The temptation of light combat aircraft

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"What makes the strength of temptation is not the grimace of evil, but the smile of good which is mixed in".

In 2017, the U.S. Air Force (USAF) launched the experimental phase of the light combat aircraft program. The goal was to replace the F-15 and F-16 fighter aircraft for Close Air Support missions in permissive environments alongside the A-10 *Warthogs* before eventually replacing the latter as well. It was also intended to strengthen cooperation with smaller foreign air forces that do not have modern combat aircraft or that were upgrading an existing fleet. The Special Forces Command (USSOCOM) later conducted a similar study for its own needs. After many twists and turns, the U.S. defense budget bill passed in December 2020 clouded the prospects for light combat aircraft development in both the USAF and USSOCOM, cancelling all funding for the program through 2023 and requiring a thorough analysis. Against all odds though, the U.S. Department of Defense (DOD) announced as soon as May 2021 the restart of competition to field a light attack aircraft for the benefit of USSOCOM. The temptation of the advent of a turboprop-powered light fighter remains a persistent one in Washington, dividing those who see it as a way of reducing the pressure to use fighter aircraft in low-intensity conflicts, and those who, on the contrary, see it as a threat to the force structure, considering the resurgence of competition among the great powers.

On the other side of the Atlantic, French fighter aircraft are also heavily deployed, such as in the Sahel and the Levant, where they operate with their flagship multirole aircraft, the *Rafale*, and with the *Mirage 2000*, in conjunction with weaponized Remotely Piloted Aircraft (RPA). The level of this commitment should be seen in the light of the downsizing of the fleet since the end of the Cold War onwards and the concentration on a reduced number of platforms, partly as a result of choosing versatility as a tactical capability. These issues raise several concerns for the French Air Force, including the ability to field enough "ready-for-combat" fighter aircraft (i.e., with all the necessary equipment and weaponry) for high-intensity combat, and the ability to be better prepared for such combat. It ultimately raises the question of fleet differentiation in the Air Force structure.

It is therefore legitimate to wonder about the transposition of the American debate on *Light Combat Aircraft* (LCA) to the French air force model, including the more distant future of the *Future Combat Air System* (FCAS). If "*the smile of good mixed in*" makes the temptation of a propeller-driven aircraft dedicated to fire support missions attractive as a solution to the current challenges, a closer look at the issues highlights "*the grimaces of evil*" and urges us to weigh this option for financial, organizational and conceptual reasons in the face of a worsening strategic environment. For low-intensity conflicts, and considering the French strategic ambition, the Air Force must rely in the short term on the flexibility allowed by the reach, speed and overall responsiveness of jet fighters, combined with the real-time *Intelligence—Targeting—Strike* capability offered by its fleet of weaponized RPA. In the medium term, France and willing European partners could help the G5 Sahel countries structure their combat aviation around the *Super Tucano* light aircraft, in order to promote organic and operational synergies and ease the pressure on French involvement. In the longer term, the arrival of the FCAS could go with a new high/low mix within the force structure: the *New Generation Fighter*, upgraded *Rafale* and remote carriers would then be used on a priority basis to operate in contact with the enemy in high-intensity conflicts; a new, lighter and less expensive single engine jet could be developed in parallel to carry out less-demanding missions, over a broader spectrum than fire support.

Turbulence in the American program

Background

The idea of a light combat aircraft was born out of the USAF's need to have an air force adapted to counter-insurgency conflicts and to unravel the complexities resulting from a strong airborne commitment concentrated on a reduced number of aircraft (*High Demand / Low Density assets*).

The project underwent many twists and turns across the Atlantic. First, in 2017, the USAF embarked on the OA-X program to study the off-the-shelf acquisition of light combat aircraft specialized in fire support, surveillance and armed reconnaissance missions (*Light Attack/Armed Reconnaissance - LAAR*). The project then continued as the *Light Air Support*[1] program, in which the USAF aimed to acquire up to 300 such aircraft. In early 2018, the USAF selected two models to test at Holloman AFB: The A-29 *Super Tucano* and the AT-6 *Wolverine*, a variant of the T6 Texan II used for aircrew training. Several international partners attended the demonstrations and tests conducted in New Mexico (Canada, Australia, United Arab Emirates, Paraguay).

In the wake of the *Air Force*, the experimentation inspired the special forces, which launched their own light attack aircraft[2] acquisition program in July 2017. The project was then renamed *Armed Overwatch*, with the first five aircraft to be acquired in 2021 for $101 million, with an eventual target of 75 aircraft.

US drivers for light combat aircraft

The U.S. Air Force's 2009 framework document[3] identifies five guiding principles for these aircraft. First, the LCA fleet must be more simple yet robust and cheaper than jet fighters, with low-logistics footprint, naturally leading to the choice of a turboprop. As an example, the cost per flight hour of the Super Tucano is estimated at $2,000, or 1/20th that of an F-16 and 1/60th that of an F-22[4]. Such a turboprop must be capable of operating from the surface to 25,000 feet with an operational speed of about 300 knots. More importantly, it must provide military commanders with increased playtime over a conventional fighter, up to five hours on station. It must also have accurate and responsive direct fire capability, in order to address the need for dynamic targeting. Thus, the gun and laser-guided rockets will remain indispensable weapons. In terms of connectivity, light attack aircraft must be equipped with modern communication systems to support the emergence of *Digital Aided CAS* (Da-CAS) and, more generally, to be in phase with the digitization of the battlefield. Finally, the acquisition strategy must give priority to short development cycles in order to control costs and ensure industrial responsiveness. To do this, off-the-shelf purchases (*Super Tucano*) or the adaptation of an existing training aircraft (AT6) are still two suitable solutions. The second option would also enable synergies to be developed between operational transition schools and LCA-equipped units.

1. Purchase of a small fleet of attack aircraft to train the Afghan Air Force.

2. Program initially known as *Light Attack Support for Special Operations* (LASSO).

3. "Air Combat Command (ACC) Light Attack/Armed Reconnaissance. Request for Information", July 27, 2009. https://www.fbo.gov

4. J. Turner. "The OA-X experiment: is there a future for light attack aircraft?", *Air Force technology*, June 2018. https://www.airforce-technology.com

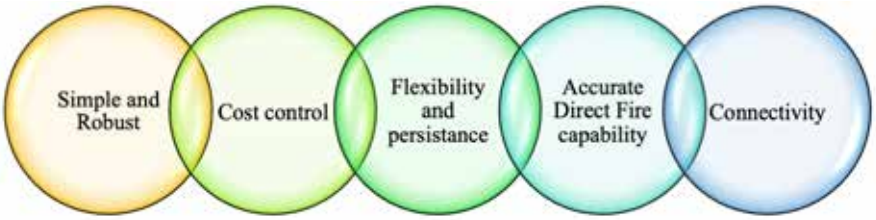

Figure 1: *Characteristics of light fighter aircraft*

Beyond the search for military efficiency in the lower end of the spectrum, the USAF's *Light Air Support* program had two other defining requirements. First, it aimed to bring together partner countries of the United States that do not have conventional fighter aircraft for a specific mission – that of combating violent extremist organizations– and providing an interoperable weapons system for which they would provide support: *light combat aircraft*. For example, the Afghan Army already operates *20 U.S.-supplied and -funded Super Tucano aircraft*. *"We're looking at light attack aircraft through the lens of allies and our partners",* David Goldfein, the previous USAF chief of staff, told members of the Senate Armed Services Committee at the time. "*A big part of the project is to build a common architecture and intelligence sharing network, so that those who would join us would be part of the campaign against terrorist or violent extremist organizations*"[5].

But more importantly, the project was intended to free up resources for the USAF to focus on its core operational readiness in higher-end missions, as General Arnie Bunch explained at the time: "*If we can get light attack aircraft operating in permissive combat environments, we can alleviate the demand on our fourth- and fifth-generation aircraft, so that the crews operating them can train for the high-intensity combat for which these aircraft were designed*"[6]. The introduction of a dedicated fleet, less costly and more adapted to low-intensity conflicts, reflects an effort to implement a new high/low mix of combat aircraft in the force structure.

Both programs seem to have fizzled out, at least for the moment. The USAF has considerably curtailed its initial ambitions, keeping only a few aircraft to prolong testing. Congress dashed the hopes of U.S. Special Forces by refusing to fund the *Armed Overwatch* program during the 2021 budget vote. To justify its decision, the US legislature insisted on the need to conduct a thorough analysis of the survivability of these aircraft in the light of the escalation of threats, as well as the impact the arrival of these aircraft could have on the force structure, employment policy, as well as pilot training and education.

5. *Ibid.*
6. *Ibid.*

The future of light combat aircraft thus appears to be on hold pending the results of additional assessments, and it is difficult to imagine a favorable outcome at a time when the American defense apparatus is focused on preparing for high-intensity conflicts and withdrawing its troops from "never-ending" wars.

The French dilemma of versatility in a context of extensive military involvement.

The setbacks to the program have not, however, eliminated the main American motivation: to ease the pressure on the use of fighter jet, which are heavily involved in low-intensity operations, in order to free up human and material resources in view of the anticipated resurgence of competition between great powers. This motivation is mirrored in France, which is facing the same difficulties, albeit on its own scale.

Since the arrival of the *Rafale* in 2005, France has chosen versatility and high technological value over aircraft specialization, whereas specialization had previously been the objective with the *Mirage* series. This choice has enabled the French armed forces to upgrade their fighter aircraft and streamline their fleets for greater efficiency. But this effort went hand in hand with the reduction of the fighter fleet by half since 1991[7]. Versatility has therefore resulted in a double phenomenon of contraction and concentration of the fleet on a reduced number of very modern and very capable aircraft.

At the same time, thirty years of intense conflicts followed the Cold War, during which time French airpower was widely used, consistently achieving clear superiority over the enemy. The French Air Force was then relentlessly engaged in these low- or medium-intensity conflicts, and it continues to be so today in the Sahel and the Levant regions[8]. The choice of versatility, coupled with a strong commitment of a limited number of aircraft, has placed combat aviation under great pressure, and the armed forces are faced with a dilemma when confronted with the possible resurgence of great power competition. This dilemma relates to three areas of concern: force structure, training for high-intensity combat and controlling costs on operations.

Versatile does not mean ubiquitous

The first point of emphasis concerns force structure. The choice of versatility has in fact been used as a pretext to streamline fleets, partially neglecting the needs and constraints of force structure[9]. However, versatile does not mean ubiquitous, especially when facing simultaneous conflicts. The more fighter

7. The Air Force and Space Ministry had 450 aircraft in 1990, whereas the 2030 operational target is 185 multirole aircraft.

8. Even if the Russian presence in eastern Syria makes the situation more complex and ambiguous, with a partial dispute over airspace, the Levant theater is still a theater reflecting the lower end of the conflict spectrum.

9. J. Henrotin « Des armes à tout faire ? Modularité et polyvalence des équipements militaires », Focus stratégique, n° 54, October 2014.

aircraft are employed in selected low-intensity overseas operations, the less available they are to create a favourable balance of power in the event of the resurgence of wars that are more violent. However, geopolitical upheavals, the hardening of operational and strategic environments, and the ever-growing contest of multidomain superiority, now make the hypothesis of a direct confrontation between great powers credible. The *Armée de l'air et de l'Espace* must therefore ensure that they are ready to scale up to this demanding future and to muster a sufficient number of "ready-for-combat" aircraft in order to avoid a tactical setback when faced with an enemy that seizes the initiative.

A deceptive operational readiness

The second point of emphasis concerns operational readiness, which is hampered by a number of flying hours below NATO standards, insufficient to hone the skills of full-spectrum war, especially the high end when faced with a peer-competitor. As Joseph Henrotin points out, "*no equipment, even if it is designed to do so, is versatile if its users are not*"[10]. However, current operations consume the lion's share (50%) of the annual flight hours allotted to French pilots for a very specific type of mission thus creating a deceptive impression of operational readiness.[11]. In fact, the remaining flight hours are not sufficient to fully master missions involving high-intensity combat such as first entry, counter-air in demanding environment, deep strikes or all-weather low-level penetration.

The performance of versatility in low intensity conflicts

The last point concerns controlling the cost of operations. For example, in 2015, reserve colonel and historian Michel Goya estimated the cost-effectiveness of operations Chammal and Barkhane at "*one million euros per neutralized jihadist*", calling into question the effectiveness of joint operational strategy and tactical choices[12]. While the figure put forward remains debatable and is a caricature taken out of context, Colonel Goya does have the merit of reminding us that versatility can be costly in low-intensity conflicts, especially when it is based on high-end technological solutions[13]. In contrast, the ambition of the LCA concept is to reduce acquisition costs to $10 millions per aircraft and activity costs to $2,000 per flight hour. In comparison, the cost of a *Rafale* is estimated at 80 million euros for an operating cost per flight hour of around 17,000 euros, i.e., 10 times higher for acquisition and scheduled maintenance of equipment.

10. *Ibid*
11. D. Pappalardo, « Le Levant » in J.B. Jeangène-Vilmer and J. Fernandez (dir), *Les opérations extérieures de la France*. Paris, CNRS éditions, 2020, p.285-292.
12. M. Goya. « Un million d'euros le djihadiste », Blog La voie de l'épée, 24 September 2016. https://lavoiedelepee.blogspot.com
13. *Ibid.*

In this context, trading the concept of versatility for increased differentiation in the use of combat aircraft is tempting. At first glance, the adoption of a fleet of propeller-driven light combat aircraft, less expensive and more adapted to low-intensity conflicts, could be a way to respond to the difficulties of the *Armée de l'air et de l'Espace*: resources that can be mobilized for high-intensity combat would increase (*readiness*); *Rafale* crews could devote a more significant part of their air activity to high-intensity combat, for which the aircraft was primarily designed (*preparedness*); the cost of operations could be controlled below a more sustainable threshold, freeing up financial resources for activity or capability improvements (*sustainability*).

The *grimace* behind the *smile* of temptation

To ignore or disregard the benefits of a propeller-driven light combat aircraft for the *Armée de l'air et de l'Espace* would be both inexcusably thoughtless and dangerously reckless. However, a closer look at the issue reveals that the light combat aircraft concept also faces major difficulties in the French context.

No actual savings to achieve the same result

This solution is in fact more costly at the same level of ambition. It sacrifices concentration allowed by the reach and responsiveness offered by fighters in the hope of regaining flexibility at the local level. By its very nature, it only partially responds to the "tyranny of distance", imposed by intra- and extra-theater sprawl. Thus, in order to maintain a close air support capability over a wide theater, it would be necessary to multiply the number of forward bases along with the logistics, the resources required to ensure defense, support assets, and human resources.

Let's take the example of Barkhane and limit ourselves to the following areas of interest: the Madama and Toumo passes in northern Niger and Chad; the Aïr massif in Niger, the central Niger delta in Mali, the Adrar des Ifoghas in northern Mali and the Lake Chad region. For *Barkhane*, consider a situation where the fighter component is armed with two expeditionary wings in Niamey and N'Djamena, allowing the force to cover the entire theater in a responsive manner. To carry out the same missions, five LCA units would be needed, but they would not be able to deal with contingencies and unforeseen events in the region (such as a hostage crisis in Timbuktu or a conflict in the Central African Republic).

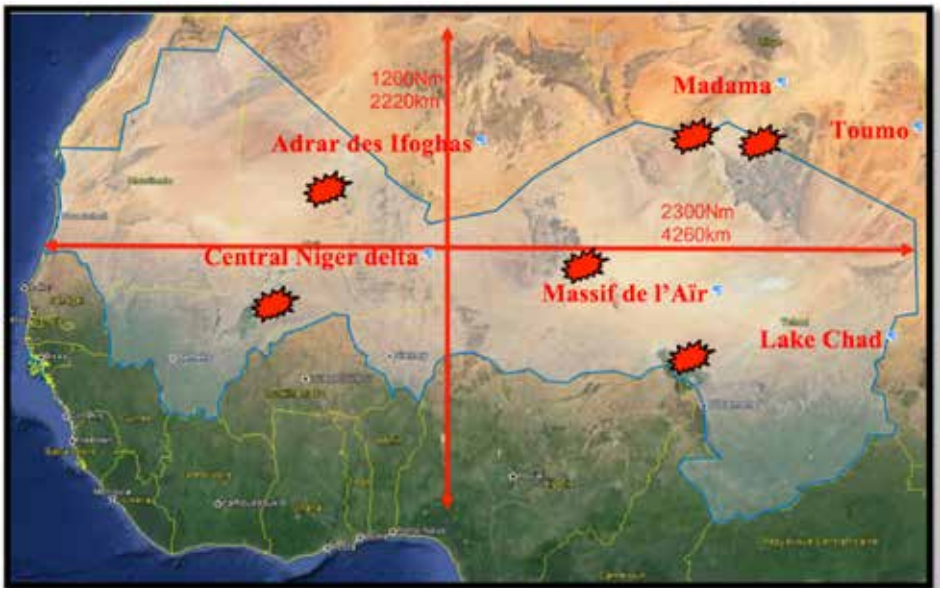

Figure 2: Scope of the *Barkhane* operation

Therefore, the "tyranny of distance" sheds new light on the estimate that LCA are ten times cheaper in terms of acquisition and maintenance costs, especially at the same level of ambition. First of all, the human and logistical costs associated with the multiplication of deployment sites should not be ignored in the equation, particularly in view of the difficulties induced by the mobility function (number of transport aircraft available for intra-theater logistic) and that of the protection and defense function. In terms of deployment, these light combat aircraft, even if they are "rustic", cannot be accommodated out of nowhere, but must be supported by the creation of Forward Air Bases (*Bases Aériennes Projetées*).

In addition to these operational and logistical requirements, there would inevitably be the organic and technical costs, with the creation and maintenance of operational and maintenance pools that are adapted and specialized (need for a training school to ensure rotations). The application of the methodological guide for calculating operational contracts thus allows us to estimate an increase of about 80 pilots and 15 aircraft in the Air Force fleet volume for the crisis management mission alone, restricted to the Sahel theater (Table 1).

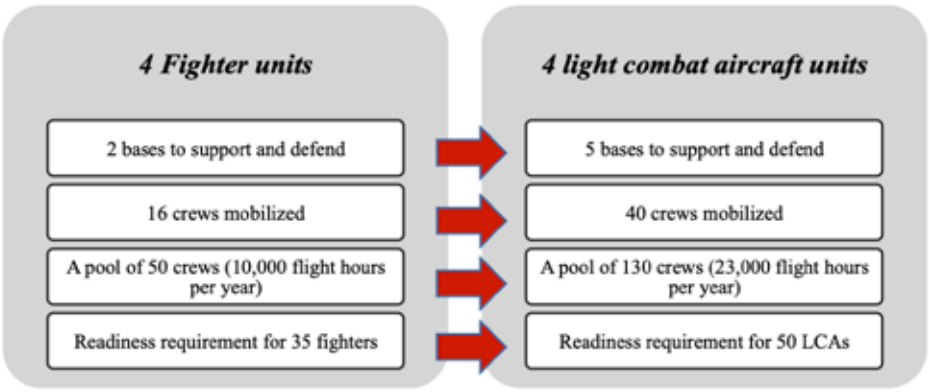

Table 1: Impact of LCA on crisis management operational contract limited to Sahel

Strategic ambition and the risk of downgrading

Moreover, the quality and quantity of our aircraft ultimately determine the level of our political and operational assertions, which, when the last budgetary law was passed, stood at 185 multirole combat aircraft. Any commitment to a propeller-driven light combat aircraft concept must not be carried out to the detriment of this capability, otherwise we will have to downscale our ambitions in terms of major engagements and deterrence.

Macroscopically, the United States, for example, has budgeted $2 billions for the *Light Air Support* program, which is more than the total cost for developing the F4 *Rafale* standard (excluding *retrofit* costs). With the respective differences having been considered, the acquisition of such a fleet of light combat aircraft would inevitably weaken the force structure and the necessary upgrading of the combat fleet, at a time when the Air Force is engaged in the build-up of FCAS to hedge against *Anti-Access/Area Denial (A2AD)* postures.

The prospect of a heightened surface-to-air threat

Lastly, the LCA concept is based on a risky strategic assumption: that air superiority will remain acquired even in this type of conflicts. However, the profusion and proliferation of surface-to-air systems increases the vulnerability of these slow, unarmoured aircraft. In this respect, the contestation of air domain is already perceptible in the Levant, where the notion Close Air Support in denied environment is re-emerging. This is why the *Mirage 2000* had to be replaced by the *Rafale* in the Levant from 2016 onwards, where the Russian presence complicated the work of the coalition. The Rafale had indispensable air-to-air self-protection against intimidating Russian aircraft, as well as a more comprehensive array of air-to-ground solutions[14].

14. D. Pappalardo, « Le Levant » in J.B. Jeangène-Vilmer and J. Fernandez, *op. cit*.

More generally, the presence of surface-to-air threats, even at short range, requires adapted flight profiles and tactics. A combat helicopter – even one that is vulnerable to light infantry weapons – can always hide in the local terrain and activate its self-protection means in close combat. A fighter aircraft can rely on its speed and electronic warfare capabilities to defeat this type of threat, or on its GNSS-guided[15] *stand-off* weapons to stay out of their interception range. On the other hand, while light combat aircraft must be able to operate at the same altitudes as a traditional fighter, they cannot benefit from their speed, EW capabilities or stand-off munitions. Worse, the effective use of their direct fire weapons (cannon and rockets) would require them to descend into the lethal envelope of enemy ground-to-air systems, including light infantry weapons.

In short, there is no indication that tomorrow's air support missions will be conducted in the operational comfort of today. On the contrary, prospective analysis of current conflicts highlights an ever-increasing constraint on the freedom of movement in the third dimension, combined with a challenge to the use of the electromagnetic spectrum. Therefore, engaging in a propeller-driven light combat aircraft acquisition program would be more in line with "yesterday's war" than "tomorrow's", where salvation will come through the definition of a global air combat system, made up of an interoperable network of manned and unmanned weapons systems, interconnected with each other.

The *extensive* implementation of the light turboprop aircraft concept to meet the needs of the *Armée de l'air et de l'Espace* thus seems to lead us into a threefold financial, organizational and operational dead end. In its current state, it could not constitute a new paradigm on which to base operational crisis management missions, unless the French strategic ambition is reviewed. Far from generating budgetary savings, the risk is, on the contrary, that of wasting resources that are already scarce. This does not mean that the idea should be dismissed. On the contrary, we must continue to reflect on how to adapt the concept to French ambitions and resources within the future force structure.

What force structure to fit what end?

For the foreseeable future, France will have to continue to deal with crisis management missions (the most likely but least demanding) and the return of strategic competition between great powers (the least likely but most dangerous missions). The force structure of the *Armée de l'air et de l'Espace* must make it possible to hone the skills of a full-spectrum war by building the best possible compromise. In the short term, this compromise involves a

15. Global Navigation Satellite System.

combination of fighter jet and armed RPA for crisis management missions. In the medium term, France could propose a propeller-driven light combat aircraft solution, not for its own needs, but to help regional partners like the G5 Sahel countries in developing air support capabilities. In the longer term, the arrival of FCAS should trigger discussion around a new *companion trainer*, which could pave the way for an in-flight refuellable lighter combat jet, in addition to the *New Generation Fighter*, the *Rafale* and remote carriers, which are more specifically designed to operate in contact with the enemy.

The synergy of fighters and RPA in crisis management

To date, the combined use of fighter aircraft and armed MALE[16] RPA is the best possible combination for fulfilling the crisis management missions entrusted to the Air Force: fighters offer reach and global responsiveness over very large areas and great survivability, while RPA, thanks to their persistence and surveillance capabilities, offer local responsiveness over a much more restricted area. Close by when *persistence* is needed and capable of acting without delay *at long distance*, this combination contributes to the implementation of a true chrono-strategy, capable of combining time in all its forms (speed, duration, frequency and opportunity).

First of all, fighter aircraft are adapted to sparse areas, as is the case in the Sahel. The long reach of fighter jets allows them to operate in depth while limiting their footprint to a specific theater, particularly with regard to the political objectives and constraints set for an operation. Their speed makes them relatively ubiquitous, allowing for the rapid concentration of forces when faced with a grouped enemy, or the almost immediate shifting of forces across a huge theater, depending on priorities. Their global responsiveness theater wide allows them to offer in a few hours an initial significant military response capability to a crisis, even at a very long distance. Finally, air power is capable of delivering effects at all levels, from strategic to tactical[17].

In a complementary manner, armed UAVs enable the implementation of a true *Reconnaissance-Strike* capability, offering local responsiveness and optimized time control: in the long term, thanks to the permanence of the system, and in the short term, thanks to the real-time dissemination of information. In 2021, the armament of the *Reaper* Block 5 has thus made it possible to benefit from a wider range of solutions than previous versions, with the firing of dual laser/GPS-guided bombs (GBU-49) and direct trajectory

16. MALE : Medium Altitude, Long Endurance.
17. D. Pappalardo. "Airpower: An Enabler Offering Strategic Opportunities The Force of Flexibility, Synergistic Effects and Versatility", *Journal Over The Horizon*, March 7, 2018. https://othjournal.com

Hellfire[18] missiles. The *Armée de l'air et de l'Espace* must continue its effort beyond the 2019-2025 military procurement act, whose annexed report provides for the increase of these capabilities to 8 MALE systems (24 aircraft). The increase in the number of systems will make it possible to multiply orbits, subject to an adequate increase in human resources.

On the other hand, these MALE RPAs remain extremely vulnerable as soon as surface-to-air systems, even relatively unsophisticated ones, appear in a theater. The *Armée de l'air et de l'Espace* must therefore be prepared to deal with the emboldening of regional powers and the return of power struggles. High-intensity conflict is no longer simply a distant and abstract hypothesis: fighter aircraft, which will include manned aircraft and drones that are very different from the *Reaper*, will have a significant role to play in overcoming these challenges, guaranteeing the preservation of air superiority and avoiding the risk of strategic downgrading.

A catalyst for cooperation and integration within the G5 Sahel

In the medium term, use of propeller-driven light combat aircraft could also be a means of relieving the burden on the air and space forces by proxy by helping the G5 Sahel countries (Burkina Faso, Mali, Mauritania, Niger, Chad) to structure their own air power based on a joint initiative. These countries are engaged alongside French forces in Operation Barkhane in the fight against jihadist organizations and operate a heterogeneous fleet of combat aircraft, which does not facilitate organic and operational synergies to achieve greater operational effectiveness on the ground. Burkina Faso, Mali and Mauritania are already using Super Tucano aircraft (although in different versions), which fall into the light combat aircraft category.

France, with willing European partners, would benefit from proposing a joint procurement, training and operation offer, or even helping the G5 Sahel countries develop a doctrine of use that would guarantee better interoperability, including with the Barkhane force. This project could be part of the capability development assistance for the G5 Sahel Joint Force, allowing the pressure on the air force's fighter component to be eased and providing additional room to maneuver in view of the return of competition between great powers.

Funding for this operational military partnership project could be provided by the European Union's European Peace Facility (EPF), within the framework of the future Capacity Building project inside the Permanent Structured Cooperation (PESCO)[19]. This model could be extended to other partners beyond the Sahel.

18. For the record, the two Reaper Block 1 systems are only capable of firing laser-guided weapons (GBU-12).

19. The CSP regulation requires that at least two Member States join France in this project to be eligible for funding

The perspective of the *companion trainer*

In the longer term, the French Air Force is committed to building FCAS, designed as a system of systems, including the *Next Generation Weapon Systems*, at the core of the collaboration with Germany and Spain. The NGWS is to be built around a *New Generation Fighter* (NGF), unmanned vectors, remote sensors and/or effectors with a certain degree of autonomy (*Remote Carriers*), all interconnected in a much larger system of systems (*Combat Cloud*)[20].

Of course, the *Rafale* will remain an essential partner of the NGF within FCAS until 2060, combined with remote carriers for the most dangerous missions. However, initial concept studies suggest that the NGF will be larger than the *Rafale*[21] and will be designed for combat in a disputed environment. Its arrival in the forces will likely go hand in hand with the need for a *companion trainer* that is less expensive to operate while offering performance similar to that of enemy fighters. This aircraft should primarily serve as a training partner for operational readiness (*Red Air* missions) while providing additional activity for crews. It is also possible to make it a lighter combat aircraft, easier to engage in the most permissive missions. In the future force structure, light combat aircraft would have their place, but in the form of a light, single-engine aircraft, refuellable in flight, with a man-machine interface similar to the NGF to facilitate the transition from one vector to another. This aircraft could be developed in cooperation, as the need for air power force generation is widely shared in Europe.

However, this aircraft must not crowd out the volume of NGFs so as not to compromise the ability of the *Armée de l'air et de l'Espace* to prepare for the return of high-intensity warfare. The upscaling of threats requires reconsidering quantity as a quality essential to successful operations. In a war of potential attrition, the number of aircraft, ammunition and crews is indeed decisive.

Conclusion

As the strategic update published at the beginning of 2021 indicates, the future environment will be marked by the persistence of entrenched crises, to which will be added the threats already identified in the 2017 Strategic Review. In particular, the return of strategic and military competition is now assumed by the major powers, while regional powers are taking advantage of the relative disengagement of the United States to assert their interests at the cost of growing military adventurism. The outbreak of a major war could once again become a credible possibility.

20. Exploratory concept "Collaborative connected aerial combat" n°00501068/ARM/EMAA/SCPA/BPLANS/NP, avril 2020.
21. 30-35 tons class compared to 24 tons maximum for the *Rafale*.

In this context, France must have a combat air force capable of dealing with the entire spectrum of conflict. In this light, embarking on the adventure of a light combat aircraft based on a turboprop engine does not seem appropriate, on pain of strategic downgrading. On the other hand, the future must be prepared by reconciling technological superiority with the need to regain sufficient combat mass to offer a favorable balance of power and withstand attrition over time.

A lighter jet fighter could therefore be developed in cooperation to serve as an operational transition aircraft after the PC-21s are retired, as a Red Air aircraft representative of future threats, but also as an attack aircraft for missions in permissive environments, with a logic of differentiated use of fighter aircraft: the NGF and the most modern *Rafale* for high-intensity combat alongside remote carriers; a light single-engine fighter for less demanding, but nonetheless essential missions. It is in this spirit that the *Armée de l'air et de l'Espace* should think about a light combat aircraft for the 2030-35 horizon, not by giving in to the temptation of a turboprop, which is ill-suited to sparse areas and unable to overcome the tyranny of distance.