to-ground targeting systems and precision munitions, they can perform ground support missions as well as the high-end strike and ISR platforms that they would relieve—for a small fraction of the cost.

At the same time, LCA deliver unprecedented leverage for restoring strategic options to US leadership. Relieving high-end platforms from duties best suited to LCA will increase overall US Air Force readiness by allowing substantial cost savings to be applied to high-end priorities, slashing wear and tear, increasing combat-ready rates, restoring aircrew and maintainer readiness for high-end conflict, and improving the seasoning of new pilots to address a critical shortage. From a risk perspective, LCA leverages the readiness and availability of high-end forces to restore credibility of those who seek to test US resolve.

However, additional US Air Force funding will be required to add light combat aircraft to the airpower portfolio. This modest investment in force structure will generate phenomenal returns in US Air Force combat capability—and for the security of the United States. ✪

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