Defense & Security Analysis

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/cdan20

Looking Beyond the J-UCAS's Demise

Alain De Neve a & Christophe Wasinski b

a Center for Security and Defence Studies (CSDS) of the Royal Higher Institute for Defence (RHID), Campus Renaissance, Av. de la Renaissance 30, 1000, Brussels
b Recherche et Enseignement en Politique Internationale (REPI), Department of Political Science, Free University of Brussels, ULB CP172, avenue F.D. Roosevelt 39, 1050, Brussels

Published online: 16 Nov 2011.

To cite this article: Alain De Neve & Christophe Wasinski (2011) Looking Beyond the J-UCAS's Demise, Defense & Security Analysis, 27:3, 237-249, DOI: 10.1080/14751798.2011.604484

To link to this article: http://dx.doi.org/10.1080/14751798.2011.604484

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the “Content”) contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at http://www.tandfonline.com/page/terms-and-conditions
In the first half of 2006, and in the midst of a global review of the US’ most costly military programs – the Quadrennial Defense Review 2006 – the United States Department of Defense (DoD) officially decided to put a definitive end to the technological demonstration program of an uninhabited combat aircraft also known as Joint Unmanned Combat Air Systems (J-UCAS). Officially, the J-UCAS was a joint Defense Advanced Research Project Agency (DARPA)/Air Force/Navy effort aimed at demonstrating the technical feasibility and the military utility for a networked architecture composed of weaponized unmanned air vehicles and sensors. The objective pursued by J-UCAS advocates was to promote the definition of uninhabited systems dedicated to a wide array of dull, duty and dangerous missions, including suppression of enemy air defenses (SEAD), surveillance, precision strike and, last but not least, combat operations. This was at least the official rationale behind the technology demonstration program initiated under the auspices of the DARPA and the two Services.

The development of such a robotic weapon system for expanded tactical missions has rapidly come to be at the center of rivalries between the US Air Force and the Navy regarding the definitive panel of missions such a system would have to accomplish. Even inside each of the Services co-operating on the technological demonstrator program, no single view was developed about the range of missions the future J-UCAS would have to accomplish. Besides doctrinal divergences between the four US Services, another explanation of the J-UCAS failure has to be explored. What was remarkable about the J-UCAS is that it involved not only a different way of thinking about air systems, but also a radical breakthrough in the way the whole process of engineering and development has to be thought of.
DECONSTRUCTING THE J-UCAS

Now terminated as a program on its own, the J-UCAS “experiment” appears to be an ideal test-bed in order to demonstrate how military technological programs, especially those initiated in order to explore innovative and experimental capabilities, are socially constructed. A common belief is that “the development of technology is driven by an autonomous, non-social and internal dynamic.”¹ Such a technological determinism has been challenged by the Social Construction of Technology (SCOT) program whose main promoters, Trevor Pinch and Wijbe Bijker,² have lastingly defended the idea that technological change does not necessarily mean “progress”. A weaker version of such a technological determinism also exists for it supposes that, without necessarily leading towards “progress”, technological innovation is following “natural trajectories”.

Keeping in mind the above-mentioned considerations regarding technological innovation and progress, some interesting questions should thus be examined: What are the main incentives of technological innovation? Are disruptive technologies the result of a clear expression of needs or the derivative products of internal rivalries and interservices competitions? Finally, does technological failure sometimes lead to progress?

Technological systems – especially those developed for military purposes – do not pursue a “natural, preplanned and linear trajectory.” Rather, they are the result of a constant turmoil between plans, concepts and projects of diverse – and sometimes, opposing – actors. Occasionally order emerges from such confusion and a technology succeeds. Like Janus, technological innovation is double-faced. First, technological innovation must be considered as a concrete illustration of political, military, scientific, and industrial leaders’ views (often contradictory) about the world military balance, be they mistaken or biased. Second, technological innovation, as it comes progressively to nurture genuine operating military systems, has the potential to influence the state of world affairs. To have the “potential” does not necessarily mean that every technological advance in the field of armaments will actually change or alter the balance of forces or, in a narrower point of view, the way war will be waged in the future.

In his book Weapons without a Cause, Theo Farrell argues that three questions have to be addressed to establish whether or not the military requirement for a precise weapon is genuine.³ These questions are intended to evaluate, respectively, the necessity, the capability and the opportunity of an acquisition. The first question is: Was the weapon intended to carry out a necessary military mission? Here, the analysis is aimed at evaluating whether or not a security challenge does exist that justifies the development of a new technology. The second question that needs to be addressed is whether the projected weapon is “well-suited” to carry out the above-mentioned military mission? Finally, the third question will try to assess if the projected weapon is not only well-suited but is also the “best-suited” for the mission. In other words, are there other, more cost-effective alternatives for meeting the security requirement defined by the policy planners? As will be explained, neither of these questions was correctly addressed by the services involved in the development of the J-UCAS.

The J-UCAS technological demonstration program is interesting for more than one reason. First, it is the first time that scientific and technological advances allowed the US military Services, in co-ordination with the industry, to imagine the feasibility of an
autonomous aerial system for defense requirements. At the same time, it must be remembered that such a technological innovation is always the result of an arbitrary process between profit-seeking (i.e. to fulfill the same missions with less or more efficient means) and technical performance. In other words, like any other form of innovation, military technological innovation does not occur *ex nihilo*; it is inextricably linked to the economic context. Second, the J-UCAS served as a test-bed for a new, innovative development method in the field of military technology: the Spiral Model of development. First implemented in information technology (IT), the Spiral Model has been extended to the military field in order to manage high-risk technological programs (e.g. the Army’s Future Combat System).

**ORIGINS OF THE J-UCAS PROJECT**

Since the inception of the J-UCAS, great confusion seems to have existed as regards both the origins and the objectives of the project. The purpose of the Air Force and the Navy was not to lead the teams in charge of the management of the program to the development of a genuine unmanned aerial and combat platform, nor was it to deploy UCAV squadrons on a hypothetic battlefield. Rather, the primary mission the managers of the project had to fulfill was the study of the sole, but ambitious, technical feasibility of a wide network of various sensors in which, it is true, the aerial sensors would have to play a specific part.

**EXPECTED ADVANTAGES**

Advocates of the UCAV solution regularly insist on the benefits such systems could bring to the US armed forces. They affirm that UCAVs will be substantially more cost-effective than current weapons systems. According to UCAV’s advocates, among the main advantages of the unmanned combat aerial systems are theater integration, cost of acquisition and cost of maintenance in operation. In that sense, UCAVs will largely differ from existing military platforms, which are characterized by prohibitive systems of integration and maintenance. For these reasons, huge military programs are frequently shut down during budget cuts. UCAVs are also deemed as a solution in terms of system costs. Since the *Desert Storm* campaign, the armed forces have expressed a preference towards military options based on the use of million-dollar cruise missiles and stand-off weapons. These were seen as cost-effective substitutes to expensive and huge-legacy military systems.

It was also believed that UCAVs could provide all of the capability of manned aircrafts with total costs below those of cruise missiles. As will be shown further, such calculations seriously underestimated the impact of acquisition and operational costs on the global budgetary envelope.

**THE FIRST STEPS**

At the very origins of the J-UCAS was the Uninhabited Tactical Aircraft (UTA) program. The UTA project was an effort aimed at designing low-cost, small air vehicles.
In a later phase, the UTA program was renamed Unmanned Combat Air Vehicle (UCAV). Since then, these acronyms have been generalized to denominate various autonomous combat aircraft projects as a whole. Future orientations given to the UCAV technology demonstration program illustrated the changing tactical and strategic visions of its then main sponsor, the USAF. Originally the UCAV program was tasked to provide the Air Force with an autonomous air vehicle dedicated to pre-emptive and reactive SEAD missions against fixed and mobile targets. Special focus was placed on reactive strike capabilities because of the limited ability for pilots of manned aircraft to wait for, find and eventually engage mobile targets. Industry was energetically pushing the idea of the UCAV as a solution to what it used to call the “supergap” of both the USAF and the Navy: that is the inability of existing fighters and bombers to target increasingly mobile systems such as surface-to-air missiles (SAMs) and theater ballistic missiles (TBMs).

The original requirements for a UCAV were:

1. a low life-cycle cost and a survivable design;
2. a mission control station that can fly single or multiple UCAV in swarming squadrons;
3. a secure command, control and communications network;
4. completely autonomous vehicles from take-off to landing;
5. off-board and on-board sensors to locate targets; and
6. human involvement in targeting, weapons delivery, and target damage assessment.

The J-UCAS vision was to develop a weapon system that, according to DARPA, was to expand tactical mission options and provide the US Air Force with new penetrating surveillance capability. Originally, it was decided to design an uninhabited aerial platform with great operational flexibility and minimal maintenance requirements in order to reduce costs. The J-UCAS technological demonstrator was developed to operate as the nodal point of a wider battlefield network. In that sense, J-UCAS was aimed at testing the feasibility of an autonomous aerial platform designed to interact with other systems (uninhabited or manually piloted) in a network-centric warfare environment.

Though great emphasis used to be placed on “autonomy”, both DARPA and the Services implicated in J-UCAS development expressed their intention to maintain the judgment and the moral imperative of the human operator in the loop. Far from extracting the human factor from the combat cycle, promoters of the J-UCAS understood the necessity to preserve human intervention inside the architecture.

Among the imperatives formulated by its conceivers, cost saving was one of the most important objectives of the J-UCAS. This is the reason why J-UCAS was to use a Common Operating System (COS) to facilitate the integration of subsystems such as sensors, weapons and communications. J-UCAS was also designed to ensure intra-operability between its internal components and inter-operability with external combat systems, such as unmanned and manned aircraft, C3 centers or space assets. To this end, the DARPA awarded the Johns Hopkins University Applied Physics Laboratory a $26.9 million contract to integrate the COS into the J-UCAS system. The quest for
commonalities between the two air systems was indeed critical. Since their inception, both the USAF and the USN projects attested to similar technical challenges.

On an organizational level, the J-UCAS program combined the efforts previously conducted under the DARPA/Air Force UCAV Program and the DARPA/US Navy naval UCAV-N project. It was the potential for significant synergy between the two systems – initially developed in order to target each of the service-specific needs – that convinced the Department of Defense to combine the above-mentioned programs. On an industrial level, the J-UCAS consisted of two technological demonstrators, respectively the X-45 and the X-47. The US Air Force selected Boeing to build conceptual airplanes – the X-45 – for defense suppression missions. In a first block of testing and development – designated Spiral “0” – two X-45As were built. The first flight occurred in May 2002. The test demonstrated the basic functionality of the C3 and navigation systems. It also confirmed the validity of the aerodynamic envelope required for future test-flights. For its part, the US Navy decided to choose Northrop Grumman for the conception of the X-47. The X-47 was not expected to address the same requirements as those of the X-45. The platform developed by Northrop Grumman, in accordance with the US Navy’s directions, was to demonstrate low-speed handling qualities, air vehicle performance and navigation performance. The first flight of the X-47 took place in February 2003.

To fulfill the above-mentioned requirements, 15 critical technologies and processes were identified. In order to gauge the level of maturity of the program, these critical technologies were classified according to their degree of risk. At that time, ten of the critical technologies identified were considered to be medium risk by the USAF and DARPA. A medium risk technology means that there was a 30 to 70 percent probability of achieving the desired functionality. The last five critical technologies were considered to be high risk. In other words, there was less than a 30 percent probability of seeing these technologies evolving to the required functionality.

LOOKING FOR JOINTNESS

Military-technological innovation in peacetime has always proved a very risky enterprise for defense establishments anchored in the Western “weapon system” culture. Indeed, as Mary Kaldor has observed, “in peacetime, in the absence of external necessity imposed by war, decisions about what constitute technical advance are necessarily subjective. They tend to be taken by people who make and use the weapons systems, whose ideas are necessarily shaped by institutional experience and interest in survival.” Consequently, “the system is almost completely introverted, concentrating on the perpetual perfection of itself against some future day of judgment.” This is what Mary Kaldor meant by “baroque technology”.

Though technical challenges related to the original version of the UCAV program were very high, additional requirements were demanded by the USAF, thus challenging the ability to make the resources match the defined functionalities. Subsequent requirements included an electronic attack mission capability and an increased combat range and survivability. In December 2002, confronted with such an ever-increasing catalog of requirements emanating from the Air Force, the Office of the Secretary for Defense
invited the managers of the program to envisage a combination of USAF and Navy efforts regarding the development of UCAV capabilities. In June 2003, the OSD decided to establish a Joint Systems Management Office for the UCAV program. Progressively the UCAV program, predominantly funded by the Air Force, evolved towards a joint effort under the auspices of the DARPA. The DARPA, however, was not necessarily the most logical choice in this regard.

DARPA’s main mission resides in innovative concepts validation. Such a program, at that stage of development, would normally have nothing to do inside DARPA. Several explanations were mentioned in order to justify the choice of DARPA as the main manager of the J-UCAS. First, many of the technologies (low-cost, compact, high-speed computing, digital wireless communications, smart algorithms, artificial intelligence, etc.) that were required to advance J-UCAS were started at DARPA. Second, DARPA had an extensive heritage in combat systems development and information technology capabilities over many decades. It would have been surprising to build a future unmanned combat aerial system without building on DARPA’s expertise in those domains.

A third explanation can be found in the DoD’s fears to see the USAF dismantle the J-UCAS program. At the end of 2002, a Report from the Pentagon’s Plans, Analysis and Evaluation Office depicted the J-UCAS as a potential substitute for the F/A-22. These allegations – though they clearly provided evidence of a grave misunderstanding of the very objectives of the technological demonstrator program – gave rise to concerns within the DoD that the USAF could not be as supportive of the J-UCAS project as had been expected.

Co-ordination of the research efforts of both the USAF and the USN regarding UCAV development never gave birth to a common catalog of requirements. Moreover, it can be said that the decision to join the USN, the USAF and the DARPA together for setting up an inter-Services project led increasingly to more demanding performance specifications. It soon appeared that the original rivalry between the USN and the USAF regarding the operational specifications of the UCAV project perpetuated, even under the auspices of the then J-UCAS Project Office (JPO). Such a trend can be explained on the ground of experience cumulated over past military programs.

According to Matthew Evangelista, the weapons innovation process can be divided into four stages, respectively labeled as: (1) technocratic innovation; (2) consensus building; (3) promotion; and (4) open windows. It is interesting, here, to focus on the first two.

In a first phase, it appears that because innovation begins, not in a decision at the higher level of political decision-making, but in the resolution to invest in a new technology, it is often “technocratic” in its essence. At an early stage of weapons innovation, external threats – actual or perceived – have not much to do with the decision to explore new military technologies. In its second phase, the innovation process has to build consensus. Because “technology is not an autonomous force [...] if an idea for a new weapon is to attract political support and funding, it must have promoters.” According to Evangelista, consensus building is characterized by two practices: the first practice is the inability – and, maybe, the absence of will – to limit technical options; and the second practice resides in the tendency on the part of the promoters to accept all specification requirements expressed by the Services that are supposed to be interested in
the acquisition of the new technology. This is the reason why consensus building often leads to the development of weapons of greater technical sophistication than is desirable for a given military mission.

**A COMMON OPERATING SOFTWARE**

“Whatever the form that these future air vehicles take, the one constant that will remain is the revolutionary software system designed to integrate the J-UCAS system elements,” as Michael S. Francis and Michael J. Hirschberg wrote. To put it differently, promoters of the J-UCAS program were firmly determined to bridge the gap between the industrial-age platforms and the network-centric architectures that were expected to dominate the twenty-first century battlefield. 12

The J-UCAS was deliberately built as a software program. The software was expected to be the core of the program. The J-UCAS was not developed to become a “single, one-size-fits-all airplane for all missions,” according to Michael S. Francis. Then he added, “some will be designed with heavy emphasis on stealth, while others may emphasize range or payload or persistence.”

What was particularly striking about the J-UCAS project is that it involved a brand new and different way of thinking about the process of engineering development. This new approach, called “spiral development”, consisted of a series of rapid design-and-build cycles in which the lessons of earlier spirals could be incorporated into the next. As can be seen, “spiral development” differs fundamentally from previous methods of development since it is not based around the settling of a final design to be built. The choice of the spiral model of development is not fortuitous, for it was specifically selected in order to help manage risks linked to large, expensive and complicated projects. The “Spiral Model”, also known as the “Spiral Lifecycle Model”, has its origins in a systems development lifecycle developed by the mathematician Barry Boehm. Today it is used in information technology (IT). As a result, the J-UCAS was conceived less as an airplane than as a networked information system. It could be added that the vehicle was merely the host around which the system was built. In that sense, both prototypes (the X-45 and the X-47) had to be envisaged as Spiral “software development tools”.

Several spirals of development were defined in order to test specific technical objectives. In “0”, individual programs, not yet clustered under the common J-UCAS designation, were based on the more advanced existing platforms – that is the X-45A UCAS and the X-47A UCAV-N. The Spiral “1”, under the J-UCAS program, was intended to design, develop, integrate, and demonstrate the technologies, processes, and system attributes (TPSAs) pertaining to the J-UCAS Operational System.

Spiral “2”, originally expected to take place between 2007 and 2009, had the objective of developing and testing greater operational utility. Results following Spiral “2” were supposed to lead to the development of the J-UCAS Objective System (J-UOS). Due to the premature termination of the program in February 2006, the J-UOS was never reached.
J-UCAS GREW FAT

What was once expected to be a low-cost counterpart to the manned fighter, rapidly evolved into a huge air system designed to address diverse, if not conflicting, requirements. Paradoxically, additional requirements regarding the level of performance and endurance of UCAV – mainly due to US Air Force pressures – contributed to placing the J-UCAS in a competition with manned aircraft programs, such as the F-22 or the F-35. According to Michael S. Francis, who directed the J-UCAS program, “a substantial effort [was] applied to keeping the system affordable and ensuring that it doesn’t duplicate or replace anything else.” If the J-UCAS Program Director was prepared to admit that the UCAV used to be in a competition with the F-22 and the F-35, he also insisted that it was “only for money.” Considering the risk for the J-UCAS was to be in direct competition with major programs such as the F-22 and F-35, DARPA argued that, from its inception, teams in charge of the J-UCAS should focus on conducting technological demonstrations. The goal was not to anticipate the exact needs of the Services because these tended to fluctuate with time. In other words, the program, as a whole, might have been considered as a test-bed for multiple acquisition programs, depending on the Services’ ambitions.

At the end of 2004, during a presentation given at an IQPC Defense conference specially dedicated to UCAV issues, representatives of Northrop Grumman admitted that the Company was looking at the development of UCAVs with a 4.5–7 ton weapon load and a maximum take-off weight of 45 tons or more. In addition, it was expected to study the possibility of designing vehicles able to fly missions of more than 50 hours. According to Northrop Grumman, these requirements, expressed by the US Air Force, were intended to fill what has since been called the “super-gap”, namely the inability for existing advanced fighters and bombers to target increasingly capable mobile systems (i.e. surface-to-air missiles, theater ballistic missiles) deep inside the enemy’s territory. A scaled-up UCAV could operate at a range similar to that of the B-2 (from 5,400 to 10,800 km) and fly well beyond the limits of human performance, thanks to regular air-refueling. Such an UCAV would be limited to carrier compatibility, however, though it was not impossible to imagine a family of UCAV bombers designed to operate from land bases.

Such an evolution was expected to alter the US Navy’s ability to imprint on the J-UCAS’s orientation. Historically, the USN considerations towards projects aimed at the development of unmanned air platforms reveal some paradoxes. Initially, it showed practically no interest or concern regarding the concept of unmanned aerial systems. In fact, the USN soon realized that there were no conceivable circumstances under which its Service could put more than a handful of UCAVs on each of its aircraft carriers. In other words, the numbers of unmanned air combat vehicles needed by the USN were too few to justify a stand-alone program specifically dedicated to naval needs. The conclusion drawn by the Navy was therefore that without a joint program, the Navy would probably not have a UCAV at all.

This is not to say that the Navy did not express its own views on the J-UCAS project. Once the J-UCAS had been placed under the management of the JPO, visions expressed by the Navy about future J-UCAS missions proved to be impressive. Whereas
the Air Force envisaged an unmanned platform as a system mainly dedicated to the
suppression of enemy air defense (SEAD) – that is, a “first day of war” enabler – the
USN initially saw in the J-UCAS a platform – that is the X-47 conceived by Northrop
Grumman – dedicated to intelligence, surveillance and reconnaissance (ISR) missions.
The goal of the USN was to provide its carriers with survivable and persistent
autonomous platforms to complement manned assets and long-range precision strike
weapons.

It was only in a later phase of development that the Navy eventually decided to
integrate strike capabilities to the platform. By designing the X-47 for strike capabilities
from the outset, and by postponing the Intelligence, Surveillance and Reconnaissance
(ISR) capabilities to future development spirals, the Navy contributed significantly to
increasing the degree of technical sophistication of the projected platform. The industry
clearly realized that UCAV developers would have to make trade-offs between surviv-
ability, onboard sensor suites and strike assets.

Another part of the X-47 program was to evaluate the feasibility of an autonomous,
precision-guided landing on aircraft carriers. The objective of the Navy was to fit the
X-47 with a new carrier landing system, the Shipboard Relative Global Positioning
System (SRGPS), aimed at succeeding the then Automatic Carrier Landing System
(ACLS) used for many years by the US Navy for its piloted aircraft.

It clearly appears that the cost-saving criteria would be very difficult to address. In
2003, the DoD expected to spend US$3.9 billion on the projected UCAV (USAF) and
UCAV-N (USN) by fiscal year 2009 (FY2009). In its roadmap, the DoD predicted that
the UCAVs would cost less than the F-35 per pound of payload carried (US$5,500 vs
US$7,300). Final prices depended on the number of UCAV ordered, however. For the
Navy, it was very difficult to determine its exact needs. Due to technical and platform
limitations, it was not possible for the USN to allocate more than six vehicles to each
carrier. It was thus unlikely to expect the Navy to express a need for more than 100
UCAVs. Regarding the US Air Force, a total command of 150 units was considered as
the maximum possible. As a result, the expected total number of acquisitions by both
the USN and the USAF was not sufficient to determine the exact unitary cost of
J-UCAS platforms.

Operational costs were also an issue. According to one USAF officer, the need for the
development of mission control systems on the ground could make the UCAVs more
expensive to operate than manned aircraft. All these elements contributed to de-mystify
cost-saving perspectives initially promised by UCAV advocates.

TERMINATION AND REVIVAL

Due to budget cuts, priority changes and, probably, management divergences, the
J-UCAS program was canceled in the first half of 2006. Forewarnings of a probable ter-
mination of the project led jointly by the DARPA, the USAF and the USN occurred as
soon as the DoD decided in 2005 a US$ 1 billion cutback. Though some observers at
the time argued that the project could survive the next Quadrennial Defense Review
(QDR), the DoD decided in 2006 to terminate the J-UCAS project. Even then, the
J-UCAS's death did not mean that the Services abandoned the idea to develop UCAVs
in the future: “J-UCAS was canceled, but the technologies have survived.” Moreover, the QDR did not speak of a “clear-cut” termination when evoking the future of the J-UCAS program. Rather, the 2007 US defense budget redirected the program’s funding to a vaguely defined “Next Generation – Long-Range Strike” (NG-LRS).

The US Navy was the first to regenerate the project of an unmanned aerial system. This time it was exclusively designed for carrier-based operations. Boeing – with its X-45B – and Northrop Grumman – proposing the X-47B – submitted bids for the USN project. In 2007, the Navy awarded a demonstration contract to Northrop Grumman in order to manufacture an inhabited air vehicle for operations from the carrier deck. The X-47B was thus resurrected by the company, which gave it a brand new label: the Unmanned Combat Air System – Demonstrator (UCAS-D). The US Navy’s requirements for the technology demonstrator proved to be very conservative. It must also be noted that the USN planned a six-year demonstration phase (stretching from 2007 until 2013) and made no commitment to pursue the UCAS-D program beyond its prototype phase. Could this situation change? According to some observers, the US Navy and the US Air Force have held discussions on reviving collaboration on building stealthy, unmanned combat air systems, more than three years after parting ways. Things remain to be confirmed during further talks.

Notwithstanding USN allegations, it appears that the Service requirements as regards the UCAS-D specifications have not been notably lowered compared with those of the J-UCAS X-47. The USN is still on track to develop with Northrop Grumman an unmanned low-observable aircraft capable of undertaking surveillance and precision strike missions at high subsonic speeds from aircraft carriers. A special emphasis has been placed on air-to-air refueling (AAR) which had been considered a critical capability for the UCAS-D. A test-flight, aimed at demonstrating the AAR ability, was originally expected to take place in November 2009 at Edwards Air Force Base. It was then postponed to the first half of 2010, which should mark the beginning of a two-years’ flight envelope intended to certify aircraft carrier operations. A second series of tests, expected to take place in 2010, would be performed using a surrogate aircraft with AAR equipment. AAR flight tests using the X-47B platform are not expected to occur before 2012.

On the US Air Force’s side, calculations regarding the future of unmanned combat aerial vehicles were jeopardized by the financial charge associated to the final phase of development of existing new generation fighter’s programs (such as the F-22 and the F-35). It must also be added that concerns over the definition of the NG-LRS have raised questions over the USAF’s middle- to long-term vision.

Shortly after the demise of the J-UCAS technological demonstrator, the USAF decided to initiate an Analysis of Alternatives (AoA) process, the purpose of which was to determine whether its future long-range bomber would be manned or unmanned (or both) and whether or not it was supersonic. The QDR, published in February 2006, clearly expressed the need to accelerate the launch of a NG-LRS for the US Air Force. Regarding the future of long-range bombers, the QDR 2006 stated:

The Air Force has set a goal of increasing its long-range strike capabilities by 50 percent and the penetrating component of long-range strike by a factor of five by
2025 [. . .]. Approximately, 45 percent of the future long-range strike force will be unmanned.20

Though the QDR was unequivocal over the necessity to speed up efforts to develop a new land-based, penetrating, long-range capability by 2018, the DoD soon revised its judgment by estimating that there was no near-term requirement for a new bomber. The existing fleet would satisfy the requirements around the year 2035. On 10 March 2009, the Office of Management and Budget (OMB) directed the Pentagon to cancel plans for a new long-range bomber. This decision was a drastic set-back for the US Air Force, which, in 2008, had concluded that it should need a new bomber, given that modernizing the existing bombers would not sufficiently meet its operational requirements.

**CONCLUSION: HAS UCAV BECOME ANOTHER “GOLD-PLATING” TECHNOLOGY?**

Alongside cost overruns, questions were expressed as to the future roles of J-UCAS platforms in future warfare. Unknown factors regarding the operational benefits that unmanned combat aerial platforms could bring were resumed. As one USAF official ruefully observed, “Everyone agrees that UCAVs are the answer [. . .]. We just have to figure out what the question is.”21 Paradoxically, it was this lack of a precise mission for UCAVs that largely contributed to the size of the J-UCAS being driven upwards.

Questions still remain as to whether there is a fundamental operational requirement for UCAVs. Some observers do not hesitate to allege that other types of weapons, such as cruise missiles or stand-off weapons launched from habited platforms, could do the same job in a more cost-effective way. In other words, rather than asking whether UCAV is the best cost-effective solution for meeting the defined mission requirements, the Services are likely to press for the greatest possible performance, regardless of cost.

This has not proved to be a viable strategy for the UCAV developers. In retrospect, it appears that both the USN and the USAF never defined their precise needs for a common unmanned combat aerial system. As a result, the DoD never obtained a clear demonstration of the need to commit large investment on J-UCAS. Each Service has had a share of responsibility for the program’s failure. The US Navy came late with its vision about UCAV. Moreover, it never decided how many aircraft it would need. The US Air Force failed to fix definitive technical specifications. But there is more: as observed in a Jane’s Information Group editorial, “there have been at least five different plans for building the UCAS into the USAF.” Unsuccessful attempts conducted by both Services in order to define J-UCAS technical specifications tend to prove that new technology does not necessarily change either people’s identities or their institutional cultures.

Given the information available, nor was the J-UCAS a technological breakthrough either in armaments or as an innovation in the way that military programs should be managed. Instead the program was a direct legacy of the Western “weapon system” culture. This is a culture that has been widely criticized by analysts for it has usually led to mission requirements inflation, cost-overruns and extremely complex management architectures.
It is currently very difficult – if not impossible – to draw a clear perspective regarding the future of unmanned combat aerial systems. Like any other military technology, UCAV is at the center of a world-wide mimetic process, one that currently leads some military powers to develop their own systems (Russia, India, etc.). Whether these projects will deliver concrete operational results is debatable. One thing is, however, sure: the proliferation of such systems may well be the trigger of a new qualitative technological race. Such a race could accelerate future investments in favor of unmanned combat aerial systems, even though these platforms have a limited window of opportunity to define their exact missions.

Finally, the incidence of strategic and technological cultures on weapons development in the US must be stressed if the J-UCAS’s program cancellation is to be properly understood. The US armed forces, when developing disruptive military technologies, have always proved to be particularly cautious when defining a stable weapon configuration. This was especially obvious over the conception of UAVs. The contrast with the development methodology of unmanned systems in Israel is particularly insightful. In contrast to the US, Tsahal had neither the budgetary means nor the strategic depth to pursue the development of large and complex weapons systems involving long cycles of development. This was particularly true regarding unmanned platforms. Given the threat to its survival emanating from its direct and indirect neighbors, Tsahal had no other choice than to pay attention to precisely defined military systems: that is, “good enough” style armaments or weapons systems, surrounded by a clear and well disseminated doctrine articulated through their armed forces.

A glance at the history of UAV development in the US shows a different phenomenon. Given its relative geographical insularity and air superiority, the US has never felt the geopolitical pressures necessary to define precise and definitive configurations for its new armaments. This was especially true as regards to UAV and UCAV technologies – as the J-UCAS experience has demonstrated.

NOTES
10. The J-UCAS Project Office opened in December 2002. It was the result of the decision taken by the Office of the Secretary of Defense to combine the two services’ efforts under a single direction.


15. Ibid.


