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The Army: Fights in Three Dimensions

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FREEDOM OF SPEECH
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THE TACTICAL THIRD DIMENSION

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Armée de Terre

>> Lessons learned — *Helicopters during the Algerian War*



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Éditorial

C.D.E.F

There is no longer any modern combat on the ground. We become today fully aware of this evolution which is mainly rooted in the sequencing of World War I. At that time, artillery is giving up direct fire and is turning to indirect fire support. Shortly after, this indirect support is depending on observation from aerial sites. From then on, ***there is no more tactical commitment of land forces without using the tactical third dimension.*** There is no commitment ***which does not demand to tightly interlink assets on the ground and land assets using the third dimension.***

Indeed, by drift, tank became an anti-tank asset and we finally ended up to assign it proper missions. Similarly, aircraft became first an anti-aircraft asset and was assigned dedicated missions beyond the tactical battle-space. But ***the tactical third dimension, for its part, really became consubstantial to the efficiency of land forces***. This went up to the point we needed to form the ALOA[1] in Indochina and the ALAT[2] during the Algeria war. At that time, the Air Force's own missions did not enable them to contribute as much as necessary to the tactical success. The evolution was emphasized up to such point that we could no longer speak of "ground combat" for land forces, but merely of *"aérocombat"**. ***"Aérocombat" became a component which could not be dissociated from the air-land battle conducted for its part at joint level.***

The combined-arms commander is the one who *"combines the effects of weapons to achieve operational efficiency"*. He develops now his action in this new tactical space which is his maneuver space. The employment of ***the tactical third dimension*** enables him to see, to understand and to act quicker. This means quicker than the adversary who is subsequently placed in a reaction situation. ***Acting quicker than the adversary means seizing then keeping the initiative. It means depriving the Other from his freedom of action. That is to say to control and subsequently to constraint, which is at the end the goal of any tactical action.*** This is however only possible through ***a really comprehensive maneuver,*** combining from the conception phase on, the whole of resources, whether they act on the ground or close to the ground; this is really about ***a sole maneuver***. It has nothing to do with the concept of "maneuver support" even if this can reveal indispensable such as close air support (CAS). This became again in the current operational commitments, the most indispensable contribution of the Air force.

The comprehensive feature of the maneuver assumes some conditions. The first one is the ***mutual knowledge***. It comes from belonging to a common world and a common culture. To take an example from abroad, this is all the spirit of the motto of the US Marine Corps, *"Every Marine a Soldier"*: in this elite Corps, pilots of support aircraft are all first and for long trained as infantry platoon leaders. They are regularly sent back as infantrymen in operations. The second condition is ***the command of the maneuver and all its vectors by a sole commander***. Such commander is the one in charge of achieving the tactical effect on the ground. By his culture, education and training, he is the best capable to achieve it. He is the combined-arms tactical commander at battalion task force or combined arms brigade level. Such control favors in particular the effect accuracy, not only in space - modern weapons are naturally more and more able of it - but also in time. This assumes, from the time it has been considered as opportune, that ***action is immediate***. It can then no more comply either with the long planning constraints or the risks of an overall coordination performed at a high level. ***Tactical command - G3's- should then decide on the action to respond to operational requirements whereas early coordination should facilitate the achievement of the selected maneuver.***
Comprehensiveness at the lower tactical levels of the various vectors of "aérocombat" is imperative. In addition, there is a new constraint: it was generated by cuts in the volumes of forces. Consequences were exacerbated by the widening of spaces to control. The problem is solved by a ***centralization of reserves and an increase of their availability. Extreme mobility*** is their essential feature. We see here the fundamental contribution of "assault and utility" helicopters - instead of just "utility" ones - in the overall operational capability of land forces with a reduced format.

The maneuver of modern land forces is a comprehensive and integrated maneuver under the command of a sole tactical commander. He controls at his level the various operational vectors in order to enhance the effect through short decision/command loops. The implementation of this concept, not a new one, assumed ***digitization*** of platforms and headquarters. It will be, as we know, at the crossroads of ***the army's tactical modernity. This is built around operational priorities and not around technical procedures of battle-space management.***

Major General Vincent DESPORTES
Commander, Forces Employment Doctrine Center

1 *Aviation légère d'observation d'artillerie:* Artillery Observation (Light) Aviation.
2 *Aviation légère de l'armée de terre :* Army Aviation.
* **"Aérocombat"** is the co-ordinated and integrated maneuver of tactical level units operating on the ground and in an air-space close to the ground, under the direct responsibility of the Force's Land Component Commander.
In addition to ground units, **"Aérocombat"** addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

The Army Fights in Three Dimensions

From the historical point of view, the progressive specialization of the Air Force, especially for what regards air defense, led the other services to develop their own air components. In France, as of the fifties, the Army developed its own aviation, the ALAT[1], in order to fulfill specific missions, particularly linked to its environment and to its service's specific culture.

Today, the very notion of operating within a single and homogeneous environment has become completely erroneous for the Army. The purely land maneuver is replaced by a type of maneuver that necessarily integrates both assets that evolve on and close to the ground. That maneuver is conducted in coherence with all other elements which operate in the third dimension. The technical task of coordinating the means remains of course an Air Force's responsibility.

Within that regulated framework, the Army implements, within the tactical third dimension, weapons systems that are more and more numerous and diversified. Simultaneously it acquires capacities - such as digitization or the MARTHA[2] system - that enable it to participate in the overall control of all its vectors.

The air-land maneuver gets its consistency from living doctrine and regulation that are put to the test of our frequent deployments. It is fully consistent with joint and multinational maneuvers.

BY MAJOR GENERAL VINCENT DESPORTES, COMMANDER, FORCES EMPLOYMENT DOCTRINE CENTER

The Army in the third dimension

The third dimension: a shared space

Airspace has become the environment within which all services operate. As a matter of fact, it is the only one where all components have means that transit through and from which they produce effects. The management of that environment's coordination belongs to the Air Force; however each service keeps the control of its own means which then operate within each of the services' own overall scheme of maneuver.

The Army has **a significant level of expertise in 3D[3] coordination** which is federated at COMALAT[4] level.

The third dimension's land intervening assets

Within that large and complex organization, land forces' combat takes **today a new dimension**. As a matter of fact, in addition to artillery (field and air defense artillery) ammunitions and helicopters[5], we find now the preprogrammed or remotely controlled UAVs. These systems will be able to work together (UAVs-helicopters or UAVs-artillery), in order to improve the weapons systems' capabilities. The number of UAVs will multiply in the forthcoming years. Some will be implemented by the GTIA's[6] combined arms commander. Later on, the infantryman might even be equipped with a mini UAV able to collect information about its immediate environment. This is how will be reinforced that close combination of airland means.

Inseparable actors

There are thus more and more Army actors which navigate through the airspace. Simultaneously, the mandatory coordination of the various combat and combat support branches' actions on the ground requires enhanced combined arms training and a combined arms structure for the brigades. In order to be efficient, **"aérocombat"*** has to be the object of daily training.

The Army Chief of Staff has perfectly summarized that approach in the speech he gave (1 February 2007) at the Army Aviation school on the occasion of the "aérocombat" days: **"The second reason for my being keen to maintaining the "aérocombat" capability within the Army is an operational one.** It is easy to understand by those who have an experience of the air-land combat. It is more difficult to understand by those who do not appreciate well enough the complexity of the physical and human environment inside which we move around. The air-land environment is different from all others. It is not homogeneous, it is uncertain and unpredictable: its complexity cannot be reduced to reading the scope of a radar and to remote system-initiated strikes. Today, the prevailing threat originates from the ground and the airspace located in the immediate vicinity of the ground. And, at the difference of a conventional threat, technological means can only detect it at the last moment. When that threat has been detected by the units in contact, opportunities are very volatile since the enemy is most often merged within the population or at close contact

with our troops and they intend to lead us into committing errors. Thus, operational superiority cannot rest on air and ground components' actions that would not be linked together. It is **only a combined and integrated maneuver** that will allow an optimization of the tactical results. In that sort of war, the **tactical linkage** is essential, as I shall demonstrate it later on. **That tactical linkage can only be the result of a common culture, well maintained and practiced on a daily basis; otherwise, it does not exist."**

The integrated maneuver

A three dimensional space of maneuver...

Land forces' freedom of action starts with the capability they have to make use of their means in accordance with their own requirements. That freedom which is undisputed on the ground

RTSE/ Maurice Lafontaine

might be denied, at least partially or in an indirect way, to those Army capacities operating in the third dimension. **It is thus indispensable that the land component be provided with a volume of airspace specifically dedicated to its operations, in liaison with the authority in charge of theater's airspace management.** That volume, called the air-land zone, is placed under the Army's direct responsibility, with technical coordination being established with the Air Force. Digitization (MARTHA, SIR, SIT, etc.) will provide the combined arms commander with the necessary and adapted tools enabling him to fully control the actions to be conducted within the *"aérocombat"* space of maneuver.

In the "Défense nationale et sécurité collective" magazine of June 2007, Air Brigade General Gelée[7] takes the example of a land component unit requesting fire support. He then proposes to "allocate an attack helicopters section, an armed UAV or a combat aircraft flight, according to the request's emergency, the need for accuracy and fire power". The Army has a different approach. **It will not consider 3D means as supporting assets only but rather as being fully part of the overall maneuver.** It has thus to integrate all the different means, their capacities and limitations early in the conception phase of the maneuver, and then to conduct that maneuver under a single command and control organization. In order to do so, the combined arms commander, during the execution phase, will have to either make use of his own means (helicopters today, armed UAVs tomorrow) or to request the Air Force's ones, taking recommendation from his Air Force advisor.

... which imposes the development of common culture and training

Besides, the use of organic means is a part of the army's culture. For many years during peace time, all of the land combat units have got a twinned combat helicopters battalion. Each year, land forces' platoon leaders practice, together with Army aviation crews, the conduct of fire support or air assault actions[8]. During the preparation before deployment, units are regrouped together and get acquainted to the theater's specificities. Combined arms units take full advantage of that phase to further improve their mutual knowledge of helicopter fire support and air assault procedures as well as, and above all, to improve the personal knowledge they have of each other. And finally, upon arrival in the theater, the initial training periods always include a practice of helicopter fire support procedures.
Under these conditions, platoon leaders will find it easy to call for support an aviation section leader they know and with whom they'll implement a complex but well practiced process where mutual trust plays a prevailing role, in a situation that will always be delicate.

What will 3D bring to the combined arms commander?

Complementing the units operating on the ground, airspace offers **the possibility to see and operate rapidly (effect of surprise), far away and with enhanced strength (new generations of helicopters, of UAVs, of artillery ammunition...)** thanks to platforms which are freed from the ground constraints. The combined arms commander's initiative is thus increased, especially in the current conflicts' discontinuous battlefields. The airspace offers also **a reaction capacity** as well as **a permanent reversibility capability during the course of the action.**

The combined arms commander should also take advantage of the third dimension's contribution capabilities in other domains. On the one hand, the lower tactical echelons will more and more benefit from that contribution thanks to the accuracy of the effects, to the miniaturization of the aerial platforms and, in the longer term, to a larger number of UAVs available. On the other hand, the operations' new conditions require that third dimension's actors intervene to control the ground physical and human environment (contact intelligence collection, counter IED operations, ...) And last, it is the enlargement of the spaces to be controlled which gives an increased importance to the vectors that operate in the third dimension. The reduction of the number of personnel that

imposes an enhanced tactical mobility and a centralization of the reserves increases thus the need for integrated airmobile assets.

An adaptation to the current constraints

Managing in accordance with the endeavored actions and not in accordance with the environment

In the third dimension like in any other space of maneuver, the operational efficiency relies on the **sound conception of the systems of forces' action**, which should be linked to the effects to be achieved and not to the environment - aerial, land or maritime - within which the forces will have to operate. A logic which would merge together all the actions that take place within the air space would rely on a spatial conception of forces employment. The acceptance by all of the fact that the logic of forces employment prevails over the one of environment management seems to be a prerequisite for a real improvement of joint coordination.
Consequently, the fundamental distinction is actually between tactical conception - which goes beyond the mere notion of environment - and coordination, a technical activity, which is essentially linked to the environment.

Tactical command and tactical co-ordination

Tactical co-ordination sometimes prevails over tactical command, although co-ordination should only be a tool that provides better conditions for command and control.
A comparison with the civilian world can illustrate that notion. DGAC[9] is in charge of airspace management. That vast responsibility enables it to respond to the commercial expectations of many private air travel companies which develop their own strategies while respecting the DGAC established framework and procedures, but keeping however an entire autonomy for what regards their choices and decisions.
Similarly, within the military operational framework, **the coordination of the means** that transit within the third dimension must respect the framework of employment regulations, that are applied by all users, but which **should however not compete with each service's command organization**. The establishment of a delegation for a domain of co-ordination responds to that expectation.

NATO and the other nations

On a larger scale, France must use, as a basis, the NATO regulations which describe air operations planning as well as their coordination. Indeed that co-ordination which is consistent with NATO standards and joint doctrine doesn't imply that all of the operational elements that operate above the ground should be controlled by the same hands. The study of other national armed forces demonstrates the opposite. All of the major NATO nations have strong army aviations whose existence is never put into question. This is illustrated by the United States, by the United Kingdom which has recently integrated the utility/assault helicopters units into the Land Command, not to mention Germany which, in order to support

ADC Olivier DUBOIS/SIRPA Terre

its land maneuver, has just created an airmobile division which is comprised of two brigades. It is also the multiplication of the number of actors involved that has led these nations to develop **adapted co-ordination means that allow a co-ordinated maneuver of the actions.**

1 ALAT : Aviation légère de l'armée de terre (Army Aviation).
2 Operations mobile control center that ensures tactical command and control of all army assets operating in the third dimension.
3 3D: the three dimensions, or related to the three dimensions.
4 Army Aviation Command.
5 One could also add to that list the HAHO (High Altitude High Opening) parachutists who can be dropped at a high altitude and then they open their parachutes as high as 4 000 m at a distance of several tens of kilometers from their objective.
6 Combined Arms (Battalion) Task Force.
7 Director of the Air Force airspace strategic studies center (Centre d'études stratégiques aérospatiales (CESA)),.
8 Based upon the doctrine document titled "ALAT 805/OPS. Notice d'emploi appui feu ALAT au contact n°564/DEF/CDEF/DEO (Fire Support employment of Army Aviation in contact)" dated 22 July 2005 .
9 DGAC : Direction générale de l'aviation civile (Corresponds to the Federal Aviation Administration).

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The multiplication and diversification of the actors operating in the third dimension made it necessary to study their co-ordination.

Today, all operations are conducted jointly, which doesn't mean that each of the services should lose its specificities. It is the contrary; however a service cannot operate alone within a given environment and it must thus call upon the other services' capabilities in order to reach the desired end-state. Keeping it in mind, the distinction between tactical command and tactical co-ordination becomes of prime importance. **The combined arms commander must be able to conceive his maneuver, integrating in it, from the outset, all of the land forces' means, including those operating in the third dimension.**

Thanks to MARTHA, the Army develops a capacity enabling it to conduct an integrated type of maneuver, called *"aérocombat"*, within its area of responsibility, that maneuver having been defined early during the joint conception phase.

The third dimension in the Army: an expertise that is entrusted to the Army Aviation Command (COMALAT).

COMALAT has been officially designated by the Army Chief of Staff to be the Army 3D expert.*
That expertise applies to the Army but also to the relations with the Armed Forces Joint Staff (EMA) and the other services.
Under the Army Deputy Chief of Staff's authority, and in relation with Land Forces Command and the Forces Employment Doctrine Center, COMALAT is responsible for the 3D domain's coherence. He focuses especially his attention on the regulations and doctrines associated to that domain. He is also the Army representative for all joint or inter-ministerial studies dealing with the third dimension.

** Letter N°32/DEF/EMAT/MGAT/EPF/COORD-ALAT dated 25 June 2007.*

The Tactical 3rd Dimension,

the Army Helicopter[1] Battlefield or Ivorian Considerations about the Nature of "*Aérocombat*"*

Employment of Army helicopters has become more topical than ever and an operation without combat helicopters can more and more hardly be envisaged. Indeed, on the one hand, their capabilities are regularly progressing (night and all weather capacity, speed, self-sufficiency, fire power, sensors, self-protection, CIS integration). On the other hand, the deployed assets, personnel and equipment are still and will more and more be limited in number. Then the presence of assets gifted with some ubiquity is required in particular during the phases of initial deployment and withdrawal of forces.

Combat helicopter moves within the terrain and takes advantage of the relief and vegetation to move securely, to position, to camouflage itself. It can fly at an altitude and with a velocity completely inaccessible to land combat vehicles. It can as well fly at a reduced speed down to hovering which is not possible for fixed wing aircraft. Its combat is called **land, air, air-land, "between earth and sky"**, surface, close to the ground. It is piloted by "poor infantrymen", flying Army soldiers, light aviators, "land air crews".

All has been said about this hybrid and multi-role machine which is moving around in the **tactical 3rd dimension**, the *"aérocombat"*'s battlefield. But if doctrine evolves, constants remain. Engagements experienced within operations, such as operation Licorne, confirm this. They make the **combat helicopter a major player in the overarching land maneuver, the *"aérocombat"*.**

By Colonel Bertrand BOHINEUST COMALAT[2], air mobility cell and Commanding officer of the Army Aviation Battalion/LICORNE 7 & 11

Stand alone or coordinated action, combat, airmobile maneuver or support, direct or general support, air mobility or *"aérocombat"*?

How to qualify the action of Army Aviation combat units ? Should we, like some years ago, refer to **"air mobile combat, air mobile maneuver** or **air mobile support"**[3] whether they have or not the leading role in the on-going action ? Is it any longer a **"separate or a co-ordinated action"**[4] depending on whether it is conducted or not in direct liaison with ground forces ? Or is it more about providing a **"direct or general support"**[5] to the overall action, depending on whether the Army aviation unit "is in charge of achieving the critical effect on its own" if "this unit participates to this effect through its own action or through temporary support to other forces"? The air mobile element is, besides that, deemed to be capable to act either as supported or supporting element, on the rear, at contact or in the depth of the opponent's disposition (...). It is also deemed to operate a tactical lift element benefiting from the fire support of attack helicopters. Meanwhile its capabilities related to intelligence, destruction, protection, command and control to perfectly fit in the overall maneuver or more seldom to lead an independent action are maintained; all these actions may be performed under an **air mobile or a combined arms command** or even **in a distributed way** according to the commitment phase[6]. Subsequently, an air mobile company team[7] can be employed either within its own air mobile (battalion) task force or adapted to a combined arms unit, at battalion level ("GTIA")[8] as a minimum. In this case, it may be employed under TACON for a specific mission otherwise it is under OPCON, the supported unit tasking it[9].

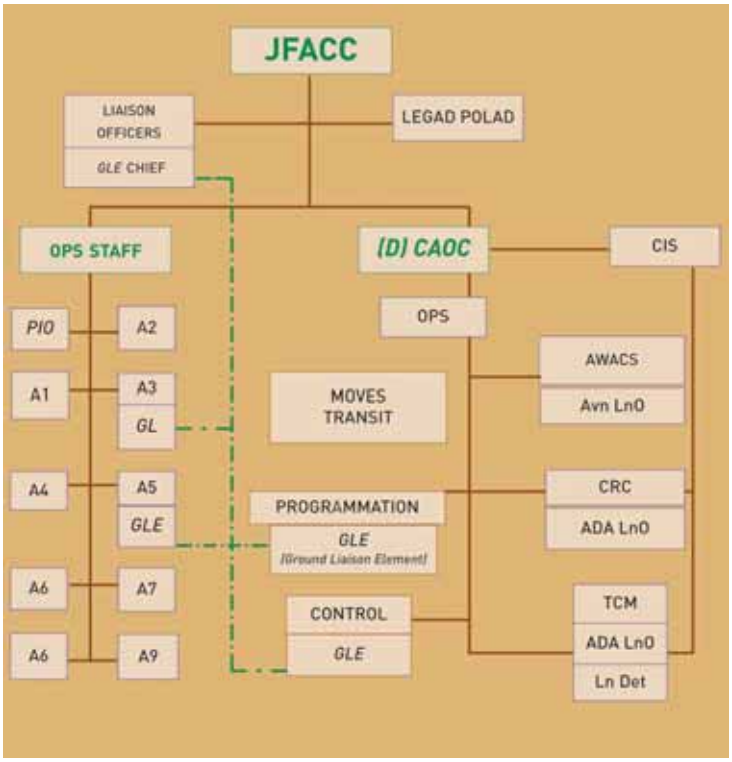
In fact, the action of air mobile assets from the Army cannot be confined, divided, reduced to such or such chapter. They can accomplish, in their own way, a very wide range of missions. They can be committed under very short notice, they have a built-in capacity to reversibility, and the possibility to switch

easily the efforts delivered. This leads today to speak no longer of "mere" **air mobility**[10], i.e. a temporary action in an overall maneuver". We now rather speak of ***"aérocombat"*** i.e. a constant contribution of air mobile tactics to the land maneuver to enable space extension and de-compartmentalization and time contraction. This is achieved by **considering these capabilities as early as the planning stage and by integrating air mobile units at the most adequate command level** to exploit the effect amplification granted by the third (vertical) dimension[11].

Operation Licorne or coping in the face of reality

Through the experience gained within operation Licorne, **what can we say about the reality of employment of Army aviation assets**, in a situation of a low intensity crisis and of real commitment?

"Kill or at least neutralize the vehicles rear of the leading vehicle". Such was the mission received in early January 2003 by a section of Gazelles AH. Interrupting their on-going reconnaissance mission, the team of attack helicopters acquired the objective from the infantry platoon leader engaged by a rebels column and destroyed it without a break.
The **so-called Typhon procedure** was applied enabling attack helicopters (guns or HOT ATGM fitted) to provide fire support to a ground unit in difficulty. Contact was made directly between the supported unit and the Gazelle section. However the order to Army aviation was given by the theater joint HQ to which a request for intervention had been forwarded. This kind of action was regularly renewed during the first month of Operation Licorne while the French force was in charge of denying any crossing by rebels of the cease-fire line splitting the country into two parts.



Mission of **reinforced** presence and surveillance, in the west of the country, south-west of Man : the combined helicopter company collocated with "GTIA2" was reinforced and placed under "GTIA"s TACON for the operation duration. It was tasked to provide intelligence and fire support if required as well as the capacity to conduct an heliborne operation at platoon level. Missions of intelligence collection, surveillance of routes, of borders areas as well as of night trafficking were regularly assigned to Licorne Army Aviation battalion ("BATALAT"). It engaged its assets distributed all over the theater but retained under its command. Modules at section level or at company team level were placed on alert to be prepared to intervene in support of "GTIAs". A MEDEVAC alert was constantly granted by the battalion throughout the theater while the decision to launch a mission lied with the medical decision chain.

The air mobile combat force of the theater had, besides that, a standing mission to maintain a **rapid reaction force based on attack and utility helicopters as well as transported troops** to face any event whether through fire support or airlift support. In the scope of spreading a part of its assets or for an operation from the sea, as it was the case in the operation for nationals evacuation from Liberia conducted in 2003 for mandate 3, the "BATALAT" shall be prepared to provide an air mobile detachment strong of 5 helicopters on a "TCD"[12] with a command & control, destruction and logistics capability for a 7 day duration.

During the November 2004 crisis, the Licorne "BATALAT" demonstrated the **irreplaceable capacities of a combat helicopter unit**. All actions were conducted under the command of the helicopter battalion HQ. A number of MEDEVACs is then achieved after Bouaké bombing. In addition, on the one hand, the aim was, in particular, during the night from November 6 to 7, to destroy "FANCI[13]" helicopters including two MI 24 based at Yamoussoukro. On the other hand, the aim was to deny a crowd of armed and threatening rioters crossing the bridges at Abidjan.

The first of these two actions perfectly illustrated this capability of own maneuver which enables to forward an important fire power on a strategic objective, at a long distance, within very short notice and very discreetly, with extreme accuracy and without collateral damage. Meanwhile a complete reversibility capacity is constantly maintained. This was typically an action in depth conducted in a low intensity conflict. Keeping "ALAT" assets, geographically spread over the whole territory, in the hand of "BATALAT" Commanding Officer enables to consolidate them on request in order to build the air mobile formation adequate for the mission.

In parallel, the second action illustrated the capacity to fill a gap in an emergency, concurring directly then to accomplish the main mission of the force. In this instance, its objective was to protect the whole of nationals and in particular to be prepared to evacuate them safely. "GTIA 43", the only combined arms battalion task force to be stationed at Abidjan, was then committed on the airport in order to seize it. This aimed to enable, on the one hand a possible aerial MEDEVAC and on the other hand the arrival of reinforcements. At this moment, only an air mobile intervention could within very

constrained times fill the gap to face the threat coming from the west of the Ivorian capital and ensure then the cover of the on-going action as well as the protection of Bouaké French camp still accommodating a number of families.
The other actions led from November 6 to 12 by the "BATALAT", consisted in extractions, troops and cargo transportation to Abidjan, a city cut from the outside and left to an hostile crowd. These actions illustrated this **capacity of air mobile units to act at their own pace but in the scope of an overall action** where combat helicopters, AHs and UHs are decisive assets.

Second week of January 2006, UNOCI HQ was seriously ill-treated by pro-Gbagbo patriotic movements. Force Licorne wanted to intervene to support it in accordance with its mandate[14], while avoiding direct confrontation with rioters. Utility helicopter was then the only asset enabling the delivery of required reinforcements without being directly involved. This course of action allowed by helicopter directly concured on this occasion to achieve the critical effect, i.e. restore law and order. Indeed a direct confrontation between Licorne and the rioters could spark off an overall fire whilst conversely, an absence of reaction from Licorne could place UNOCI in a very difficult position. It was only about providing airlift support but this capacity, being essential in this instance, should be taken into account to orientate the initial reflection.

"Aérocombat", a full-fledge dimension of land maneuver

A wide field of action

Almost all types of air mobile actions were achieved[15] in RCI[16], by day and by night, in open terrain and in urban area: destruction actions, in depth and as a retaliation[17] (Gazelle Viviane HOT), anti-personnel and close fire support (gun fitted Gazelle, Puma Pirate[18]), tactical heli-transport of commandos, MEDEVAC, extraction of nationals, from the sea, intelligence and reconnaissance actions, surveillance of areas and movements of populations, authorities escort and transport, active deterrence (warning shots) and passive (flying over hostile area), photographic support, route opening and even scouting the progress of a rail convoy...

Combining effects rather than actions. A matter of perspective

In fact, the aim is not necessarily to combine actions but effects. These are not systematically military effects but the effects in terms of consequences on the center of gravity of the enemy. Subsequently, any air mobile action is both in co-operation and self-sufficient, or else it provides a support both direct and indirect; all depends on the level of command where we are and the perspective where we place ourselves, the land maneuver being an overall air-land maneuver.

Elsewhere does not mean outside

Integration in the land maneuver neither means, nor it excludes the physical juxtaposition of ***"aérocombat"*** assets.

Elsewhere and at its own pace, possibly alone, does not mean outside. Being capable to gain contact with the enemy from a distance, briefly but strongly or just in time, enables to provide with time ground units in charge of holding the downhill terrain. Such exchange of depth against time illustrates the complementary proprieties of actors playing within the same overall maneuver .

Intrinsic irreplaceable capabilities to take into account from the planning stage

Helicopters cannot indeed replace an infantry company installed on check-points but only combat helicopter have such capacity to intervene without advance notice to face an unforeseen threat. During the November 2006 crisis, missions accomplished by "BATALAT" could not have been achieved by any other unit whether we consider opportunity terms ("timely") or in terms of intrinsic air mobile capacities ("capacity to get free of obstacles").

The imperative necessity for the theater commander to keep the lead

These capacities are especially fundamental on a non-continuous theater where by definition all space is neither occupied nor organized around a continuous front line.
On a theater like RCI, it is a low intensity conflict with violence control missions that can go up to temporary actions of forces coercion. This goes in some way, with an overall mission of area control on a very wide territory[19]. It is then fundamental for the commander to retain in his hands this unique tool to switch efforts that solely can save and give time through *space de-compartmentalization and time contraction.*

A centralized command and taking over of the assets to retain any possibility to detach them... or not

All command levels of "BATALAT" assets, geographically de-centralized[20] but hierarchically centralized were temporarily used: under command of a BATALAT's tactical HQ (EMT[21]), co-located with the Bn. HQ, under TACON of a Battalion task force or even a company team; under direct command of BATALAT HQ in support of a "GTIA" reinforced by an ALAT liaison team;

Photo fournie par l'auteur

under direct command of BATALAT under JTHQ ("PCIAT") command, or under direct command of the JTHQ reinforced with a command element from "BATALAT" HQ.

Indeed, whether in terms of command level or nature of mission, from intelligence to fire support action across air assault, a wide spectrum of employment within the land maneuver is offered by air mobile combat units from the Army. It is then appropriate for the commander never to be deprived of the capacity to employ these assets, in keeping at the right level the command and control of their employment as far as missions and modules building is concerned. This does not exclude combined arms cooperation down to the lowest level. Finally, at all echelons and levels, capacities of combat helicopters shall be integrated when initiating reflection and planning and not only in case of a problem, deadlock or failure, or to compensate, rescue or play for time in an emergency which is frequently a bad adviser.

* "***Aérocombat***" is the coordinated and integrated maneuver of tactical level units operating on the ground and in an air-space close to the ground, under the direct responsibility of the Force's Land Component Commander.
In addition to ground units, "***Aérocombat***" addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

1 *In the French original version, pun on helicop'terre: helicop'land*
2 *Commandement de l'ALAT (Aviation légère de l'armée de terre) : (French) Army (Light) Aviation Command.*
3 *Manual for employment of a combat helicopter regiment: TTA 567 1989. issue.*
4 *Plan of action for airmobility 99/03/17, ALAT 101: Manual for employment of ALAT units 01/09/06.*
5 *ALAT 102: Manual for employment of Air Mobile Brigade (BAM) 02/09/10.*
6 *Concept of employment for air mobile forces within the Army dated 00/06/05.*
7 *Translator's note: around 8 to 10 aircraft.*
8 *GTIA : Groupement tactique interarmes.*
9 *ALAT 502/OPS Manual for employment of ALAT company teams 06/09/12.*
10 *Air mobility is the capacity given to land forces to deploy and act free of obstacles thanks to the employment of air assets flying around in the air space close to the ground. This capability enables to control the employment of air assets belonging to land forces in a view to increase the effects of their maneuver (TTA 106).*
11 *Général ALLARD, COMALAT, Revue de Défense Nationale, November 2006.*
12 *"TCD : Transport de chalands de débarquement": French medium amphibious assault ship.*
13 *FANCI : Ivory Coast's National Armed Forces.*
14 *Resolution 1528 dated 2004 February 27.*
15 *With the exception of any air to air intervention (in 2003, a section of Gazelle Mistral was deployed in RCI for some months).*
16 *"RCI": **République de Côte d'Ivoire** = The Ivory Coast Republic.*
17 *Destruction of a ZSU 23/2 in Abidjan on November 8th 2004.*
18 *Puma equipped with a door mounted 20 mm gun.*
19 *The two thirds of France.*
20 *The geographical location of a part of its combined helicopters companies changed on the theater during the operation.*
21 *With which a GLE is usually assigned **(GLE: Ground liaison element).***

A strongly land action allowing no confusion between tactical command and co-ordination

Within a joint force, the action of **"*aérocombat* fighters" fits then into the action of the land component it belongs to.** This considers on the one hand its battlefield and on the other hand its "ground" course of action. This means the capacity down to the lowest level of command, in this instance the helicopter senior pilot, to be capable to make decisions "in" the terrain and "in" the friendly land disposition, according to his knowledge of the local tactical situation. The action of "*aérocombat* fighters" is indeed not comparable to an airman's who just gets temporarily out of his environment to deliver an effect in support of ground forces.

Subsequently, **the conduct of *"aérocombat"* falls within the competence of the command of land operations for the joint force.** At PCIAT level, COMAIR (COMJFAC), the commander of the Air component[21], has been delegated by the Force Commander ("COMANFOR") to manage the theater air space and the whole of third dimension movements through CAOC, themselves liaising with land 3D cell. It is about air traffic control, which means coordination and not control as meant by TACON and OPCON or tactical and operational control, that is to say command. These are really a matter of command in operation and are, from conception to execution operated by the land component chain of command. We should by the way in this respect avoid that the same cell ("DL ALAT") assume both the 3D function in support of CAOC and of G3 ALAT function. This could indeed contribute to confusing responsibilities of JFACC and JFLCC in regard of ALAT assets and the conduct of their missions.

Such **confusion**, which is not innocent, no doubt present the risk to misrepresent what is actually *"aérocombat"* and therefore to deprive command of all what it can duly expect especially in terms of flexibility and reactivity and then efficiency of Army helicopter.

Special Forces and Tactical Third Dimension

Special Forces (SF) are being developed in most countries but very few are those able to control the entire spectrum of the tactical third dimension (3D) capabilities. This is a dimension that includes the employment of airborne and TACP techniques, tactical air transportation and attack helicopters capabilities as well as that of tactical UAVs which capabilities are currently being developed. Although most SF have the basic capability to master the airborne domain, **only a few countries - among which France - have undertaken the effort to develop a SF specific air component with fixed and rotary wings aircraft.**
It is thus interesting to find out how, within the French forces, the tactical 3D is being integrated in the operations and what for. What is the relevance of that deliberate choice and how it is concretely implemented by SF and in their operations? This is what this article intends to illustrate by describing SF units and their 3D capabilities and then how these capabilities are being integrated within SF maneuver and constitute an essential element of *"aérocombat"*.

By Colonel Patrick-Pierre BRETHOUS, BFST[1]

The 3D within SF

French SF units - i.e. these units designated by the Chief of Staff of the Armed Forces to develop and provide those specific capabilities required for the conduct of special operations - have, **today, organically most of the 3D capabilities:** airborne, tactical transportation, airmobile combat.
All of the three services' commando units fully master all airborne techniques. This is thus a capability that is used as a basis and that is extensively developed throughout the entire spectrum of all the various types of operational jumps.
SF do not have any fixed wing combat aircraft but within all commando units the capability exists to guide close air support; that capability is even more developed within the air force commando units which can control laser guided projectiles, they can also reconnoiter tactical landing strips for fixed wings transportation aircraft.


photo fournie par l'auteur

Since the creation of the SOF Command ("COS") in 1992, Land and Air Forces have been providing **the SF with aerial vectors.**

French Air Force has dedicated the "helicopter special flight" ("ESH"), which is organically attached to the helicopters squadron "Pyrenees" based at Cazeaux for SF operations. It includes three crews and priority is given for the use of 2 helicopters belonging to the "Pyrenees" helicopters squadron. "ESH" will shortly be using the EC 725 Caracal helicopter, which has been recently acquired by SF and CSAR.
Since 1992, the Air Force has participated in the SF operations with C160 Transall, and later with C130 Hercules aircraft, belonging to "Special Operations groups". In 2005, all crew members have been regrouped within the Poitou squadron in Orléans and the aircraft have been dedicated to SF task which allowed SF to equip them permanently, in particular for what regards night flight using night vision goggles.
These units are organically **regrouped under the responsibility of a Special Forces Division within the Air Force Command** (located in Metz).

The Army has made significant efforts in SF air mobility. Since 1992, it created a PUMA helicopter flight which in 1997, with the addition of a Gazelle helicopter flight, has become the **Army Aviation Special Forces detachment ("DAOS"), organic element of the Special Forces brigade (Land),** based at Pau. It includes today **32 helicopters** in five platoons, two of which are dedicated for the joint helicopter detachment to the benefit of Gendarmerie's Special intervention group ("GSIGN"). All types of Army Aviation helicopters can be found in these units, Gazelle AH, Support and Reconnaissance helicopters, Cougar and Puma Utility Helicopters, and now the Caracal, which provides the entire spectrum of *"aérocombat"* capabilities while expecting the arrival soon of the Tigre.

3D experts can be found within "COS" units and staff as well as within the SF Brigade and the Air Forces SF Division, they

participate in the operational preparation of the units for what regards training, specific equipment, prospective, operational planning and regulations.
The option chosen, i.e. dedicating specific units ("DAOS", "ESH", Poitou air squadron), meets SF's requirements: i.e. **having personnel who are volunteer, selected, trained, and, when assigned to a unit, will master the use of specific equipment and special procedures.**

A large array of capabilities plus a widened spectrum of missions thanks to special procedures and night flight

3D provides special operations with improved capabilities in various domains: deployment, action, intelligence, command and control.

The **airborne capabilities** that are fully mastered by day and night, offer the entire spectrum of jumping possibilities: from special operations jumps at very low altitude (200 m) with personnel and equipment (LILO), to parachute infiltration with high altitude jump (HIHO) up to the level 120 and at very high altitude (with oxygen mask) up to the level 240, and tandem jumps which allow the dropping of unqualified personnel. HIHO infiltration flights can reach several dozens of kilometers and allow the most discreet type of deployment to prepare the SF group's arrival.

Fixed wings aircraft are selected for their intra theater deployment capability by day, but also and mainly by night with the use of night vision goggles. They are, in particular, capable of HIHO or LILO injection of paratroopers, and of conducting assault landings to the benefit of special motorized patrols on summarily equipped landing strips, applying their aircraft normal employment procedures in a degraded mode. The same way, they can provide night refueling to a module of several night vision goggles equipped helicopters under radio silence; they can also drop equipment in an operation area with the use of special ground marking. In addition they offer, of course, the entire spectrum of regular tactical transportation and logistic capabilities, MEDEVAC, etc.

Helicopters are always engaged within tactical elements that combine 4 to 6 attack and utility helicopters. They ensure the infiltration and exfiltration of commando units as well as their landing and extraction thanks to the UHs supported by AHs fires. They are regularly practicing road opening missions to the benefit of motorized groups as well as to assist the guiding of convoys in urbanized areas. Their different types of weapons enable them to provide fire support to commando units when at the contact and to conduct destruction missions. They participate in collection of strategic intelligence, mainly IMINT, as well as in tactical reconnaissance to the benefit of a direct engagement of SF group commando units or to their own benefit. They are also often placed on readiness for personnel recovery missions when the operations level of intensity doesn't require the Air Force component intervention. That mission is not limited to the crews but includes all deployed personnel. Helicopters are also able to support the units and to provide flying command posts. All these missions are conducted at the contact of the enemy and in coordination with the other SF modules or, when in the depth of the area of operations, in a more autonomous way, for, for instance, the destruction of a high value target (HVT).

What are these missions' specificities, several of which being conducted by aircraft that do not belong to the SF? They originate partly from the fact that they are conducted in **close coordination and cooperation with commando units**. These are dedicated units; aircraft crews and commando units know each other well, train together and thus acquire automatic types of reflexes. Besides, they all implement special operational air procedures enabling the crews to go beyond the usual minimum safety requirements. A commando unit, whatever might be the service of origin, is thus capable of establishing a landing area and, following enciphered exchange of messages, to control the landing of rotary or fixed wings aircraft without any marking being openly visible.
And last, it is important to highlight the value added by the night engagement capability of all components. Helicopter night flight and combat capability is fully mastered by all crews thanks to enhanced training as well as to the use of state of the art night vision goggles; that capability provides the operation commander with a technical and tactical superiority over all potential opponents; it is even enhanced thanks to the perfect knowledge of the third dimension domain by all, from the basic investigation team member to the aircraft pilot.

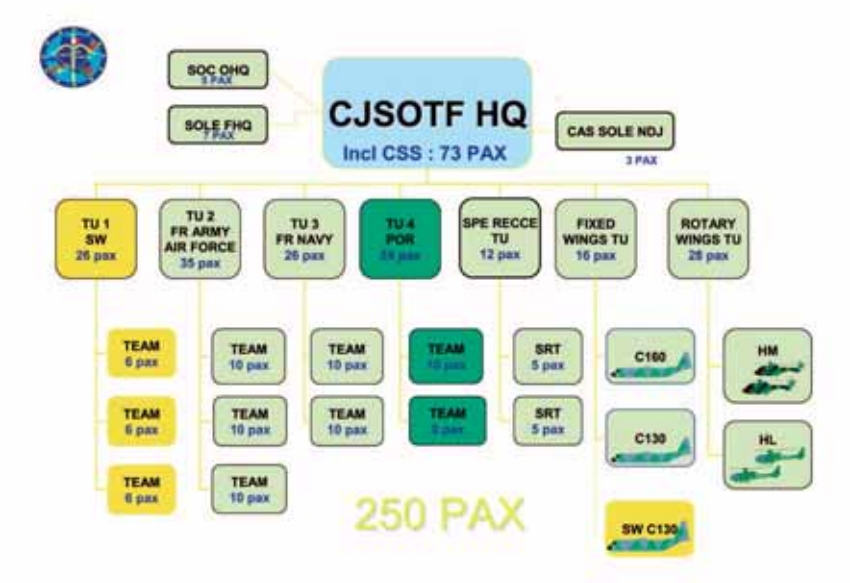
Full integration in operations

SF can be engaged in autonomous or adapted types of operations. In autonomous operations they are engaged alone in an operation area or sector under direct control of the Chief of Staff of the Armed Forces. In an adapted type of operation, they operate in coordination with a deployed force and are under the force or operation commander's command and control. In all cases, they are **the only ones who combine in permanence actions within the third dimension with ground or even maritime actions.**
At the difference of the other deployed components which are organized in accordance with their specific environment (land, air, sea), the SF component is **organically joint**. Should the deployed force's volume will not require a SF component level (e.g. for the Licorne operation), it will be an SF group that will be deployed, but it will always be of a joint nature. Within the J3/5 of an SF command post there will be commando staff officers (land, air and navy) as well as an airmobile (helicopter pilot) operations officer, an air operations (fixed wings pilot) officer, and an airborne operations officer. Each one will participate in the tactical conception of the maneuver, integrating his capabilities and constraints very early in the conception and planning process, then they'll participate also in the drafting of the operation orders and in the execution phase. Should the maneuver requires it, they may be integrated into a field tactical command post.
The regrouping of these personnel and means under the SF group commander's tactical control offers a **high performance tool that is particularly coherent, and reactive**. It provides the operation commander with the entire array of capabilities he

requires and a combination of means from which he can make a selection. He may, for example, in accordance with the constraints, decide to send either a patrol of Gazelle helicopters or a motorized one for a reconnaissance mission; he may also use an aircraft as a radio communication relay to the benefit of a team infiltrated in the depth of the area of operations; he may also decide to have a HIHO team infiltrated. Within a short delay, a standing-by SF aircraft can scramble with a group of commandos, a motorized patrol or a group of HIHO parachute jumpers. Within the next two hours a Gazelle helicopter patrol could be loaded in the fixed wing cargo aircraft. This is what happened during the summer of 2006 when EUFOR CJSOTF (Democratic Republic Congo, operation Benga) which had been placed in a stand-by status in Gabon early in the afternoon, was deployed with its commandos and helicopters that same evening in Kinshasa. This kind of reactivity would not have been possible without having the aircraft placed under TACON.

In terms of **co-ordination**, although SF aircraft are not under JFACC's C2, they are however integrated within the air planning process (ATO, ACO), benefiting most often of a ground stand by alert system, enabling them to take-off at any time, and benefiting also of reserved time blocks and areas. Besides, in any engagement that would require enhanced coordination with JFACC - personnel recovery or engagement of a significant volume of aircraft - a SF officer could be detached to the JFACC operation center, just like to any other component's HQs.

All SF groups that France engages in operations include 3D capabilities. Licorne force has, within its SF group, an element of the Special Operations air detachment (AH and UH), that had for a few months been combined with the air force's PUMAs. In the 2006 operation in the DRC, France assumed command of the EUFOR SF component that included also Swedish and Portuguese elements within the framework of a CJSOTF mainly oriented towards third dimension operations and that included an helicopter element of the Special Operations air detachment as well as French and Swedish fixed wings aircraft. The huge size of the area of operations had made their use indispensable, and the CJSOTF's efficiency relied primarily on that specific capability that offered a reactivity that had no equivalent across the entire force.



1 Special forces Brigade (Land).

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The use of all the tactical third dimension capabilities has nowadays become a constant for special operations that thus become *"aérocombat"* operations as well. Fixed and rotary wings aircraft belong to the most modern category of combat weapons and the fact that they are dedicated to and integrated within the SFgroups permitted even more to optimize their capabilities.
This has been one of the French armed forces' major axes of effort; they understood all the benefit that they could draw from that integration to achieve superiority over an opponent. In addition to C2 capabilities at the SF component level, this is one of the criteria required to become a **NATO or EU framework nation.** France has been NATO certified during major multinational exercises and will assume command of *NRF-13* in 2009. In 2006, within the EUFOR in the DRC, France was the framework nation for the first European *CJSOTF* that combined all capabilities. Its efficiency and operational interest have been highlighted by the force commander and all participating European nation members.
UAVs will soon join this collection of capabilities and will provide an additional factor of tactical superiority through the third dimension.

UAV[1] - Helicopter Co-operation A Promising Course of Action

Along with the US Army commitment in Iraq in 2003, the UAV domain has been living a strong progress. In this new kind of commitment, UAVs imposed themselves as an irreplaceable tool. The tactical added-value provided by these unmanned aircraft in this new strategic environment - which led to abandon the COMANCHE - as well as the technological break through are at the origin of the budget effort granted by the US State Department for their development. As a complement to other battlefield factors, the UAV system is a real multiplier of assets efficiency especially for airmobile assets.
In this context and in order to go along with this evolution, a survey about a possible cooperation between UAVs and helicopters was launched in 2004. Within CDEF[2] field of competence and registered in COCOOPS[3], the precise wording for this study mandate was "to clarify the interest of cooperation between UAVs and helicopters in terms of employment, its practical fields and operating procedures". This had to be conducted in consideration of "recent commitments which emphasize the growing employment of UAVs and the complementary action between UAVs and helicopters". Being currently completed, this survey highlights **"the relevance of combined employment of UAVs and helicopters.** This is **especially due to operating methods similarities and equipment complementary nature between these two systems, which are from now already fully part of *"aérocombat"****. Conversely, the survey also points out the increasing complexity of coordination and the management of the air space close to the ground which is more and more "occupied".

By Major Xavier PREVISANI, EAALAT[4]/ DEP[5]/ Doctrine Section

UAV within air-mobility: a tool at the right place

The Army airmobile component is fully integrated to the process of mutation of its armed forces. It is committed in a deep transformation. So the next few years will see the deployment of the digitized chain of command of airmobile formations and the fielding of new generation efficient assets. Development of UAVs and their progressive integration to the battlefield could not let unconcerned the Army aviation (ALAT) the privileged tenant of the battlefield close to the ground.
In this new context, the combined employment of helicopters and UAVs in the scope of the action of an airmobile force, during a modern commitment in support of land forces, falls in the continuity of on-going evolutions.

Interesting characteristics

What strikes our mind with the UAV is that it gathers all the vantages. It flies, consequently it takes the advantages from utilization of the third dimension. As it is unmanned, it gets free of constraints and risks linked to the presence of a human crew. It can then act enduringly in an hostile context due to the environment or to the enemy. It can as well be discreet and its flexibility of employment enables its use with a limited number of deployed personnel.

UAVs are then **especially capable to easily carry out the so-called "3Ds" *(Dull, dirty and dangerous)*** tasks. In respect of these tasks, the "attrition" risk remains high for a manned helicopter. UAVs by nature will then be more inclined to be employed with higher attrition risks than manned vectors. We should them keep in mind that the "all weather", "multi-role" and "risk-taking" capacities of UAVs enable them to constantly accomplish surveillance, observation and reconnaissance missions at any time and in any place and especially in urban areas where the attrition risk is high. Subsequently, UAVs should valuate the employment of manned aircraft. Basically, these will be committed when *in situ* direct human intervention is demanded.

Co-operation: indispensable for the future

Recent theaters of operations are characterized by their extend and by the compartmentalization of the battle space. A first type of area is characterized by the presence of forces that physically occupy the terrain and face the direct threat. These areas, more and more urban, are a sanctuary for an opponent being very mobile and difficult to identify. This makes complex any intervention and requires accurate and up to date intelligence as well as an assured designation of the target. Between the areas of action where the forces are concentrated, lies a second kind of area, usually very wide,

that modern armies cannot occupy physically due to their reduced strength. These gaps are however of a significant tactical value as they allow to preserve freedom of action, which is a critical factor for success.

In fact the Army has still today the resources to achieve tasks of observation and surveillance types with aircraft from the old generation. But budget constraints which are now applied and will be applied on the Army Aviation will then no longer allow in the future to achieve these tasks with new generation aircraft. These are complex to operate, expensive and limited in number.

CCH Jean-Jacques CHATARD/SIRPA Terre

In this new tactical and financial context, UAV system would be **an efficient asset to cope with the Army Aviation capacity being reduced.** This is not the loss of intrinsic capabilities of Army Aviation but the consequence of the evolution of tactical and budget requirements.

A co-operation based on a real complementary action between UAVs and helicopters

Within common features of UAVs and helicopters, the capacity to move in the third dimension is dominating. The UAV is then capable to carry out some tasks carried out by manned helicopters as well as extending or completing them. We can then contemplate in addition of usual criteria of technical or tactical availability, **the decision to use a UAV instead of an helicopter will be dictated by the "3Ds" criteria seen above.**

In this case, as far as helicopter action is concerned, the UAV could be in a position either to replace it for repetitive and long lasting tasks (as surveillance type) or to extend it for missions at contact with high risks or to optimize it through direct cooperation.
The survey has then considered **the UAV both as a complement and an efficiency amplifier for air mobile assets.** The envisaged cooperation is the one between a UAV as a sensors system and an helicopter as an effecter or as a weapon system.
If, in a first stage, this cooperation, limited by the technical capacities of interfaces between UAVs and helicopters, would mainly concentrate on capacities related to dialogue and information transfer, it would quickly get more complex to reach a level of direct control between the two systems. **Cooperation between UAVs and helicopters has been classified in levels** corresponding to the degree of interaction between the two systems.

In the first level, the helicopter receives information from the UAV or through the UAV without any direct control either on the payload (camera type) or on the UAV trajectory.
In the second level, the helicopter controls the UAV and receives real-time information from it. Such control goes up to the command of the trajectory for the UAV and of its payload.
In the third level, the UAV carries a payload used in support or in addition to the air mobile action (**PR4G**[6] communication relay for instance). The coordination is then performed at the stage of preparation to the commitment of air mobile assets.

If today, a number of technical problems prevent from contemplating level 2 in the short term, time and cleverness of our industry staff will overcome these technical difficulties. Besides that, the survey is positioned in a 10 year perspective which enables to consider bold possibilities. What is already granted is that **UAVs systems are much less expensive (at equal performance) than manned aircraft and should then be considered as assets multipliers.** They also allow to spare men (stress, tiredness...) and to save for expensive weapon systems and ammunition (firing accuracy). Thanks to their intrinsic qualities- self-sufficiency and lower medias vulnerability because unmanned - UAVs systems could impose themselves as the indispensable means to commit in an optimal way helicopters units. The UAV-helicopter couple then seems to have a promising future.
UAVs have **multi-load and multi-role capacities**. These enable to employ them in the whole of phases of an air-land commitment. Their reconnaissance capabilities enable them to cover wide areas durably without tiredness or stress that would decrease their performances. Their capacities to securely detect a target and of real-time transmission of related data (picture, coordinates) allow their immediate engagement by an attack helicopter, with a probability of direct hit on the target increased tenfold by accuracy and updated intelligence.

In this scope, **UAVs in cooperation with helicopters** might be **tasked** for instance of the following types of missions:

❒ Provide direct information to combat helicopters crews:
- Imagery (prior reconnaissance of an infiltration route or a pre-designated target, enemy position);
- environment (weather reconnaissance, NRBC);
- prior reconnaissance, detection of any threat including ADA[7] weapons.

❒ Provide a direct support:
- Objective designation;
- Laser illumination of an objective.

New constraints

However, to exploit the full spectrum of their capabilities, UAVs systems shall be **integrated in an adequate organization architecture**. No doubt, this is where the key of UAV employment lies. Indeed, revolutions are never orphans. This cooperation generates new constraints in terms of C3 and information flows. It is then required to prepare the future through the development of a **new concept of employment,** which allows at command level, a new units organization and which allows then to design, plan and control this three dimension maneuver. Reinforcement by UAVs, in addition to helicopters, over a battlefield more and more reduced (urban areas), will set up a new challenge for coordination in the third dimension more difficult as the UAV system efficiency lies partly in its reactivity.

France in the move

Up to now, only the **United-States** have launched this kind of survey and development of interfaces required for an in-depth cooperation.
Technical tests of in-flight video retransmission from Hunter and Predator UAVs towards Apache helicopters have been completed. Tests would be currently in progress to enable an helicopter (experimental plat-form) to control during the flight a rocket-armed UAV. The helicopter shall be capable to drive the UAV towards a selected target, identify it and trigger remotely the UAV armament.

We should note that **up to date, no operational utilization of the UAV/helicopter couple has been observed.**
Similarly, **Israel** is with the United-States an historical developer and user of a UAVs system in the military field. However, to date, no external element has been reported on a direct cooperation between UAV and helicopter.
At the **European level**, the other UAVs programs do not envisage for the time being to develop specific interfaces with the air mobile function. Let us mention the British ***"Watchkeeper"*** program, which was mainly developed to accomplish intelligence missions in support of the theater land component.

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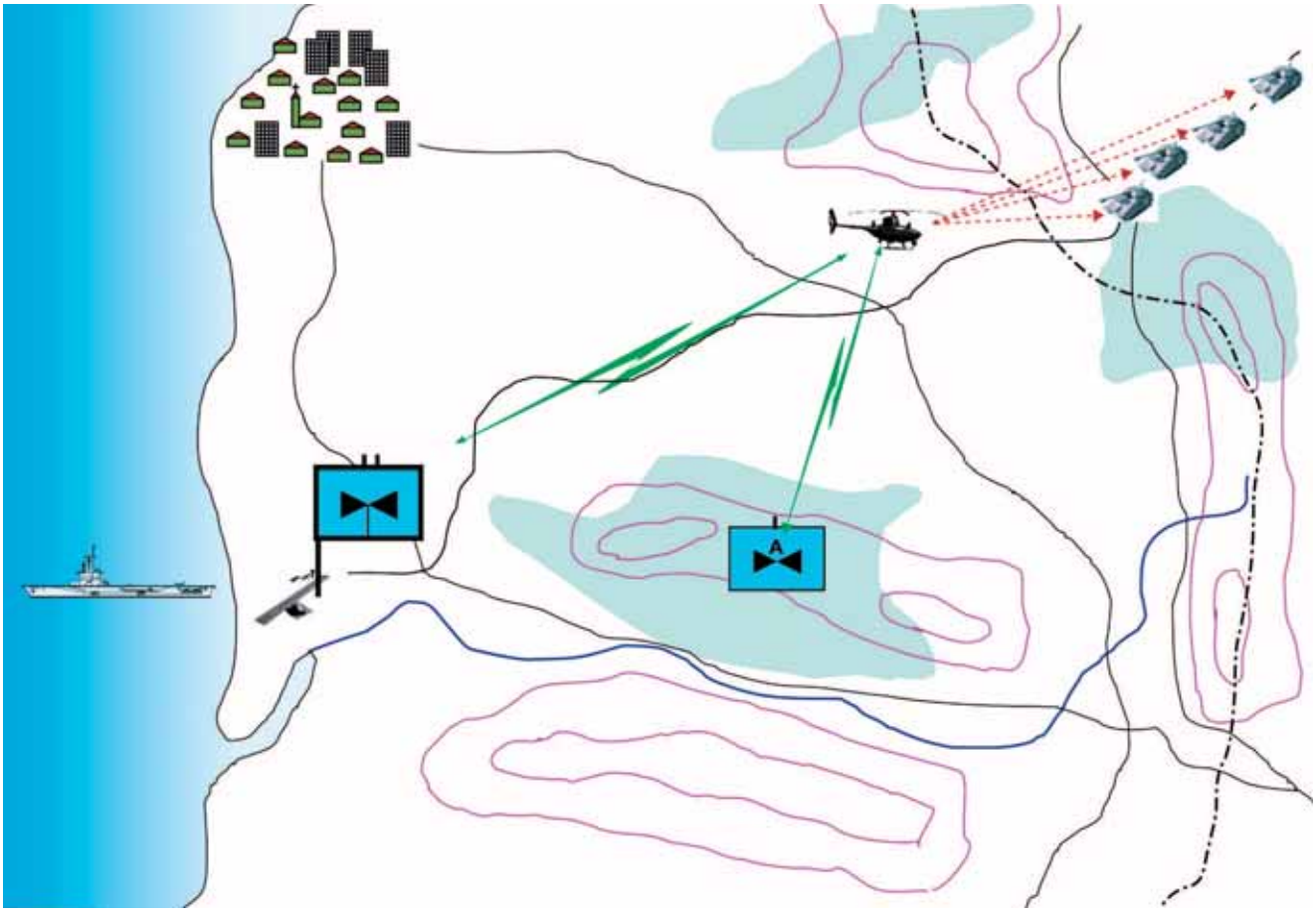
1 UAV: unmanned aerial vehicle.
2 CDEF: Doctrine & Forces Employment Center.
3 COCOOPS : Comité de coordination des études opérationnelles : Coordination Committee for operational studies.
4 EAALAT : Ecole d'Application de l'Aviation Légère de l'Armée de Terre : Army Aviation Branch School.
5 DEP : Direction des études et de la prospective : Planning and Studies Department.
6 PR4G : poste radio de 4e génération : 4th generation radio set.
7 Air Defense Artillery.

In Iraq, in Afghanistan, on all theaters of recent operations, the use of UAVs system is spreading. First used far from the battlefield for the acquisition of operational intelligence, these systems are closer and closer from ground troops. Continuous technical progress achieved in the fields of automation and miniaturization are today providing UAVs systems with **a new and unavoidable interest at tactical level.** Tactical UAVs are from now on an integral part of *"aérocombat"* . Less and less expensive and more and more efficient, their adoption fully fits into the transformation process launched by the Army. We are in a context of geo-strategy and society evolutions with the addition of budget constraints. UAVs systems are then **an adequate response to the reduction of war frictions.** Less vulnerable for the medias as they are unmanned, their lower costs and their capabilities will turn them indispensable, in the future, for the optimization of manned airmobile assets on the battlefield. Far from replacing the man's flexibility and situation understanding, UAVs system is conversely an efficient and reliable means to reduce the combatant's "attrition" due to long and repetitive duties. Besides that, as a man's extension at the closest to danger, it enables the optimization of the employment of expensive weapon systems and ammunition in accomplishing with no stress detection and target designation tasks that will be then engaged by helicopters. UAVs system shall then remain as **a complement and an efficiency amplifier for airmobile assets, a new actor of air combat.**

Illustration of UAVs-helicopters Co-operation

SCREENING



Situation and missions:

- Air mobile task force (GAM) intervenes to destruct an enemy crossing the border.
- The UAV screens the enemy:
  - Either after a surveillance mission
  - Or after having scouted and gained contact with the enemy (these tasks are carried out either by the same UAV or another UAV present on the battlefield)
- Information collected by the UAV are forwarded in the same time to GAM and to the attack helicopter company in charge of destroying the enemy
- Once the enemy acquisition istaken over by the attack helicopter company, the UAV is in a position to illuminate the targets.

The Air Force and the Co-ordination in Land Air Operations

History has naturally inclined us to distinguish between Army and Navy. Military aviation, then Air forces were born when technology enabled to highlight and then to make use of the decisive advantage provided by third dimension. This particular space, providing considerable operational prospects, was then divided between various entities, each of them having its own logic, a specific culture, or even a different view for its use.

When it first appeared, during the First World War, military aviation was entirely subordinated to land operations in order to observe and then to bomb enemy positions. Very soon, so as to retain freedom of action, the "conquest of the sky" appeared as a prerequisite, and aerial expertise was deemed as something specific, which prompted various nations to regard independence of air force command as essential, in order to achieve even more efficiency.

Interactions in time and space, as well as optimization of combination of efforts, have naturally reinforced the need for coordination measures. This falls within the responsibility of either a force component commander within his area of responsibility, or of a COMANFOR (force commander) who, whatever the situation, retains responsibility for the overall coordination on the theater of operations (see diagram 1, from Ministerial Directive IM 1000). Moreover the increasingly frequent intervention on theater of non-combatant players reinforces the need for coordination at a high level of centralization, often going beyond military entities only.

Therefore coordination within third dimension is part of the imperatives of modern military combat, concerning which recent commitments have shown the relevance of operations performed with increased responsiveness and close joint coordination, within a context characterized by globalization of the theater of operations and permanence of action.

The main issue, within a permissive or hostile environment, consists in taking the initiative and retaining it while imposing one's tempo on the opponent.

Air missions, which are extremely demanding, require adequate intelligence and a particularly relevant and efficient fusion of information, so as to allow accurate strikes, with strong responsiveness and appropriate power. These principles should apply already in peacetime, particularly during protection operations for major events like summit meetings of heads of states, but also in time of crisis, whatever its intensity level.

BY COLONEL THOMAS MAECHLER, FRENCH AIR FORCE STAFF

Why and how appropriate co-ordination can enable to achieve desired effects efficiently

Effects to be achieved

All components of the joint force are likely to use third dimension, either for their own requirements (actions described as "direct support"), or within the framework of the air campaign (actions described as "common support"). In the same way, they must protect themselves against actions that the opponent might conduct in third dimension. Thus in particular, and prior to any other action, ensuring air superiority is crucial.

Often occurring simultaneously in spaces of variable size, **the various activities making use of the aerospace environment should at least be coordinated.** Actually, beyond mere coordination, it is necessary systematically to see to the overall coherence of third dimension activities, and to make the best of potential synergies. Consequently, a single authority should be established, responsible on the one hand for a harmonious integration and synchronization of all airspace activities, from the development of planning to command and control, and on the other hand for airspace and air defense organization. Thus the COMCJTF (Commander Combined Joint Task Force) will appoint an **air component commander** (COMJFAC: Commander Joint Force Air Component), who is **the unique chief of all air activities** included within the air campaign ("common use"), and who also **coordinates the other activities performed in third dimension** ("direct support").

The control of environment and of its constraints is also essential for "fire" air support missions. It may be described as follows:

- an ability to operate regardless of environment constraints (weather, terrain, day/night, ...)
- discrimination capabilities (friend/foe/populace)
- netting of all players
- training and equipment of these players
- standardization of data and of exchange formats.

Moreover, the requirement for efficiency in engagement with regard to desired effects makes it necessary to achieve a high level of coherence between the activities of all parties. Among other things, two aspects linked to ground - air coordination should be mentioned:

- according to emergency level and required precision and power, a fire support request in support of a ground unit could be met by allocating a combat helicopter section or a combat air patrol, and possibly tomorrow an armed UAV. This decision should be based on an analysis aiming to allocate the most adequate weapon system among those available in the space-time slot involved.

- With a similar logic, but with a view to the requirements of some air missions, some elements on the ground now frequently provide decisive information items, sometimes in real time, whether at contact or in deep operations missions; this enables the aerial platform to perform the necessary strike. Their action may also consist in driving the opponent towards an area favorable for the strike, or in preventing him from withdrawing from this area. This is a type of "mutual support", performed in particular within the framework of special operations.

Preserving the human as well as technical potential is still an "effect" which it is essential to achieve, at least so as to be enabled to continue operations. These have always shown, and this is increasingly the case, that the sometimes very close intermingling between friendly forces (in particular in the case of "fire" air support), with the civilian populace, or in the vicinity of specific installations, makes the risk of fratricide fire or collateral damages particularly significant. These two imperatives should then be reconciled, thanks to efficient coordination.

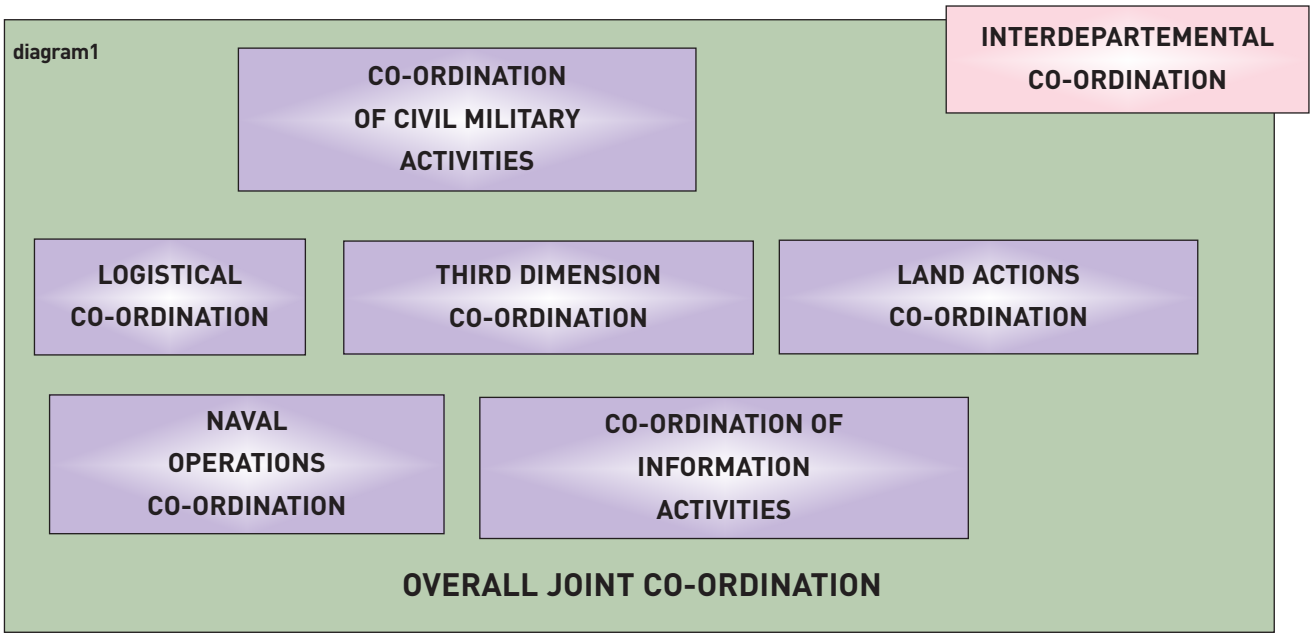
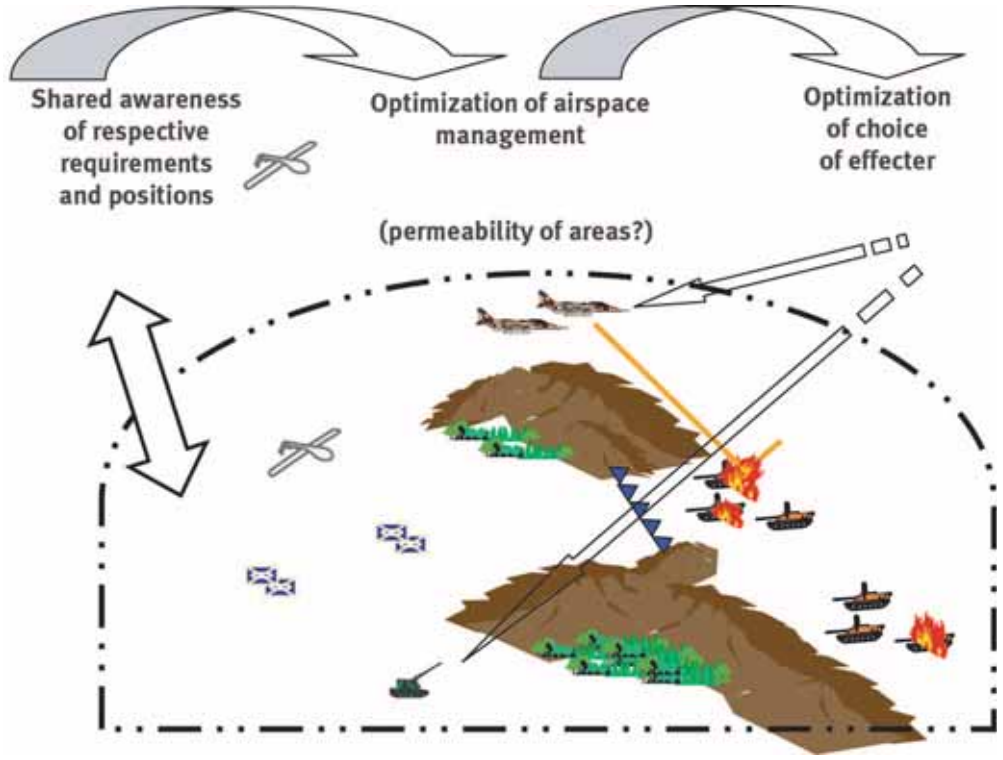


diagram 2



Besides, there are also risks of fratricide between aircraft, especially when they belong to two different components, or between aircraft and artillery. Moreover, there are risks of collision between friendly aircraft, still significant in spite of improvements in weapon systems.
All these scenarios must be suppressed, because they allow the enemy a victory which is too easy and particularly bitter to the forces involved. Lastly we should observe that all these risks are increased by the desired quickening of the tempo of operations.

Command of an airspace, by nature a "common" environment, is an essential prerequisite

All aircraft and weaponry of land or air forces move within **a same third dimension, which should be organized so as to know "who is in what place and where he is going to..."**, which moreover would enable to achieve friend or foe discrimination capabilities.

Control and defense of airspace are an essential prerequisite for forces security within the corresponding combat zone. Survival and freedom of action of troops on the ground are actually jeopardized if the opponent can access this airspace, whether for intelligence or "fire" operations purposes. Achievement of air superiority depends on rules governing centralization of command and decentralization of action; these rules are universally recognized. In order to obtain efficiency in this mission, it is essential that detection of aerial vehicles should be submitted to identification before triggering appropriate action, anywhere within the airspace. In this regard, the fact that other players involved in air defense know nothing about an identification performed by a friendly element is harmful and possibly dangerous.

Actually, **centralization of intelligence** is the basis for obtaining a relevant picture of the overall aerial situation, enabling a unique commander to determine the most adequate asset for countering opponent air threat. But separation of spaces results both in more restricted awareness of that situation and in inadequate compartmentation of fighting assets. Therefore it is necessary that this situation should be amended in order for a component to know the position of the vectors) of other components, as illustrated in diagram 2. That **sharing of information in near-real time** would provide a considerable advantage: facilitating, when required and with increased responsiveness, employment of a vehicle of a specific component in support of an effect expected by another specific component, on the ground or within the airspace. This intervention could then occur by using an airspace which had not been previously planned for the involved vector).

Thus, prior apportionment of space above battlefield, whether on land or at sea, is today considered. This is mainly due to a lack of coordination means in real time. Current organizations and the way they operate, described further, thus correspond to that "historical heritage".
Lastly, in some specific scenarios, civilian aircraft may use part of the airspace. In addition to the safety they must be provided with, history teaches us that more and more often they may be turned into potential weapons, to be taken into account during the conduct of operations.

Interest of the Joint Force Air Component Command (JFACC) in the implementation of centralized command in support of decentralized utilization

When a JFACC is established within the CJTF structure, COMJFAC is assigned by COMCJTF (tactical) command and (operational, through delegation of authority) control over the assets participating in the joint air activities within an area called AOR (Area of Responsibility).

Taking into account the specificities of air operations, he is specifically responsible for:

- designing, preparing and conducting the joint air campaign;
- designing, organizing and conducting air defense activities;
- organizing the airspace and coordinating the handling of areas by the various users.

In his capacity as Air Commander (AC), he is responsible for coordination of air operations and more specifically for **coordination with the other component commands** for comprehensive integration and deconfliction of all air operations within the area of responsibility. He is also in charge of the development and dissemination of rules of engagement (ROEs) within third dimension, and determines directives and special instructions (SPINS) as required.
As included within his mission as Air Defense Commander (ADC), he coordinates in particular air defense assets and directs the development of the overall air and space situation as well as warning dissemination.

Lastly, in his capacity as Airspace Control Authority (ACA), he is responsible for airspace organization and issues the Airspace Control Plan (ACP), as well as for coordination of its utilization which expresses this plan in Airspace Control Orders (ACO).

Moreover, as included within his responsibilities as the commander of functional forces, he is an advisor to the force commander for employment of air assets power and third dimension activities, besides providing him with information about any change in the situation.

In order to fulfill his command mission, COMJFAC is supported by the JFAC Headquarters (JFAC HQ), in charge in particular of developing air operations directives, and of liaising with the other components, and by the (Deployable) Combined Air Operations Center - (D) CAOC, which is the control and execution tool of JFACC.
COMJFAC is therefore enabled to direct air operations by implementing the principle of centralization of command and decentralization of control and execution.

Means and methods for third dimension co-ordination

Coordination of activities necessitates a highly responsive decision-making loop at theater command level, which needs to be reduced constantly, due to the elusiveness and stealth of modern terrorist attacks. This function, which is fundamental to achieve desired efficiency, is performed under the authority of COMJFAC who plays a crucial part in this field.

In order to **maximize synergy of all participants in joint operations**, it is necessary to coordinate their third dimension activities, particularly at tactical level. This is performed through the Air operations Co-ordination Center (AOCC) and the **Ground Liaison Element (GLE)** whose tasks are complementary: each of them is a representative of its own component, which enables to take into account all tactical objectives within a coordinated joint approach.

Diagram 3 shows these essential elements as well as the main functional liaisons which must link them so as to meet responsive coordination requirements.

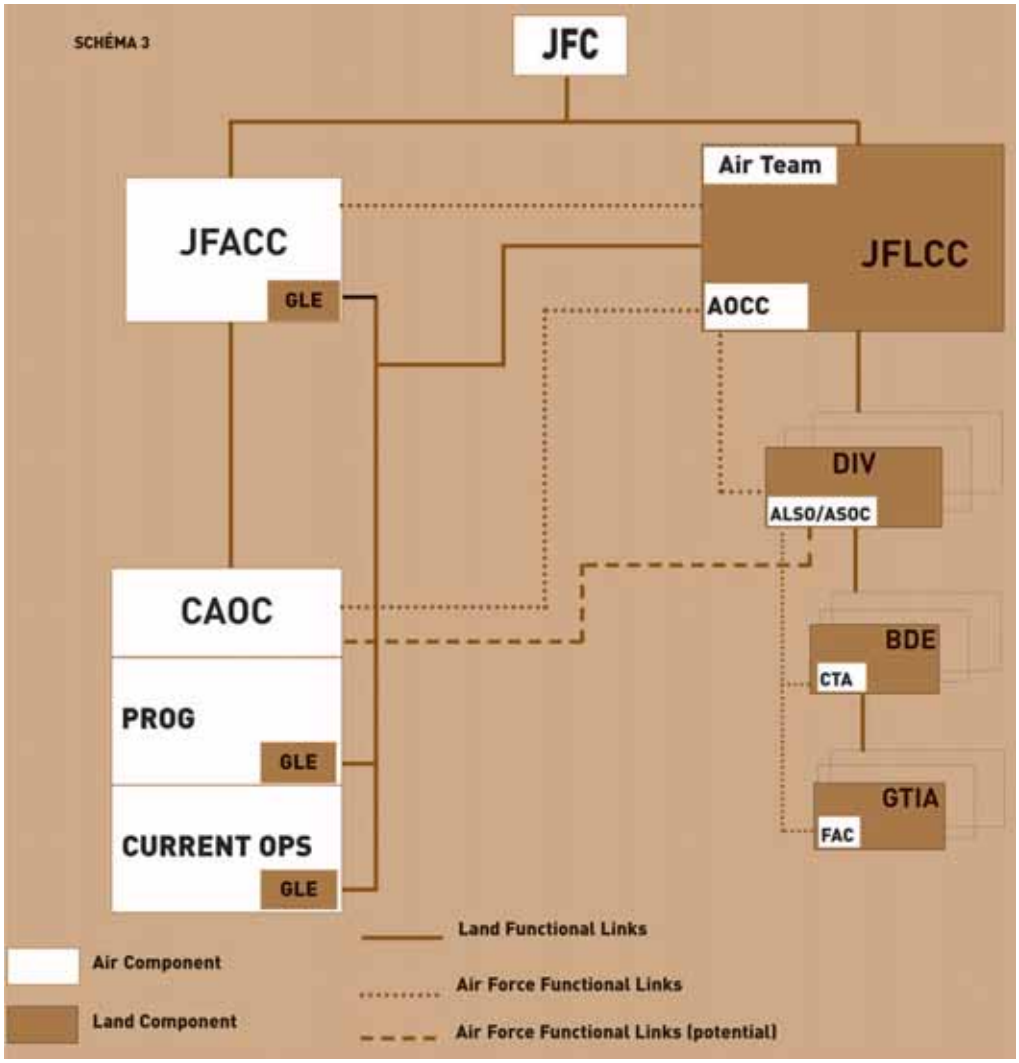
In order to optimize coordination within third dimension, in particular within the framework of air defense, **two airspace control methods** can be used by ACA, through delegation of COMCJTF, according to the concept of operation which has been selected:

- **direct control**, based on positive identification, tracking, control of aircraft and the commitment of air defense assets within an airspace designated by an organization with relevant authority and responsibility;
- **control by means of procedures**, based on the splitting of the airspace through the issue of an Airspace Coordination Order which specifies its sharing out in time and the implementation of weapon control orders.

These two processes are complementary because direct control cannot be performed systematically. Actually it necessitates an efficient centered network system which enables better implementation of available assets, in particular electromagnetic devices, and better coordination of command and action.

Mode of operation determines the organization responsible for direct control.
In centralized mode, this is the responsibility of ACA, who actually is often the COMJFAC, and is assumed by a Control and reporting center (air support). Land players in third dimension then comply with the measures relating to direct control.
Decentralized mode enables ACA to delegate, within a specific area, direct control over army assets to the coordination center of land component while supervising its activities. The Control and reporting center retains ability to commit air defense assets and is still in charge of classification. This mode of operation should be privileged while determining areas which correspond to important activities of air-land maneuver.

Lastly, when no Control and reporting center is operational, the independent mode enables components to perform, in



direct control, coordination of anti-aircraft fires and space management within the limits specified by control by means of procedures.

Here we must observe that even if overall co-ordination remains within COMJFAC's responsibility, direct control within Army responsibility may be considered within the framework of a division of airspace by a Co-ordination level (CL) which specifies in detail responsibilities concerning airspace control:

- above CL level, coordination and deconfliction of operations is performed by (D) CAOC;

- below this level, this responsibility lies with AOCC; this allows a short coordination loop through Air force elements deployed within the land component (AOCC, Air Support Operations Center (ASOC) at division level, Tactical Air Controller at brigade level and Forward Air Controller (FAC) at combined armed task force level).

However, when activities interfere with each other, above CL level (artillery, ...) or below CL (Close Air Support missions and fire support), AOCC coordinates requirement for airspace necessary for segregating Army activities from DCAOC, or coordinates Air force support missions with air-land activities.

Operations necessitating reinforced ground-air coordination

Ground-to-air and ground-to-ground

It can be concluded from the preceding remarks that **the requirement for coordination is particularly patent as regards ground-to-air and ground-to-ground courses of action,** as illustrated in the following examples.

During the setting up of specific safety dispositions aimed at denying access to the airspace, for instance on the occasion of a summit meeting of heads of states, specific detection, command and control assets are involved. In order to cover the whole spectrum of threats, it is considered to use surface-to-air systems and aerial vehicles, on ground alert or airborne alert posture. Some of these assets may be used by the Army, others by the Air force or the Navy. During the recent summit in Nice, that operation involved, among other assets, Army UAVs, Navy ships (detection), Air force surface-to-air systems and aircraft, and Navy crafts.

It is obvious that **fusion of detection data originating from the various systems** is necessary in this case in particular, in order to be enabled to commit as soon as possible the adequate asset according to the attitude and classification of possible intruders. Moreover, it is an absolute necessity to be protected against collision risks, and to make sure that no aircraft included in the disposition will be considered suspicious, or, even worse, threatened with destruction by surface-to-air units. Therefore a **C2 structure under "CDAOA"** (Air Defense and Air Operations Command) **responsibility** was assigned this crucial coordination mission.

To take the example of an operation within a different context, the latest operations in Lebanon are quite convincing. Actually, on that occasion, Israeli forces performed joint operations, which were essential in order to check a highly mobile opponent. In order to do that, within an area with a lot of spatial constraints, they had in particular to make sure that artillery fire could be performed without jeopardizing their helicopters, UAVs and fighter aircraft, also quite numerous in the area. It was thanks to meticulous coordination, through spatial and/or time

division of space performed by their air force, that they were enabled to achieve this goal.

Moreover, the intermingling of conflicting parties and the small dimension of the "battlefield", typical of operations on urbanized terrain and city outskirts which are, by definition, dense and of comparatively limited size, are already the usual conditions of modern operations.

Air support

Air support, which is intrinsically inter-component, also requires as close coordination as possible, under sole responsibility of the Force commander. "Fire" air support missions are those in which coordination issues are most prominent.
These missions are mainly aimed at contributing, with high responsiveness, to the safety of forces deployment areas, while presenting a substantial degree of threat to opponent elements; their purpose is also to intimidate the enemy or respond to aggression. Moreover, they can be directly integrated into the force's overall maneuver, thanks to strikes performed in immediate support of committed forces or with a view to disorganizing enemy disposition through the tactical and operational level depth, in order to supplement the other air-to-surface missions performed within the framework of the air campaign, as was the case during Operation Iraqi Freedom.

Operations over Fallujah in November 2004, were organized in "inter-component" mode as early as the planning phase, and generated pinpoint coordination of airspace under "air" responsibility. They made use, among other things, of "fire" air support, as shown in the following simplified chronology:

- first, intense air preparation prior to land maneuvers: surveillance (UAVs) and precision air strikes, enabling to deprive the opponent of any safe area;
- then, as a direct preliminary to invasion by ground forces, air raids were performed the night before armor entered the city, to blunt insurgents' resistance;
- lastly, numerous air support missions were performed during battle, to reassure friendly forces and bring confusion and destruction among enemies. On that occasion, attack helicopters played a substantial role, even if their vulnerability to enemy surface-to-air fire caused commanders to prefer using them in the city outskirts.

Special operations

Special operations may use air assets like transport planes, UAVs, helicopters or fighter aircraft, but always with the same imperative: **secrecy**. This obviously results in a requirement for specific equipment, but also in extremely comprehensive preparation, with a view to anticipating all scenarios. A **requirement for close coordination** results from the above mentioned secrecy imperative, and from the high degree of accuracy inherent in this type of operation. One of the consequences is to try to restrict communications, in particular voice, to a minimum. However, more specifically when those forces are employed in enemy "depth", updating of the target to be engaged is requested and entails surface-to-air as well as air-to-surface communications.

Moreover it is quite obvious that in order to ensure safety of these personnel it is crucial to know, without revealing them, friendly forces' positions during ground-controlled strikes (by means of a laser designator or "mere" extraction of pinpoint coordinates).

In some cases, as during above mentioned operations in Lebanon, some special forces moreover enabled, through maneuver or fire, to confine enemy troops within an area in which they were then neutralized by a precision air strike. This was also the case in the course of Operation Iraqi Freedom.

UAVs

These systems are increasingly significant assets, used in bigger number and playing a bigger part in operations. The number of UAVs committed on a theater actually increases correlatively with permanence requirements (intelligence, surveillance) and with perspectives of employment in support missions (target acquisition, reconnaissance, communication relays, electronic warfare, etc.). They now provide an essential capability and their integration should be performed by allocating to them what is called **"segregated" airspaces, in time or space.**
In the medium term technical progress should enable to equip them with *"sense and avoid"* devices, as a prerequisite for their integration within the same space as the one in which piloted vehicles operate.

Some of these UAVs operate very close to the ground and can adapt to a small-size allocated airspace. On the other hand, things are very different concerning tactical UAVs operating up to medium altitude or MALE or HALE UAVs, whose service ceiling is more or less similar to that of fighter aircraft. The above mentioned necessity for obtaining an overall airspace situation, enabling to take the relevant choices during conduct of operations, also makes it crucial to achieve third dimension coordination of these particular vehicles.

SIRPA AIR

Mastery of third dimension co-ordination: an environment expertise, an Air force competence

The uniqueness of the aerospace environment requires a **unique management authority**, JFACC. On behalf of the Force Commander, he is in charge of third dimension coordination. Responsiveness, which is crucial, requires employment of a centralized command structure in support of decentralized execution.
Specifically for small-size operations, JFACC may be assigned, without managerial difficulties, OPCON over all "land, "navy" and "air" aerial assets. Operation Baliste is a recent illustration of this, during which JFACC was co-located with the Force HQ.

Efficiency of a joint campaign depends **on basic tenets which can be applied to any operation.** Besides achieving crucial air superiority, a prerequisite for freedom of action, it is essential, thanks to optimized coordination, that the enemy should be denied a "victory" resulting from fratricide fire or collisions between friendly aircraft. These are the foremost loss hazards to prevent.
Moreover, an endeavor to achieve ever increasing responsiveness and efficiency relies on a capability of choosing the most appropriate weapon system likely to achieve the desired effect and whose use is compatible with required time allowance for intervention. This naturally leads us to **identify all the means to optimize effects.** One of these means is to consider that support does not always "come down" from the air: troops operating in support of an aerial vehicle in order to achieve the goal may also prove very useful.

Various hints seem to be the right road to improving the efficiency of modern operations. Thus, it might be useful to question the usual way of static partitioning of airspace between the various components. In order to obtain better efficiency in the field, embracing a **logic of dynamic management of third dimension** seems to be a relevant goal, following the example of concepts developed today in Europe in order to optimize employment of a limited airspace resource.
In the same way, the current management of vehicles, too much focused around employment on behalf of an "owner" Service, might be substituted with **permanent, inter-component endeavor to find the best effect/effecter association.** This logic should act independently of the effecter's parent Service, while making sure that the campaign objectives will be achieved and ensuring the security and efficiency to be expected from an overall maneuver.
To be equipped with efficient and fully interoperable information and communication systems is a necessary prerequisite.

The French Navy and 3D Space Management

The ocean has been for ages an open space which according to Grotius[1] is governed by the law of freedom of the open sea. This environment, composed of two dimensions up and down from the sea surface, has naturally been bound up with the "overlying" airspace and the submarine space lying below.

The third dimension, which is today our topic, pertains to the aerial environment, which has kept becoming increasingly important since the first hot-air balloon flights, from a military as well as commercial point of view.

Air campaigns which accompany, or rather support, any naval or land operation have become multiform and have been submitted to considerable change. These transformations originating from technological and doctrinal evolution have resulted in **a significant requirement for coordination with a view to the management of very different delivery vehicles within diversified contexts,** ranging from domestic operations to operations performed from sea within a coalition. That complexity is bound to increase along with the employment of cruise missiles and combat or reconnaissance UAVs.

An abstract notion on the face of it, third dimension management within the Navy may be apprehended at sea in naval operations, from sea in power or force projection, and lastly with regard to the upcoming evolution linked to the fielding of cruise missiles launched by submarine platforms, as well as to the prospects provided by network centric warfare[2].

By Commander Patrick ZIMMERMANN, Aircraft carrier air group commander

RES NULLIUS, but closely dependent on air security and international relations

In the eyes of legislators, open sea maritime space remains a *"res nullius"* (which belongs to nobody), on which ships can sail without constraints except those linked to their own mobility (range, detection capabilities, information and threat processing capabilities).

SIRPA MARINE

"Overlying" airspaces are also regarded as being free for use outside the limits of coastal waters. This principle, which results from agreements ratified by the authorities signatories to the Montego Bay convention[3], was absolute until the last decade, and widely implemented by aircraft carriers, whether carrying fixed wing or rotary wing aircraft.

Moreover, since the 1990s, commercial air traffic has increased about ten percent a year. The vast expanses of oceans, which once were deserted areas, are increasingly packed with airways and regulated or responsibility spaces defined according to the principles established by the Chicago convention (in particular concerning assistance and rescue)[4]. Beyond what was stated in the founding texts, **the difficult issue of flight security is raised today, with its political and economic consequences.**

This particular area has come to play a considerable part as regards regulations and management of airspaces, even when they are regarded as "free"[5]. It is then becoming crucial to report activities and to perform coordination with civilian or military agencies in charge of the considered airspace. Moreover the status of diplomatic relations

with riparian states also makes it necessary to have a specific line of conduct amending flight management from a maritime platform. Lastly, complex regulations and legal precedents as regards management of contentious situations make it advisable to get available personnel, flying staff as well as air-traffic controllers, whose expertise should be recognized by states (through ICAO delegation), over and above their training activities and equipment capacities.

The problematics of tactics has gone through a similar change. A fighter aircraft controller was in the past confined to interceptor guidance tasks; today he has to tackle the broader fields of air operations and civilian and military regulations. In the same way, tactical air controllers of ships using broadcast control[6] will doubtlessly have to shift towards a more substantial specialization so as to meet the expected requirements in coordination and control activities.

Once distinct from each other, **warfare areas**[7] now have a common denominator: aircraft, whether fixed or rotary wing. Management of third dimension used to be performed tactically, more often through "procedural" control intended to maintain vehicles within their operating zone. This type of management is subject to changes in accordance with the specifications of the delivery vehicles themselves as well as those of the weapon systems. Third dimension management is becoming an overall assessment guided by a principle of interaction of information and threat processing systems. Area management is becoming overall management. Obviously difficulties increase along with the necessary identification of vehicles so as to avoid fratricide fire, but also with time being squeezed within the decision-making process due to the improvement in performances of the various players.

Crisis time thus becomes the most critical context through accumulation of constraints of air-traffic, whether it is endogenous or exogenous to the naval force, as well as those of force protection. Besides, asymmetrical action has become the main risk factor because, over and above the difficulties mentioned before, it is still bound up with rules of engagement and opening of fire.

Third dimension management at sea therefore requires first and foremost quick detection and information processing assets, operated by personnel with legally recognized competence; these should be equipped with long-range high-performance weapon systems so as to get an extended advance notice, and also with close self-protection assets, whether missiles or high-rate-of-fire guns, in order to deal with asymmetrical threat or a missile which has gone through the different screens.

From sea to land, power projection, force projection or air support

Concerning power or force projection, **the aircraft carrier or the command and amphibious assault ship remain the main** conveyors of action against land. Action of their air groups is part of employment prospects ranging from domestic operation in an open conflict to operation within a contingency coalition committed in OOTW.[8]

First entry operations or peacekeeping troops support are missions which require permanent support regarding 3D coordination.
For that purpose the French Navy has been equipped with a high-performance tool: **E-2C Hawkeye**. A center for detection, assessment development and information distribution, this aircraft is **really a command and tactical control tool** (or even a tool at operational level of war in some conditions).
The development of "liaison 16"[9] between the various platforms which include surface ships, Hawkeye and F2 Rafale aircraft, also enables better command of third dimension. By distributing identical and coordinated information to all players, it enables to have unparalleled **tactical or theater awareness.**

At command level, particularly in planning and control, systems such as ICC[10] or ACCS[11] have become indispensable to coordinate more and more numerous vehicles, these being subjected to the increasing constraints due to their interdependence. The Afghan theater is the best example of coordination made extreme by:
(a) the number of aircraft operating simultaneously,
(b) remoteness of battle areas from sea (which requires a lot of in-flight refueling), and
(c) land forces' requirements concerning accuracy and diversity of airborne armament (which is sometimes fitted for military operations on urban terrain, some other times for cave destruction or for intelligence support).

This **extremely comprehensive coordination in the third dimension,** which involves dozens of aircraft, can be performed only from ground-based air operation centers having the necessary resources available (CAOC)[12], or at naval force level within tactical HQs (HRF[13], CTF[14]...).

Planning and control systems should be perfectly interoperable, so as not only to coordinate but also to tailor assets in accordance with future requirements. From a doctrinal point of view but also in the field, the responsiveness necessary for engaging high pay-off targets within a reduced time slot (TST)[15] still has not been achieved as regards equipment. The same is true for fusion of information from the various theater NTISR (non traditional intelligence, surveillance and reconnaissance) sensors, which is still in the pipeline. Moreover, the various delivery vehicles expected in the next few years will make 3D management even more complex. Airborne or sea-launched cruise missiles, as well as combat UAVs, have become a reality. Unmanned flight decreases responsiveness and hinders vehicles' adaptability. Just as the dropping of a propelled bomb (AASM type) from a Rafale fighter aircraft requires appropriate kinematics for escort aircraft, firing a SCALP missile or an equivalent weapon from a submarine makes 3D management more rigid and restrictive as regards planning (slots, corridors, terminal maneuvers, etc.).

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1 Grotius: (1583-1645) initiated the principle according to which the sea is international territory and all nations are free to use it for maritime trade **(Mare Liberum).**
2 NCW - Network Centric Warfare: capability to link to one another the various Services (Army, Navy, Air Force), as well as allied nations' forces, to collect information thanks to UAVs, satellites, to distribute information to units in real time, so as to strike faster and with more accuracy.
3 Montego Bay Convention, or United Nations Convention on maritime law which compartmentalizes maritime spaces (coastal waters, exclusive economic zones, straits, etc.)
4 Chicago Convention (1947, 7th amendment in 2000): established ICAO, a United Nations specialized agency in charge of coordinating and regulating international air transport. The convention defines air rules, rules for aircraft registration, safety, and specifies rights and duties of signatory nations as regards aviation law.
5 Airspaces are classified into different categories according to radio/radar link status and to flight rules with which aircraft must comply.
6 Type of nondirective informative control. Flight responsibility (safety, mission) is with the pilot.
7 Surface to surface warfare, anti-air warfare, anti-submarine warfare.
8 OOTW (Operations Other Than War (US)), or PSO (Peace Support Operations (NATO)).
9 High-speed tactical automatic data link, highly jamming-resistant, which enables to exchange radar images and to transmit information without radio communication.
10 Integrated Command and Control (ICC): NATO computer-assisted programming system of air activities, enabling in particular the development and formatting of "Air tasking orders" and "Air coordinating orders"; its American equivalent is Theater Battle Management Core Systems (TBMCS). These systems are not interoperable.
11 ACCS: NATO Air Command and Control System: further development of ICC which should become interoperable with numerous planning and air activities control systems.
12 CAOC: Combined Air Operations Center of JFACC (Joint Force Air Component Commander).
13 NATO "High Readiness/Response Forces".
14 CTF: Commander of the Task Force (tactical level command).
15 Time sensitive targeting: a process of detection, identification and destruction of a fleeting and tactically or strategically high pay-off target within a reduced opportunity slot. Requires a particularly responsive organization of control, and the corresponding assets.

Co-ordinated from the peacetime transit phase down to the various warfare domains, Navy 3D management must still be subjected to change. **The control of air - sea spaces is dependent on changes in and interdependence of the capacities of ships, submarines and aircraft.**
Even if it is fully coherent as regards high-intensity warfare, it can still be improved for asymmetrical warfare. The main difficulty results from technological superiority counterbalanced by the careful complexity of rules of engagement and suicidal fanaticism of the opponent.

In the same way third dimension in operations launched from sea to land can be planned and scheduled with computer assistance, and conducted by vehicles with technological superiority. This is particularly the case for assault missions, which in the future will be performed with interactions coordinated through network centric operations, with employment of UAVs, cruise missiles and aircraft.

While military and industry researchers focus their energy on tomorrow's warfare, today's warfare is supported largely by players on the ground. These **currently** meet with **material and doctrinal difficulties as regards 3D.** Air support (whether "briny air" or not) to ground troops is still the subject of much research work because it is performed within a very changeable context which is made more complex in peace" operations. While this weak link in the chain has already been taken into consideration by our main European allies (British, Dutch and Belgian), we French are behind schedule. Beyond the national capability deficit and personnel losses which could result from this, the credibility of France is at stake in the course of operations conducted within a coalition.

We can safely predict that we will be in a position to fill this gap in the joint (and not specifically Navy) management of third dimension.

Case Study to Illustrate Tactical Co-ordination

This article, that reflects basic reference texts, i.e. the doctrine for co-ordination of these land elements intervening in the third dimension "CI3D"[1], intends to illustrate in a concrete way **tactical co-ordination as it is envisaged for the future.** It refers to the notions of planning and execution (reflection time or real time). The latter should be favored since it provides more flexibility by enabling the land component to intervene directly on its land actors operating in the third dimension, using a short loop technique.

By colonel Bruno DUMAS, CDEF/DEO

Land forces combat operations take new amplitude within the third dimension with the use of pre-programmed or remotely controlled Unmanned Aerial Vehicles (UAVs) that come on the top of what was previously existing, i.e. the artillery (field and air defense artillery) ammunition, and the helicopters.
Complementing the units operating on the ground, air space offers additional capabilities: to see and operate quickly, far away and in a strong way, thanks to its vectors which are not submitted to the constraints linked to ground operations.
The combined arms commander's initiative is thus improved especially when operating within the current discontinuous types of battle fields. The third dimension must thus be regarded as a true space of maneuver for the land forces.
But many other friendly or neutral additional entities operate in that same environment. It is thus indispensable to ensure a permanent and real time co-ordination to preserve each one's freedom of action without endangering the others' safety; this is especially true since the type of trajectories as well as the reduced size of certain vectors generate difficulties of localization and identification. That point is especially crucial since the reaction times that are required to have an effect on the different vectors are often very short.

*"The co-ordination of land elements intervening in the third dimension ("CI3D"), or tactical co-ordination, participates in providing the combined arms commander with a larger freedom of action, while guaranteeing all airspace users' safety"**. Its purpose is to *"provide the army with the capability to manage in the more flexible and reactive way possible, the actions and trajectories of its various mobile elements that operate or move within that space of maneuver"**. Modern combat that requires reactivity in order to take the initiative, demands command and control as well as co-ordination capabilities that should not induce a cumbersome type of planning. On the contrary, they should permit the conception and execution of a contingency operation that would regroup several complementary weapon systems, within the shortest delays possible. **Although the control by means of procedures constitutes currently the most often used method for co-ordinating land elements intervening in the third dimension, in order to meet the challenge of the future air land combat, it should be necessary that the Army acquires assets which would enable it to know in real time the position of all of its elements operating in the third dimension and to modify, again in real time, their trajectory should it be required.**

Control by means of procedures: a method of co-ordination in the third dimension that relies on a combination of orders and measure previously defined and disseminated. Control by means of procedures includes processes such as splitting airspace into several volumes and periods of time (time blocks); it also includes the use of fire support coordinating measures.

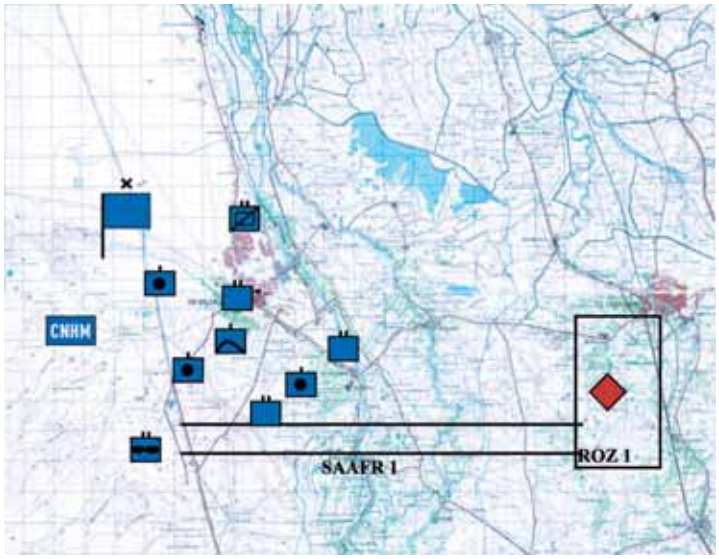
It is however indispensable that land actions in the third dimension should be conducted in liaison with the air organizations that are specialized in air space management. As a matter of fact, in that domain, the co-ordination rules must be strictly respected since they guarantee joint and interallied interoperability.
It is also necessary to limit the impact of the air force's planning cycle which results into specific orders (ACO[3] and ATO[4]), due to the significant loss of flexibility of the relevant capabilities' engagement. In order to do that it is necessary to develop a capability to exert direct control.
In addition the co-ordination of the land elements intervening in the third dimension should not interfere with these various elements' own chains of command. It is only a way to improve their freedom of action by improving implementation flexibility and reducing delays for unexpected actions.

Direct control: a method of co-ordination in the third dimension which, within a given volume, relies on the actual identification, the tracking and control of aircraft and air defense systems, achieved through electronic means by an organization that is in charge, within that volume, of the overall authority and corresponding responsibilities.

The tactical situation herein presented is voluntarily very shallow, since this is not the main topic of this article. The chosen example involves a brigade engaged in an expeditionary type of deployment and manned by a single nation.

The brigade lay out, at the time of the action is as follows:

An enemy element having been detected, the brigade has required, during the planning phase[5] (i.e. 15 to 18 hours in advance), a zone of action for its airmobile unit (ROZ[6]) and a dedicated corridor to join that zone (SAAFR[7]). Following the request's acceptance by the authority in charge of managing the air space (ACA[8]), these measures have been included in the daily ACO for that specific intervention.



In order to co-ordinate the action of its land elements intervening in the third dimension, the land component requests and is granted by the ACA a volume of responsibility within the air space. Co-ordination will thus have to be conducted in a decentralized way. In that mode, ACA hands over to the Army, within a specific zone, the responsibility to exert direct control of its assets while supervising its actions.

That area will thus be managed by an Army center[9] in accordance with the land component HQ's guidance. That center, in order to permit operations by the air defense deployed unit, provides that unit with a zone of engagement and issues a "restricted fire control measure", which means that the air defense unit will be allowed to open fire, at its initiative in its zone of engagement, only on aircraft that have been identified as hostile or on the orders of the center that is responsible of the area.

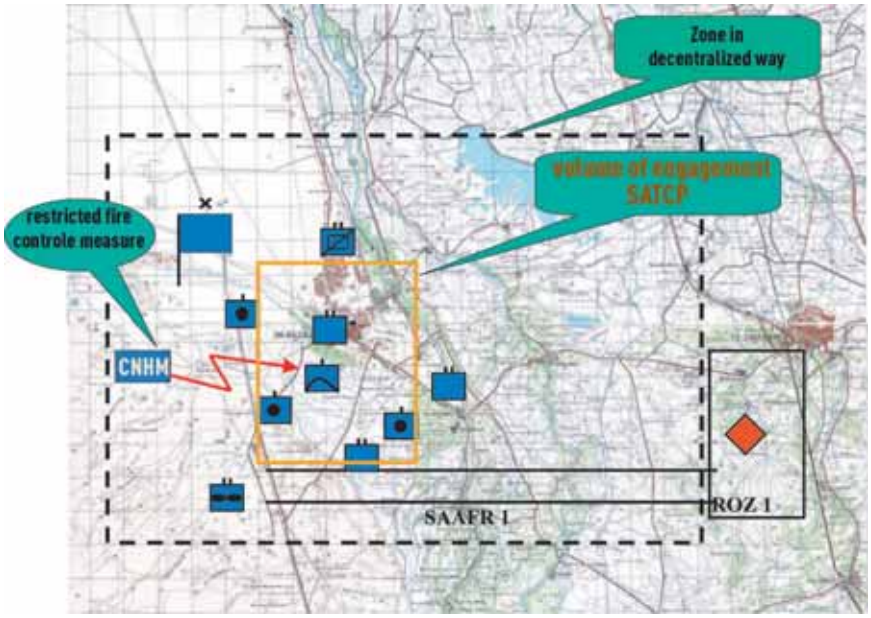
An enemy unit has just appeared in a zone that had not been initially forecast; the brigade HQ assesses it as being more threatening that the first one, it decides thus to suppress it as fast as possible and consequently modifies the army aviation unit's mission.

That unit requires from the CNMH a volume for the mission and a corridor to join it. CNMH thus establishes these measures and notifies other concerned elements (in that case the air defense unit, since the corridor crosses its volume of engagement).

Within the framework of its maneuver, a GTIA* commander wants to collect intelligence and thus decides to make use of a DRAC[10].

He thus requires from CNHM a volume to launch the DRAC (in green on the figure). That volume will be strictly reserved for the DRAC since the UAV is particularly difficult to localize and identify. The CNHM grants that required volume, while notifying it to all other concerned units (in that case the air defense and the airmobile units since the volume interferes with their respective areas).

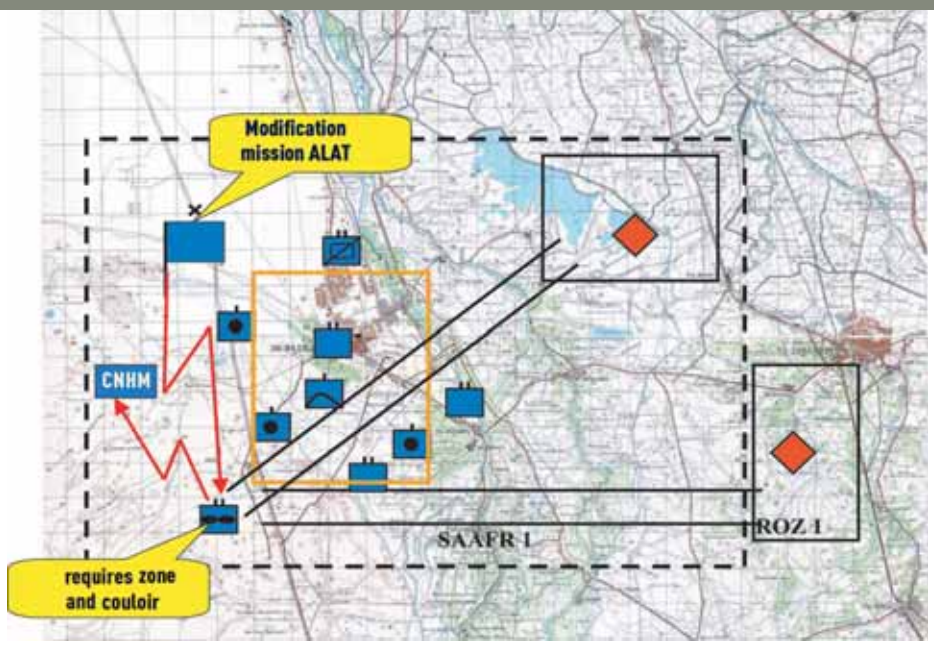
The situation becomes then even trickier since the airmobile unit begins its operation using the corridor that it has been allocated but which crosses the air defense unit's volume of engagement as well as the DRAC's dedicated volume, which could cause risks of collision between the DRAC and the helicopters. In addition DRAC's volume being included within the air defense unit's volume of engagement, the risks of friendly fires from the air defense unit against the DRAC are not to be excluded. In that situation, where many actors will have to intervene into the same volume, CNHM will:



- Limits the air defense unit's fire possibilities by issuing a "prescribed fire" co-ordinating measure, i.e. the unit will permitted to open fire only on CNHM's order or in self defense;
- Reroutes the army aviation unit and let it be guided by an Army aviation controller located at CNHM level.

During the directly controlled guiding of the helicopters, le CNHM issues a "no fire" order to the field artillery battery which was attacking the opponent's element, valid during the period of time the airmobile unit flies over the battery area.

As soon as the airmobile unit has finished its transit over the battery area, CNHM issues an

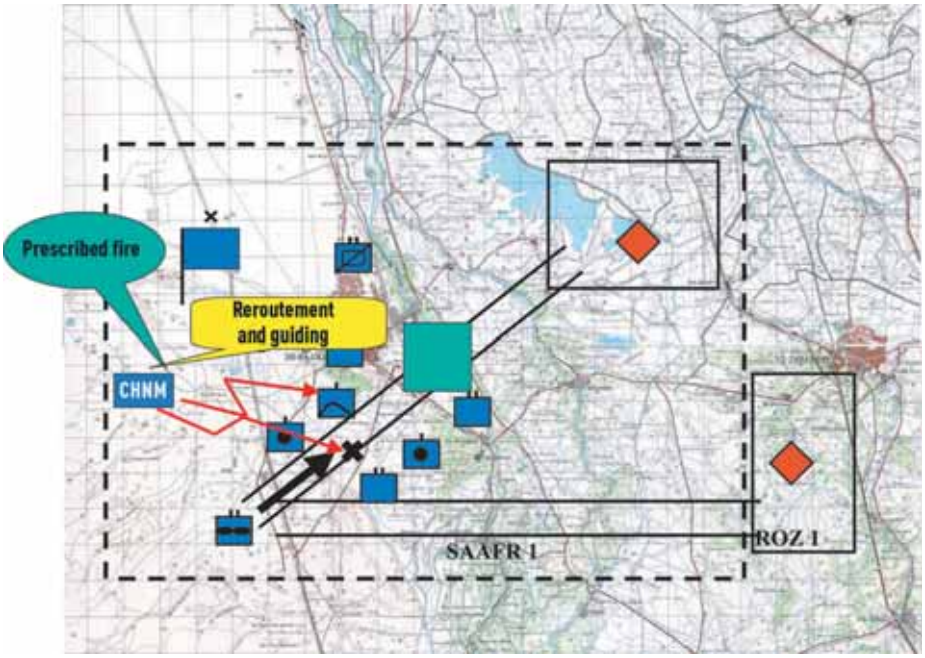


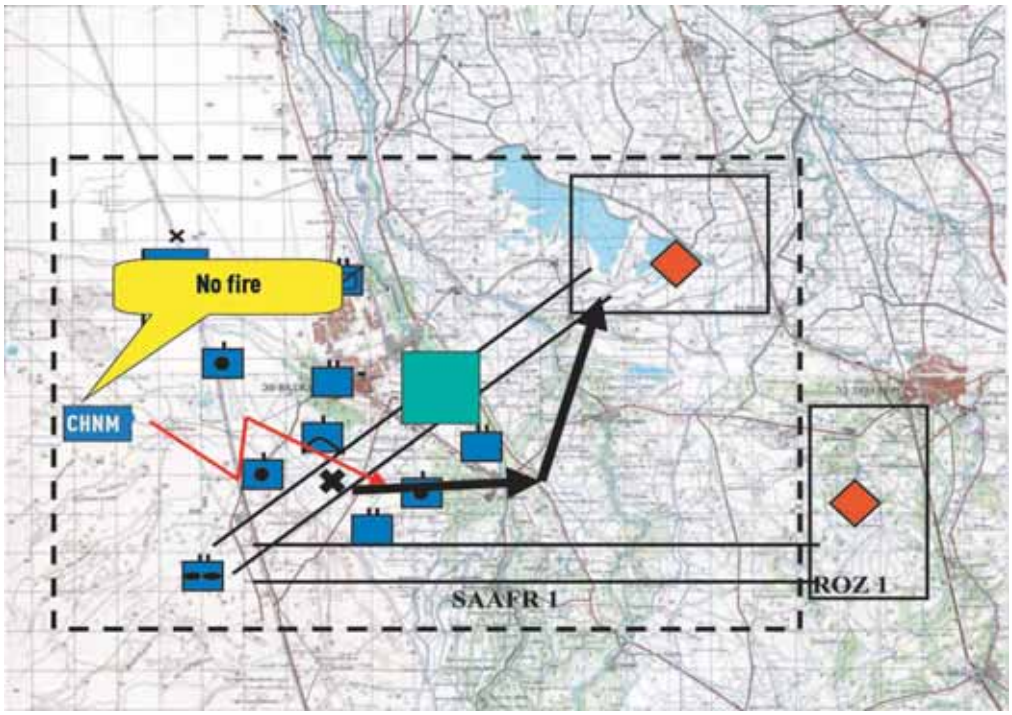
1 Approved on 4 July 2006 n° 478/DEF/CDEF/DEO/CDM - Edition 2006.
2 Excerpt of the concept for coordination of the land elements intervening within the third dimension, approved on 24 October 2005 n° 2635/DEF/EMAT/BPO/TN-3D/42.
3 Airspace Control Order.
4 Air Task Order.
5 Classical process of 3D coordination making use of measures of coordination.
6 Restricted Operation Zone.
7 Standard use Army Aircraft Flight Route.
8 Airspace Control Authority, usually the COMJFAC.
9 CNHM (MARTHA Higher level center).
10 UAV dedicated to collect close contact information.

*Combined arms battalion task force.

"end of no fire" order to the field artillery battery to enable it to resume attacking the opponent's elements. A new "no fire" order will be again issued when the army aviation unit enters the battery's zone of action to avoid endangering that unit.

That simple example intends only to demonstrate how the land component should coordinate, within the framework of its mission, the intervention of its elements in the third dimension. By acting directly on them through a short loop circuit, it improves reactivity and thus provides the combined arms commander with more freedom of action while guaranteeing all airspace users' security.





The Army doesn't have yet the indispensable equipment required to achieve that type of coordination but it should, in the future, acquire them in order to be able to conduct actions in the third dimension the way they are described in this example.

Implementing A2C2 Tactical Co-ordination

This article builds upon the previous article's case study and shows a **practical implementation of A2C2 tactical coordination thanks to MARTHA Block 2 equipment.**

BY LIEUTENANT COLONEL LOÏC BOUE - EMAT/BSA[1]

The MARTHA program

MARTHA "block 1" was fielded in 2005 within the SHORAD and VSHORAD ADA platoons of a level 1 centralized coordination center (co-ordination level 1 "NC1") equipped with detection and identification radars. Within that framework, "NC1" was fully autonomous and could only implement control by means of procedures. It had no direct control capability.
MARTHA "block 2" should bring all the functionalities required to achieve the tactical coordination of all those land elements having to intervene within the third dimension. More concretely, it is "simply" a question of interconnecting all these elements' command and control systems.

That interconnection must go through the **development of a new coordination center,** the **"CNHM"** (higher MARTHA coordination center), that will be provided with all required interfaces and adapted data processing software. These interfaces are being developed in accordance with the doctrine. As a matter of fact, each of these interfaces corresponds to an **effect to be achieved:** connecting intervening elements, information to be exchanged, types of connection to be established (real time, reflex or reflected). Once the definition has been established, each interface might then be specified as well as its associated communication support and data exchange protocol. That specification process must take into account current and foreseen systems. All desired functionalities are not immediately achievable, which leads to organize the program in a sequence of blocks. And last, the constraints that are linked to the available funding impose to make choices about the content of each of the blocks, by striving to develop first the essential functionalities, while developing, if required, additional functionalities, in a degraded mode, based upon what currently exists. **Providing consistency to a complex operational capability** is thus a long term business that must be controlled by higher level organizations: overall operations, staff program divisions, steering structures of the armament programs, etc.

The MARTHA program, a tool to coordinate 3D operations, is part of the overall land CIS program and, since a decision made by the Armed Forces Joint Staff in 2005, is also part of the Air Force operations command and control system ("SCCOA").

The object of this article is not to describe the sequenced implementation of the different blocks (see figure annexed to this article).
I'll describe the practical implementation as it could be conducted with the finalized version of the program which is currently being developed ("V2C").

Practical implementation, a case study

First of all, "CNHM" receives through forces' CIS the airspace sharing description as it has been decided by ACA (Airspace Control Authority): i.e. the ACO (Airspace Control Order), and the ATO (Air Task Order) and, for our study the allocation of a volume of responsibility in a decentralized way. "CNHM" receives also through CIS, the land component command HQ's guidance about how to manage that volume (fire control measures, operational priorities, etc.).
In accordance with this guidance, "CNHM" issues a "weapons tight" fire control measure to the air defense units located within its AOR. That measure is immediately forwarded to subordinate units ("NC1") through tactical data communication links as well as to the higher level air coordination center (e.g. deployed CAOC) that keeps in permanence an actual control capability. That organization also provides all actors present on the network with a real time aircraft classification (via L16 or L11). Thus, in all that will follow, the allocated volume of responsibility will not be a "black box" but rather a "transparent one". At the very moment an Army Aviation unit receives an unplanned mission, "CNHM" has at its disposal all the digitized software tools necessary to establish a corridor and an *ad-hoc* set of air control measures; it also has the capability to disseminate them instantly. This data is transmitted through "NUMALAT" which, in return gives the aircraft positions.

That real time, permanent exchange of communications provides for a reactivity that is indispensable to the

"aérocombat"* **while it guarantees aircraft security.**
In addition, "CNHM" has voice radio communication link ("SATURN" radio set), an indispensable complement to the exchange though tactical data communication link.
The same process applies to the implementation of the short range intelligence UAV "DRAC", but in that case the battalion level data exchange network ("SIR") is being used. As soon as the situation complexity generates conflicts between volumes and coordination measures, "CNHM" is notified and thus can immediately conduct the required de-confliction. In our study the Army Aviation controller, located at "CNHM" reroutes the Army aviation unit, while the fire coordination operator issues a "restricted fire" control measure to the air defense unit.
Simultaneously, a "stop fire" is sent to the field artillery ATLAS chain through a digitized bridge. These three actions are developed simultaneously under the supervision of the center's commander and are immediately forwarded through tactical data transmission links. Concretely, the Army aviation patrol's leader knows unequivocally what are the fire control measures that the air defense units he is flying over has received whereas that unit knows the identity and mission of the approaching aircraft. Consequently, during that phase of the conduct of the operation, all the actors share the same picture of the situation and the control measures that have been issued as if they were operating within the framework of a planned action. **Real time direct control has thus replaced the procedural control.**

Joint synergy

We have seen how **MARTHA's A2C2 tools make it possible to conduct a reactive *"aérocombat"* at land component level.**
Other types of scenarios exist for the air component (air defense systems deployed in support of a deployed air base) or for joint level (air fire support to the benefit of the land component and participation of the land air defense systems to the overall air defense).
It was possible to envisage the development of command and control systems specific to each of the potential frameworks of employment and then develop their interoperability later on. However, the studies that were conducted by the Joint Staff in 2005 resulted in the fact that "CNHM" could respond to all the requirements, provided that a few functionalities specific to air component be added.

The program has thus been **merged with "SCCOA" in 2006 to achieve a single joint 3D defense management center adapted to all the potential frameworks of employment.**
Within that same logic, MARTHA merged, into a theater level ensemble, with "C3M" (mobile Command and Control Center), Land MIDS (land communication support means in L16) and DAMB/T (Theater anti ballistic missile defense).
That consolidation ensures the coherence of all the means intended to be employed during a deployment in support of projected land forces.

1 Army staff, Weapon Systems Division.

* **"Aérocombat"** is the co-ordinated and integrated maneuver of tactical level units operating on the ground and in an air-space close to the ground, under the direct responsibility of the Force's Land Component Commander.
In addition to ground units, **"Aérocombat"** addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

In 2010, "CNHM" will become the indispensable joint interoperability pivot enabling the joint commander to conduct his ***"aérocombat"***.

The *MARTHA* Program

MARTHA program consists of two blocks:

- *MARTHA* block 1, fielded in 2005, with 45 air defense platoon coordination stations ("NC1"),

- *MARTHA* block 2 that includes the upgrade of **39 *"NC1"***, the creation of **14 *"CNHMs"*** (higher level *MARTHA* centers) and **34 *VPC*** (command posts vehicles) as well as the associated sofware **(*SIRASA*)**.

Block 2 is developed in 3 incremental versions:

- V1: basic functionalities,

- V2: addition of the medium range air defense capability ("SAMP/T"),

- V2C: **convergence version that will provide *"CNHM"* with the major functionalities of an air force tactical cell (*"CETAC"*).**

MARTHA system establishes tactical data links with the **12 control stations** of the **MIDS/Terre** (L16) operation, with PR4G and SATURN radio sets as well as with RITA HAWK stations.

***MARTHA's* network allows a real time coordination of all land elements having to intervene in the third dimension as well as with the air force ADA systems, *into a single joint ensemble* in liaison with airspace control organisms and with the land component chain of command, in a deployment abroad as well as on the national territory.**

MARTHA's program is part of the "*SCCOA*" (air operations command and control system) theater system and of the overall land CIS. Future improvements will be developed within the "*SCCOA*" framework.

Operational performances

Coordination of the *HAWK, MISTRAL, SAMP/T, CROTALE* NG weapons systems.
L16, L11, LLAPI Tactical data exchange systems.
Interoperability with *SCCOA*, joint CIS *SICF*, battalion level CIS, and *ATLAS* systems.
Capability to process 500 tracks simultaneously, update of the local air situation picture every 3 seconds, set up of the centers in 30 minutes.
Two versions of *NC1* exist: 25 *NC1*-30 equipped with a 16 km range radar, and 14 *NC1*-40 with a 25 km range radar. *NC1s* are equipped with an IFF system for aircraft identification.

Simulation and Integration of Army Aviation into Combined Arms Combat

The importance of simulation in training as well as in operational preparation is increasingly developing as its performances are refining and as budgets available for training are decreasing.
ALAT[1] (French Army Aviation) has always been a trail-blazer in the field of simulation in respect of pilot education and training, operational and tactical readiness. More recently, this extended to preparation of missions and assistance in decision-making.

We are first going to consider the various capacities of simulation tools to represent air mobile combat and its participation in combined-arms and joint actions. This article will then describe the necessity to take in hand the objectives assigned to a simulation tool. Finally, we will deal with the evolutions contemplated in the medium and long term about the employment of simulation in drafting and planning orders.

BY MAJOR LOUIS DE FIRMAS - CDEF/DSRO[2]

CCH J.J. CHATARD/SIRPA TERRE

Simulation: to facilitate training in realistic conditions

ALAT and "aérocombat" simulation*

As the land component of the third dimension, ALAT is at the heart of joint coordination. Moving at the boundary between ground and air environments, it cannot get free of the constraints of air space management even if it accomplishes purely land-related missions. Within the Army, it works within specific time limits and conditions of employment. ALAT is characterized by a number of factors. First is its high **velocity for accomplishing** missions. Second is a **varying volume of committed units:** these can go from a module either isolated or in support of ground units up to an air mobile (battalion size) task force set-up directly under the command of the brigade. Third is a **high modularity of its structures** within this committed element. Fourth is a **significant extend of its communications capabilities...** Facing these specificities, simulation reveals as an efficient facilitator of professional education and operational preparation.

From the three branches of simulation usually accepted (instrumented simulation, virtual simulation and constructive simulation[3]), ALAT mainly uses the tools of virtual and constructive simulation. As a forerunner in the

field of simulation of weapon systems, it has beenfor long an enthusiast of simulators. These are dedicated to individual and crew training and are enabling the acquisition of know-how in respect of operating activities. The efficiency of this virtual simulation is real and even "quantified": the equivalence ratio between the simulation hour and the flying hour depends on the quality of the simulator. EDITH simulator enables EAALAT[4] trainees to train for missions preparation and command while an instructor flies the virtual flight with a joystick. In respect of operational preparation, ALAT has few instrumented simulation tools: in CENTAC, helicopters employment is not marked by fire results of DX type simulators. Constructive simulation tools, while representing combined-arms combat, do include air mobile units.

Simulation and operational capabilities: SCIPIO[5] capacities

ALAT intrinsic capabilities and limits do not raise a priori any modeling difficulty. These capabilities are first **tactical mobility** linked to the third dimension, velocity of movement or accessibility to any terrain sector. These are, from the point of view of simulation software, only variables to adjust in tactical "pawns" models. Similarly, we should consider the **relative vulnerability** of helicopters due to their light armor and their immobility during the firing phase or the **strong dependence on weather conditions** to achieve tasks. These characteristics will be delivered rather accurately. The **possible communications difficulties** in relation to overstretching (commitment distances varying in the range of ten to one hundred kilometers) are not taken into account in a simulation such as SCIPIO but could easily be the goal of developments. Tactical helitransport of units or extraction of nationals/VIPs are as many tasks or know-how being satisfactorily reproduced.

ALAT main operational capacities are also reproducible in a satisfying way. **Direct support** to GTIAs[6] in order to enhance their freedom of action is reproduced in its two-fold dimension fire and intelligence. **General support actions by a separate task force** are well modeled according to the doctrine for employment of air mobile "homogeneous" basic tactical units: neutralize or destroy land or airmobile targets; control areas or key points; participate in the collection of contact information, ahead or on the flanks of the main maneuver, or in battlefields located out of range of land task forces. Conversely, the adaptability of ALAT units and their ability to multi-role missions remain more difficult to reproduce accurately; in a tool like SCIPIO: "automates" representing the basic tactical units have a structure and a tactical behavior that can hardly integrate isolated elements which have non-homogeneous behavior and tasks such as attack helicopters and reconnaissance helicopters. **The composition of a** very modular **contingency task force** currently remains difficult to reproduce unless a sufficient number of operators is available to operate each component of the task force. Creating "generic" automates that we can adapt as much as we want and that can endorse the behaviors of several operational functions is one of the on-going projects. Finally, **particular actions,** for instance in support of **COS**[7], do not raise "reproducing" problems with the existing tools, even if they are less used in the current exercises.

An interaction between components linked to training objectives

In the development of simulation tools, we should always keep in mind what is the level to train. This determines the accuracy requirement for representation. SCIPIO is dedicated to the training of level 2 and 3[8] headquarters. Subsequently, it automates elementary acts and tasks down to platoon level included but does not reproduce the in-flight behavior of each helicopter. JANUS is more orientated towards training at battalion level. Then it enables the operator who operates pawns at section level to deliver a finer granularity but this is not automated. The aim is then to find a principle of strict sufficiency, in order to represent only what is necessary... knowing that this requirement evolves frequently at a more quicker pace than the pace of delivery of new simulations.

Cross-Services co-operation

The advantages of simulation reveal numerous for a good modeling of air mobile combat and its integration to combined-arms and even joint combat. We can rely among others on a good reproduction of interaction of the various ground actors and of air, airmobile and ADA[9] support. **ALAT intelligence** capacities, logistics specificities (FARPs...), tactical effects in terms of fire support and units transportation will also be reproduced adequately. Another advantage of simulation, the evolution of tools for operational readiness enables a quick amendment of organization changes or technical evolution of equipment. **Connection with CIS** (ATLAS, SIR et SICF), in progress for SCIPIO, will allow the training of digitized units in nominal conditions.

The specificities of some terrains such as urban areas (ZUB) are currently being studied and should be part of the next evolutions of simulation softwares. In MOUT[10], ALAT contribution consists in particular in "pinpoint" direct support mission: CQS (Close Quarter Support), ISR (Intelligence Surveillance Reconnaissance), accurate drops of supplies and ammunition, infiltration/exfiltration of combatants... Faced with high risks of interweaving and friendly firing, with distances between friendly troops around fifty meters, cooperation with FACs (Forward Air Controllers) is indispensable. Such a detail level requires significant developments in simulations but remains technically achievable. FAC teams for instance and the contribution of intelligence/guidance they provide to CAS (Close Air Support) are already modeled in SCIPIO.

Training to specific know-how in respect of combined-arms cooperation as DIG[11] has already been experienced by

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31st RG[12] in 2003 on EDITH simulators from EAALAT. Engineers platoon leaders were preparing their mission like in reality and then played it with student -pilots on a simulator. The possibility to trigger these missions from maritime platforms is not a problem for simulation. An amphibious exercise coordinating 9th BLBMa[13] and the French Navy was already played with SCIPIO at CEPC in May 2006 (Exercise Poseidon). Constraints for using the air space require coordination measures defined in an Airspace Control Order (ACO). In SCIPIO, cooperation and even tactical control by air assets for surveillance and control are currently only represented by a player/Air Liaison Officer. However coupling being in progress with CIS[14] will enable ACO dissemination via SIR[15] and SIC/F[16]. In the medium term and if the need was confirmed, coupling simulation with tools of preparation and control of air missions available to the air liaison officer to EMFs[17] could be envisaged.

Joint simulation, being also in full development, will be capable to provide all 3D involved staff with ACO operational data. CSFEE[18] already allow to run joint exercises, in particular, for training CID[19] students and with the support of JTLS tool. In the near future, simulation federations such as ALLIANCE SI and MENTOR[20] projects should improve training at operational level while allowing inter-connection, data exchange and taking into account interactions between services specific simulations. In the framework of these simulations, the "land element" (SCIPIO) would be coupled to naval (ORQUE) and air (SCEPTRE[21]), simulation, and would allow ALAT to train to 3Ds cooperation in its clearly-land scope of employment.

In the future, assistance tools for decision-making and/or planning ?

An orientation contemplated for some simulation tools is decision-making assistance during planning or drafting orders. Once more, ALAT is at the vanguard with tools for mission preparation being airborne and integrated in SIT[22]. Back-brief tools are also available. They enable flights to be recorded and matrixes for the analysis of data compilation to be generated. In the same kind of ideas, functions of "re-play" and after action review (AAR) present in constructive simulation allow lessons to be drawn *a posteriori*. This is done from tactical choices made during an exercise with simulation (CAX: Computer Assisted Exercise), while noticing the effects generated by the action conducted. But as soon as developed simulation models enable it, benefiting from capacities of accelerated sequencing, we can envisage several levels of employment, going from the employment of a simulation as a **"virtual sand box"** to the **confrontation of courses of action** in order to orientate the choice of COAs. This is achieved by simulating

the various cases envisaged through the **lively presentation** of the courses of action envisaged and/or selected during the briefings. Today, new tools are available on a mere laptop (ASTEC experimentations[23]). They could on the one hand be a support to training courses (basic courses for lieutenants, company commanders advanced courses or Bn. commanding officers) and on the other hand be used by DEPs[24] for doctrine studies. The confrontation of courses of action, experimented with APLET[25] project could enable for instance to illustrate the contribution of an air mobile action on friendly COA: flank-guard on the flank of the main action, deep air mobile raid on an enemy second echelon, interception of an enemy counter-attack...

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In addition to ground units, **"Aérocombat"** addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

1 Aviation légère de l'armée de terre.
2 CDEF/DSRO: Doctrine Forces Employment Center/Simulation and Operational Research Division.
3 From a technical point of view, considering men trained and equipment on which they train, the distinction is as follows : the instrumented simulation addressing real personnel on real equipment, only fire effects are simulated (CENTAC: Force on Force Training Center); virtual simulation enables training real personnel on simulated equipment, requiring 3 dimension virtual representation (in general, flying and fire simulators utilized in Branch Schools), finally, constructive simulation simulates personnel and equipment at subordinate levels in view of operational readiness of a higher command level (CEPC: CP Battle Command Training Center).
4 EAALAT: (French) Army Aviation Branch School.
5 SCIPIO: Simulateur de combat interarmes pour la préparation interactive des opérations : Combined-arms combat simulator for interactive preparation of operations.
6 GTIA: Combined-arms (battalion) task force.
7 COS: Commandement des opérations spéciales : Special Forces (Joint) Command.
8 Translator's note: division and brigade level.
9 ASA : Artillerie sol-air. ADA: Air defense artillery.
10 MOUT: Military operations in urban terrain.
11 Détachement d'intervention du génie : Engineers intervention team.
12 31e Régiment du Génie : 31st Engineers Battalion.
13 9th Light Armored Marine Brigade.
14 SCIPIO version v1.SIC should be tested at CEPC in March 2008 during a digitized battlefield exercise with 2nd Armored Brigade.
15 SIR: Battalion Information System.
16 CIS: Command Information System.
17 Etat-major de force : level 2 (division) HQ.
18 CSF2E : Centre de simulation pour la formation, l'entraînement et l'expérimentation. : Center for military education, training and experimentation.
19 CID : Collège interarmées de défense.
20 MENTOR : Moyen d'entraînement opératif : Operational training asset.
21 SCEPTRE : Simulation cohérente et polyvalente réutilisable et évolutive : Coherent multi-purpose re-usable and evolving simulation.
22 SIT : Système d'information terminal : Terminal information system.
23 ASTEC : Analyse de situation tactique et des comportements : Analysis of tactical situation and behaviors.
24 Division des études et de la prospective des écoles d'application. Directorate for combat development (Branch schools).
25 APLET : Aide à la planification de l'engagement tactique : Assistance for planning and tactical engagement.

Simulation allows then to envisage, on the one hand, training of air mobile units, through very sophisticated simulators, thanks in particular to ALAT long experience in this area. **On the other hand,** we can contemplate **training of large units.** This is achieved **through taking realistically into account the cooperation between land components and coordination of the various actors of 3Ds,** from Air Force to ADA, not to forget the fighter force, Army units supported by ALAT or navy ships used as an helicopters platform or participating in an amphibious operation. Some more particular aspects such as MOUT which require a fine-grained modeling even for training of large units still remains to develop. Finally the employment of simulation in support of decision making is today a prospective field as a "natural" development of "re-play" functionalities and after action review of simulation.

Field manuals, French forces' employment (tactical level)

Concept de la coordination terrestre dans la troisième dimension (CI3D) *(Concept for land 3D co-ordination),* approved under n° 2635/DEF/EMAT/BPO/TN-3D/42 dated 24 October 2005.

Doctrine de la coordination terrestre dans la troisième dimension (CI3D) *(Doctrine for land 3D co-ordination)*, approved under n° 4178/DEF/CDEF/DEO/CDM dated 04 July 2006.

Manuel de coordination dans la troisième dimension, *(Field manual for 3D co-ordination)* approved under n° 969/CDES/CREDAT/B4 dated 31 October 2002.

ALAT 100 - Concept d'emploi des forces aéromobiles au sein de l'armée de terre *(Concept for airmobile forces employment within the Army)*, approved under n° 104/DEF/EMAT/BCSF/ALAT dated 05 June 2000.

ALAT 805/OPS - Notice d'emploi appui feu ALAT au contact *(Operating instruction for Army aviation fire support at the contact)*, approved under n° 564/DEF/CDEF/DEO dated 22 July 2005.

ALAT 003/OPS - Manuel d'emploi des formations de l'aviation légère de l'armée de terre en zone urbaine *(Field manual for Army aviations units employment in urban areas)*, approved under n° 694/CDEF/DEO/B.ENG dated 31 October 2006.

Concept d'emploi des drones dans l'armée de terre *(Concept for UAVs employment within the Army),* approved under n° 796/DEF/EMAT/B.EMPL dated 10 August 2007.

Etude sur la coopération drones/hélicoptères *(UAVs/Helicopters co-operation study)*, approved under n°481/CDEF/DEO/B.ENG dated 16 July 2007.

Book dealing with tactical third dimension

L'histoire de l'aviation légère de l'armée de terre - 1794-2004 - De l'Entreprenant au Tigre, *(History of the Army aviation - 1794-2004 - From the "Entreprenant" to the "Tigre")* Lieutenant General André Martini, Lavauzelle, 2005.

Publications or articles dealing with tactical third dimension

De l'aéromobilité à l'aérocombat des forces terrestres: vers une rupture tactique majeure *(From airmobility to land forces "aérocombat": towards a major tactical disruptive innovation),* Major General Jean-Claude Allard, "Revue de la défense nationale et sécurité collective", November 2006.

La limite basse de la troisième dimension *(The lower limit of the third dimension)*, Air Brigade General Guillaume Gelée, "Revue défense nationale et sécurité collective", June 2007.

Principes élémentaires de l'aérocombat *(Elementary principles of "aérocombat"),* Major General Jean-Claude Allard, site intraterre du CESAT, Taktika, July 2007.

Commandement tactique et coordination : préserver la liberté d'action et l'efficacité opérationnelle *(Tactical command and co-ordination: how to preserve freedom of action and operational efficiency)*, lieutenant-colonel Peradejordi, Héraclés n°22, July-August 2007.

Main Abbreviations and Acronyms

in the 3rd Dimension's Area used in the articles

	Third dimension
3Ds	*Dull, dirty and dangerous*
A	
A2C2	*Army airspace command and control*
AAC	*Army air corps (UK)*
AAR	*After action review*
ABCS	*Airborne command system*
AC	*Air commander*
ACA	*Airspace control authority*
ACAS	*Airspace co-ordination areas*
ACC	*Air control cell*
ACCS	*Air command and control system*
ACE	*Allied command in Europe*
ACMS	*Airspace control measures*
ACO	*Airspace coordination order*
ACP	*Airspace control plan*
ACP	*Air control point*
ADA	*Air defense artillery*
ADC	*Air defense commander*
AFDD	*Air force doctrine document*
AGL	*Above ground level*
AI	*Air interdiction*
	(French) Army aviation
ALO	*Air liaison officer*
	Artillery observation light aviation (former acronym)
AMD	*Air and Missile Defense*

Principaux sigles et acronymes

concernant la 3e dimension utilisés dans les articles

3D :	Troisième dimension
A	
	Contrôle de l'espace aérien de l'Armée de terre
	ALAT britannique
3A	Analyse après action
	Systèmes de commandement opérationnel de l'armée de terre américaine
ACA	Commandant air
	Autorité de contrôle air
	Zones de coordination de l'espace aérien
	Cellule contrôle de l'espace aérien
	Évolution d'*ICC* qui devrait devenir intéropérable avec de nombreux systèmes de planification et de conduite de l'activité aérienne
	Commandement allié en Europe
	Mesures de contrôle de l'espace aérien
ACO	Ordre de contrôle de l'espace aérien
	Plan de contrôle de l'espace aérien
	Point de contrôle aérien
ASA	Artillerie sol-air
	Commandant de la défense aérienne
	Documents doctrinaux de l'Armée de l'air
	Niveau au dessus du sol
	Mission d'interdiction par air
ALAT	Aviation légère de l'armée de terre
OLFA	Officier de liaison de l'armée de l'air
ALOA	Aviation légère d'observation d'artillerie (ancien)
	Défense antiaérienne et antimissile

Abbreviations

AOC	*Air operations center*
AOCC	*Air operation co-ordination center*
AOO	*Area of operations*
AOR	*Area of responsability*
	Tactical commitment planning assistance
ADA	*Air defense artillery*
ASOC	*Air support operation center*
ATG	*Amphibious task group*
	Tactical situation and behaviour analysis
	Automation of field artillery fires and liaisons
ATO	*Air task order*
ATP	*Allied tactical publication*
avn TF	*Aviation task force*
avn	*Aviation (US)*

B

	Airmobile brigade
	(Temporary) Army aviation battalion
	Armor Brigade
BCD	*Battlefield co-ordination detachment*
BCT	*Brigade combat team*
bde	*Brigade*
	Airborne Battalion - French Foreign Legion (Former)
	Special operations forces division
	Special forces brigade (Land)
BFT	*Blue force tracker*
BGs	*Battlegroups (EU)*
	Combined arms brigade
	Light armored brigade (Marine Infantry)
	Air-land battlespace
	Command and amphibious assault ship
BSA	*Brigade support area*

	Centre opérations air
CCOA	Centre de coordination des opérations aériennes
	Zone d'opération
ZR	Zone de responsabilité
APLET	Aide à la planification de l'engagement tactique
ASA	Artillerie sol-air
	Centre operations d'appui aérien
GA	Groupement amphibie
ASTEC	Analyse de situation tactique et des comportements
ATLAS	Automatisation des tirs et des liaisons de l'artillerie sol-sol
ATO	Ordres à l'aviation
	Publication tactique alliée
	Groupement ALAT
ALAT	Aviation légère de l'armée de terre

B

BAM	Brigade aéromobile
BATALAT	Bataillon ALAT
BB	Brigade blindée
	Détachement de coordination du champ de bataille
	Groupement de niveau brigade
BDE	Brigade
BEP	Bataillon étranger parachutiste (ancien)
BFS	Bureau forces spéciales
BFST	Brigade des forces spéciales terre
	Système d'identification ami
GT	Groupements tactiques (UE)
BIA	Brigade interarmes
BLBMa	Brigade légère blindée de marine
BOA	Bulle opérationnelle aéroterrestre
BPC	Bâtiment de projection et de commandement
BLB	Base logistique de brigade

C	
C2	Command and control
C3	Command, control and communication
	Third dimension coordination
	Mobile command and control center
	(Army) Corps
	Military air traffic
CAOC	*Combined air operation center*
CAOC-N	*Combined air operation center-Nellis AFB*
CAS	*Close air support*
CAX	*Computer assisted exercise*
CD&E	*Concept development and experimentation*
	(French) Air defense and air operations command
Bn CO	*Battalion Commanding Officer*
	Forces Employment Doctrine Center
	Forces Employment Doctrine Center / Research & Lessons Learned Division
	The Admiral, commander in chief for the Mediterranean Sea
	Chief of Staff of the (French) Armed Forces
	(French) Army Chief of Staff
	Force on Force Training Center
	CP Battle Command Training Center
	Airspace strategic studies center
	Air force tactical cell
	Air support elementary school
	(French) Land Forces Command
	Army officers advanced course

C	
C2	Commandement et contrôle
C3	Commandement, contrôle et communication
C3D	Coordination dans la troisième dimension
C3M	Centre de commandement et de contrôle mobile
CA	Corps d'armée
CAM	Circulation aérienne militaire
	Centre interarmées des opérations aériennes et aérospatiales
	Centre interarmées des opérations aériennes et aérosptiales à la base aérienne de Nellis (Nevada)
CAS	Appui aérien rapproché
CAX	Exercice assisté par ordinateur
	Développement conceptuel et expérimentations
CDAOA	Commandement de la défense aérienne et des opérations aériennes
CDC	Chef de corps
CDEF	Centre de doctrine d'emploi des forces
CDEF/DREX	Division recherche et retour d'expérience du centre de doctrine d'emploi des forces
CECMED	Commandant en chef pour la Méditerranée
CEMA	Chef d'état-major des armées
CEMAT	Chef d'état-major de l'armée de terre
CENTAC	Centre d'entraînement au combat
CEPC	Centre d'entraînement des postes de commandement
CESA	Centre d'études stratégiques aérospatiales
CETAC	Cellule tactique de l'armée de l'air
CFAA	Centre de formation à l'appui aérien, (école de formation initiale)
CFAT	Commandement de la force d'action terrestre (FAT)
CFCU	Cours de formation des commandants d'unités

Abbreviations

CFL	*Co-ordinated fire line*
CHF	*Commando helicopter force*
	Coordination of all Army systems that operate in the third dimension
	(French) Joint Defense College
CJOC	*Combined joint operation center*
CJSOTF	*Combined joint special opérations task force*
CJTF	*Combined joint task force*
CJTFHQ	*Combined joined task force headquarters*
CL	*Co-ordination level*
	Combat support operating center
	MARTHA higher lecel center
	United Nations convention about law at sea
COA	*Course of action*
	Army operational studies coordination committee
ACC	*Air component commander*
	(French) Army Aviation Command/Commanding General
FC	*Force commander*
COMCJTF	*Commander of the combined joined task force*
COMJFAC	*Commander of the joined force air component*
	(French) Special Operations Forces Command
	air observation practical course
CRC / CRP	*Co-ordination reporting center / Co-ordination reporting point*
	Military education, training and experimentation simulation center
TAC	Tactical air controller
CTF	*Commander of the task force*

CFL	Ligne de coordination des feux
	Force d'hélicoptères des commandos
CI3D	Coordination des intervenants terrestres dans la troisième dimension
CID	Collège interarmées de défense
	Centre opérations interarmées multinational
	Composante forces spéciales multinational et interarmées
GFIM	Groupement de forces interarmées mutinationales
	Etat-major de GFIM
NC	Niveau de coordination
CMO	Centre de mise en œuvre
CNHM	Centre de niveau haut MARTHA
CNUDM	Convention des Nations unies sur le droit de la mer
MA/ME	Mode d'action (ami/ennemi)
COCOOPS	Comité de coordination des études opérationnelles
COMAIR	Commandant de la composante aérienne
COMALAT	Commandement de l'aviation légère de l'armée de terre/Général Commandant l'ALAT
COMANFOR	Commandant de la force
COMGFIM	Commandant du GFIM (Groupement de forces interarmées multinationales)
	Commandant de la composante air de la force interarmées
COS	Commandement des opérations spéciales
CPAO	Cours pratique d'observation aérienne
	Centre de coordination des compte-rendus / point de coordination des compte-rendus
CSFEE / CSF2E	Centre de simulation pour la formation l'entraînement et l'expérimentation
CTA	Contrôleur tactique air
	Commandant de groupement tactique

D	
	The (French) Airmobile division (former)
	Theater anti balistic missile defense
	Special Operations Army Aviation Element
DASC	*Direct air support Center*
D-CAOC	*deployable CAOC*
D-DAY	
DECOORD	*Deputy effects co-ordinator*
DFSCOORD	*Deputy fire support co-ordinator*
	Directorate for combat development (Branch schools)
	Civilian aviation general direction
	Colonial infantry division (former)
	Airmobile intervention element (former)
DIV	*Division*
	Artillery liaison team
	Liaison team
	Forward observation team
	Deep operations observation and liaison element
DME	*Damages estimation*
DOD	*(US) Department of defense*
	Specific safety device
	Short range intelligence collection UAV
DSA	*Division support area*
	(CDEF's) Simulation and Operational Research Division
	A family of fire simulators (tanks, helicopters, ATGMs...)

E	
	(French) Army Aviation school and Center
EBO	*Effect-based operations*
ECAS	*Emergency close air support*
	Scout and investigation troop
	Helicopter Squadron
	Staff
	(French) Armed Forces Joint Staff
	(French) Air Force Staff
	(French) Army Staff
	Army Staff /Weapon systems division
	(French) Land force HQ (DIV level)
	Tactical Staff
	Artillery observation light aviation
	Specialization school (former)
	Special forces helicopter flight
EUFOR	*European force*
	European force in the Democratic Republic Congo (June to September 2006 - Operation Benga for France)
MEDEVAC	Medical evacuation
	Tactical experimentation

D	
DAM	Division aéromobile (ancien)
DAMB/T	Défense antimissile balistique de théâtre
DAOS	Détachement ALAT des opérations spéciales
	Centre d'appui aérien direct
D-CAOC	CAOC deployable
jour J	
	Adjoint du chef coordinateur du *JFEC*
	Adjoint au chef coordinateur des feux d'appuis
DEP	Division des études et de la prospective des écoles d'application
DGAC	Direction générale de l'aviation civile
DIC	Division d'infanterie coloniale (ancien)
DIH	Détachements d'intervention héliportée (ancien)
DIV	Division
DL ART	Détachement de liaison artillerie
DL	Détachement de liaison
DLO	Détachement de liaison et d'observation
DLOP	Détachement de liaison et d'observation dans la profondeur
	Estimation des dommages collatéraux
	Ministère de la Défense EU
DPS	Dispositif particulier de sûreté
DRAC	Drone de renseignement au contact
BD	Base divisionnaire
DSRO	Division simulation et recherche opérationnelle
DX	Famille de simulateurs de tir (chars, hélicoptères missiles AC...)

E	
EAALAT	École d'application de l'aviation légère de l'armée de terre
	Opérations fondées sur les effets
	Appui aérien d'urgence
EEI	Escadron d'éclairage et d'investigation
EH	Escadron d'hélicoptères
EM	État-major
EMA	État-major des armées
EMAA	État-major de l'armée de l'air
EMAT	État-major de l'armée de terre
EMAT/BSA	Bureau des systèmes d'armes de l'état-major de l'armée de terre
EMF	État-major de force
EMT	État-major tactique
ESALOA	École de spécialisation de l'aviation légère d'observation d'artillerie (ancien)
ESH	Escadrille spéciale hélicoptères
EUFOR	Force européenne
EUFOR RD Congo	Force européenne en République démocratique du Congo (juin-décembre 2006 - opération Benga pour la France)
EVASAN	Évacuation sanitaire
EXTA	Expérimentation tactique

F	
FAC	*Forward air controller*
	Ivory Coast Republic national armed forces
	Rapid reaction force (former)
FARP	*Forward arming and refuelling point*
	(French) Strategic Air Command
	(French) Land forces
FCM	Fires control measures
FECC	*Fires effects coordination cell*
	Helicopter unit in (French) Indochina
FHQ	*Force headquarters*
UNIFIL	United Nations interim force in Lebanon
FIST	*Fire integrated support team*
FOB	*Forward operating base*
	Operational force (land) LCC
	Multipurpose frigate
SF	*Special forces*
FSC	*Fire support cell*
FSCL	*Fire support co-ordination line*
FSCMs	*Fire support co-ordinating measures*
FSCOORD	*Fire support co-ordination*
FSE	*Fire support elements*
FSO	*Fire support officer*
G	
G3	Operations section (Army)
	Divisional Army aviation squadron (former)
	Airmobile (Bn) Task Force
	Air observation group
	Artillery air observation group (former)
GCMS	*Graphic control measures*
	Commanding General of the (French) Special operations forces
SOF TF	*Special operations forces task force*
	Helicopter group
	(French) CIMIC Joint Organization
	Joint helicopter group
GLE	*Ground liaison element*
	(French) General Staff (until the 20s)
	French Gendarmerie Nationale's Security and intervention group
Bn TF	(Combined arms) Battalion Task Force
	Major unit
H	
AH	*Attack helicopter*
	Waiting assembly area
HALE	*High altitude long endurance*
HIDACZ	*High density airspace control zone*

F	
CAA	Contrôleur air avancé
FANCI	Forces armées nationales de la République de Côte d'Ivoire
FAR	Force d'action rapide (ancien)
	Plot de ravitaillement (ALAT)
FAS	Forces aériennes stratégiques
FAT	Force d'action terrestre
	Mesures de contrôle de l'espace aérien et de coordination des feux
	Cellule de coordination des effets des feux
FHI	Formation d'hélicoptères d'Indochine (ancien)
FHQ	PC de force
FINUL	Force intérimaire des Nations unies au Liban
DLO ART	Détachement de liaison et d'observation de l'artillerie
	Base opérationnelle avancée
FOT	Force opérationnelle terrestre
FREMM	Frégate multimissions
FS	Forces spéciales
	Cellule appui feu
FSCL	Ligne de coordination des feux d'appui
	Measures de coordination des feux d'appui
	Coordination des feux d'appui
	Éléments d'appui feux
	Officier appui feux
G	
G3	Bureau opérations (division et au dessus)
GALDIV	Groupement d'aviation légère divisionnaire (ancien)
GAM	Groupement aéromobile
GAO	Groupe aérien d'observation (ancien)
GAOA	Groupe aérien d'observation d'artillerie (ancien)
	Ordre graphique
GCOS	Général commandant le COS
GFS	Groupement de forces spéciales
GH	Groupe d'hélicoptères
GIACM	Groupement interarmées des actions civilo-militaires
GIH	Groupe interarmées hélicoptères
	Elément de liaison terre
GQG	Grand quartier général (ancien)
GSIGN	Groupement de sécurité et d'intervention de la gendarmerie nationale
GTIA	Groupement tactique interarmes
GU	Grande unité
H	
HA	Hélicoptère armé
ZDA	Zone de déploiement et d'attente
	Drone à long rayon d'action transitant à haute altitude
	Zone contrôlée de l'espace aérien de haute densité

UH	*Utility helicopter (medium)*
	Utility and air assault helicopter
HQ	*Headquarters*
	Attack and reconnaissance helicopter
HRF	*High readiness forces*
	Weapon system helicopter
	Heavy lift helicopter
I	
	All Army systems that operate in the third dimension
ICC	*Integrated Command and Control*
IFF	*Identification friend or foe*
IMEF	*1st Marine expeditionary force*
IMEX	*Immediate extraction*
IO	*Information operations*
	Provisional instructions
ISR	*Intelligence, surveillance, reconnaissance*
	Infiltration by paraglider
	UNIFIL's Italian helicopters detachment
J	
JAGC2	*Joint air-ground coordination cell*
JFA	*Joint fires area*
JFAC	*Joint forces air component*
JFACC	*Joint force air component command*
JFC	*Joint forces command*
JFCM	*Joint fire-support control measures*
JFLCC	*Joint force land component commander*
JHC	*Joint helicopter command*
JHF	*Joint helicopter force*
JRTC	*Joint readiness training center*
JSFAW	*Joint special forces aviation wing*
JSTARS	*Joint Services Theater airborne radar system*
JTAC	*Joint terminal air controller*
JTF	*Joint task force*
	Night vision goggles

HM	Hélicoptère de manœuvre
HMA	Hélicoptères de manœuvre et d'assaut
QG	Quartier général - Poste de commandement de grande unité
HRA	Hélicoptère de reconnaissance et d'attaque
HRF	Force d'une haute disponibilité opérationnelle
HSA	Hélicoptères systèmes d'armes
HTL	Hélicoptères de transport lourd
I	
	Intervenant dans la 3e dimension
I3D	Système de programmation informatisée de l'activité aérienne de l'OTAN permettant notamment l'élaboration et le déformatage des "Air tasking orders" et "Air coordinating orders" qui a pour équivalent américain "theater battle management core systems (TBMCS)". Ces systèmes ne sont pas interopérables
IFF	Identification ami - ennemi
	Unité du *Marine Corps* equivalent au corps d'armée
	Extraction d'urgence
	Opérations d'information
IP	Instruction provisoire
	Renseignement, surveillance, reconnaissance
ISV	Infiltration sous voile
ITALAIR	Détachement d'hélicoptères italiens de la FINUL
J	
	Cellule interarmées de coordination air-sol
	Zone d'application de feux interarmées
	Composante air des forces interarmées
	Commandement de la composante air de la force interarmées, composé d'un *JFAC HQ* et d'un *CAOC*
	Commandement interarmées de force
	Mesures interarmées de contrôle de l'appui feu
CCT	Commandant de la composante terre de la force interarmées
	Commandement interarmées des hélicoptères (RU)
	Force interarmées d'hélicoptères
	Centre interarmées d'entraînement et de préparation opérationnelle
	Escadre ALAT interarmées des forces spéciales
	Système interarmées de radar aéroporté de surveillance et d'attaque
	Contrôleur interarmées d'attaque terminale
	Groupement interarmées
JVN	Jumelles de vision nocturne

L	
	Data transmission channel 16
LAM	*Loiter Attack Munition (Army)*
	Combined arms air defense
	Antisurface warfare
ASW	*Antisubmarine warfare*
LNO	*Liaison officer*
	Dropping for special operations force
LRSD	*Long range surveillance detachment*
LUH	*Light utility helicopter*

M	
MALE	*Medium altitude long endurance*
MAOTs	*Mobile air operation teams*
	Tactical radars network for air defense against rotary and fixed wings aircraft
	Operational preparation for deployment
MCT	*Maritime counter-terrorism*
MDMP	*Military decision-making process*
MEDEVAC	*Medical evacuation*
	Deputy (French) Army Chief of Staff
MIDS	*Multifunctionnal information distribution system*
MIDS/Land	*Multifunctionnal information distribution system (Army data transmission channel 16)*
	Evacuation module
MONUC	*UN observation mission in Congo*
	Special forces marking
MOUT	*Military operations in urban terrain*
	Tridimentional land maneuver

N	
NATO	*North Atlantic Treaty Organisation*
	MARTHA coordination level 1 - coordination center for a weapon system
NCW	*Network-centric warfare*
	Battlespace digitization
NFZ	*No Fly Zone*
NRBC	*Nuclear, radiological, bacteriological and chemical*
	(French) Army aviation digitization

L	
L 16	Liaison 16
	Munitions offensives à effets retardés (Armée de terre US)
LATTA	Lutte antiaérienne toute armes
LAS	Lutte anti surface
LASM	Lutte anti-sous-marine
OL	Officier de liaison
LOS	largage opération spéciale
	Détachements de surveillance à longue distance du corps
	Hélicoptère de manœuvre léger

M	
	Drone de grande autonomie à moyenne altitude
	Equipes mobiles d'opérations aériennes
MARTHA	Maillage des radars tactiques pour la lutte contre les hélicoptères et les aéronefs à voilure fixe
MCP	Mise en condition pour la projection
	Lutte anti-terroriste à la mer
MEDO	Méthode décisionnelle opérationnelle
MEDEVAC	Evacuation sanitaire
MGAT	Major général de l'armée de terre
	Système automatique de distribution multifonctionnel
*MIDS/*Terre	Support de communication au sol en Liaison 16
MODEVAC	Module d'évacuation
MONUC	Mission d'observation des Nations unies au Congo
MOS	Marquage au profit des forces spéciales
	Opérations en zone urbaine
MTT	Manœuvre tridimensionnelle terrestre

N	
OTAN	Organisation du traité de l'Atlantique nord
NC1	premier niveau de coordination MARTHA - centre de coordination d'un système d'armes
	Opérations en réseau centralisé ou info-centré
NEB	Numérisation de l'espace de bataille
	Zone interdite de survol dans laquelle les moyens sol-air peuvent intercepter tout aéronef
NRBC	Nucléaire, radiologique, bactériologique et chimique
NUMALAT	Numérisation de l'ALAT

O

	International civilian aviation organization
FAC	*Forward air controller* (Army officer)
	Heliborne operation
	Air Force liaison officer
OMLT	*Operational mentor and liaison teams*
UNO	United Nations Organization
UNOCI	United Nations Organization in the Ivory Coast Republic
OOTW	*Operations other than war (US)*
OPCON	*Operational control*
SO	*Special Operations*
NATO	*North Atlantic Treaty Organisation*

P

CVA (N)	Nuclear powered aircraft carrier
	Assault landing by special operations forces
TAC CP	*Tactical Command Post*
CP	*Command Post*
	Theater joint CP
PI	*Probability of incapacitation*
PL	*Phase line*
	Air defense (ADA) standard operating procedures
	Standard operating procedures/ Special operating procedures
PSO	Radio sets. 4th generation
	Peace support operations (OTAN)

R

	Artillery battalion
	Medium range ground surveillance radar
	The Ivory Coast Republic
	"Dragoons regiment" - Traditional appellation of some (Fr) Armor Bns.
	Democratic Republic Congo
RED	*Risk estimate distance*
INTEL	*Intelligence*
	French higher representative
CSAR	*Combat search and rescue*
NEO	*Non-combatant evacuation*
	Engineer Battalion
	Helicopter Battalion
MSE	Mobile subscriber equipment
RMA	*Revolution in military affairs*

O

OACI	Organisation de l'aviation civile internationale
OGT	Officier guidage terre
OHP	Opération héliportée
OLFA	Officier de liaison des forces aériennes
	Equipe opérationnelle de conseil et de liaison
ONU	Organisation des Nations unies
ONUCI	Organisation des Nations unies en République de Côte d'Ivoire
	Opérations autres que la guerre
	Contrôle opérationnel
OS	Opérations spéciales
OTAN	Organisation du traité de l'Atlantique nord

P

PAN	Porte-avions nucléaire
PAOS	Poser d'assaut des opérations spéciales
PC TAC	Poste de commandement tactique
PC	Poste de commandement
PCIAT	Poste de commandement interarmées de théâtre
	Probabilité de mise hors de combat
	Ligne de coordination (de phase, d'objectifs intermédiaire, limite de bond...)
POPDSA	Procédures opérationnelles permanentes de la défense sol-air
POP/POPS	Procédures opérationnelles
	Procédures opérationnelles spéciales
PR4G	Poste radio de 4e génération
	Opérations de soutien de la paix

R

RA	Régiment d'artillerie
RASIT	Radar de surveillance des intervalles du terrain
RCI	République de Côte d'Ivoire
RD	Régiment de dragons
RDC	République démocratique du Congo
	Distance de sécurité
RENS	Renseignement
REP FRANCE	Représentant France
RESCO	Recherche et survie au combat
RESEVAC	Recherche et evacuation de ressortissants
RG	Régiment du génie
RHC	Régiments d'hélicoptères de combat
RITA	Réseau intégré de transmissions automatiques
RAM	Révolution dans les affaires militaires

RNAS	*Royal naval air station*
ROAS	*Restricted operating areas*
ROE	*Rules of engagement*
IMINT	*Imagery intelligence*
ROZ	*Restricted operating zone*
	(French) Army military district
RTU	*Remote terminal unit*

S

SAAFR	*Standard-use army aircraft flight route*
	Very short range ADA system
	Combined-arms combat simulator for interactive preparation of operations
	(Combined arms) Company team
SHORADEZ	*Short range air défense engagement zone*
CIS	Command Information System
	Forces Command information system
	Command information system (Bn. level)
	Command information system (Bn. level) for Air defense artillery
	Terminal information system (on combat vehicle)
	Shooting training simulator
	Liaison and reconnaissance platoon
	Artillery air observation platoon (former)
	High altitude operational jump
SOSO	*Special operations and support operations*
	Very high altitude operational jump
SPINS	*Special instructions*
SSC	*Small-scale contingencies*
SUPLAN	*Supporting plan*
	Flights safety

	Base aéronavale (britannique)
	Zone d'opérations restreintes
ROE	Règles d'engagement
	Renseignement d'origine image
ROIM	Zone d'opérations restreintes - zone réservée pour permettre des missions particulières
	Région terre
RT	Terminal déporté

S

	Corridor aérien réservé aux aéronefs de l'Armée de terre
SATCP	Sol-air très courte portée
SCIPIO	Simulateur de combat interarmes pour la préparation interactive des opérations
SGTIA	Sous-groupement tactique interarmes
	Zone d'engagement pour système sol-air courte portée
SIC	Système d'information et de communications
SICF	Système d'information pour le commandement des forces
SIR	Système d'information régimentaire
SIRASA	Système d'information régimentaire de l'artillerie sol-air
SIT	Système d'information terminal
SIT	Simulateur d'instruction du tir
SLR	Section de liaison et de reconnaissance
SOAA	Section d'observation aérienne d'artillerie (ancien)
SOGH	Saut opérationnel à grande hauteur
	Opérations spéciales et leurs opérations d'appuis
SOTGH	Saut opérationnel à très grande hauteur
	Instructions particulières
	Opérations de circonstances de faible ampleur
	Plan complémentaire
SV	Sécurité des vols

T	
TAA	*Tactical assembly area*
TACOM	*Tactical command*
TACON	*Tactical control*
TACP	*Tactical air control party*
TACS/AAGS	*Theater Air force Control System / Army Air to Ground system*
TAIS	*Tactical air integration system*
TBMCS	*Theater battle management core systems*
	(French) Medium amphibious assault ship
TF	*Task force*
TIC	*Troops in contact*
TOC	*Tactical operations center*
TRADOC	*Training and Doctrine Command*
TST	*Time sensitive targeting*
TTPs	*Tactics, techniques and procedures*
U	
UAV	*Unmanned aerial vehicule*
UE	*European Union*
UKNLAF	*UK/Netherlands amphibious force*
ULM	*Ultra-light machine*
UNSCR	*United Nations Security Council Resolution*
	Brigade intelligence unit
USAF	*US Air Force*
USJFCOM	*US joint forces command*
V	
	Terrain flight
	Command Post Vehicle
VT	*Variable time*
Z	
	Temporary regulated zone
	Urbanized area

T	
ZDO	Zone de déploiement opérationnel
TACOM	Commandement tactique
TACON	contrôle tactique
TACP	Équipe de contrôleurs air tactiques
	Système de contrôle air de théâtre de armée de l'air / système air-sol de armée de terre
	Système d'intégration tactique air
	Système central de gestion des opérations du théâtre
TCD	Transport de chaland de débarquement
GT	Groupement tactique
	Unités au contact
CO	Centre d'operations
	Commandement de l'entraînement et de la doctrine américain
	Processus de détection, identification et destruction d'une cible fugace et de haute valeur militaire ou stratégique, dans une fenêtre d'opportunité réduite
	Tactiques, techniques et procédures
U	
	Aéronef sans pilote / drone
UE	Union européenne
	Force amphibie britannico-néerlandaise
ULM	Ultra léger motorisé
	Résolution du Conseil de Sécurité des Nations Unies
URB	Unité de renseignement de brigade
	Armée de l'air des États-Unis
	Commandement interarmées des forces des Etats Unis
V	
VOLTAC	Vol tactique
VPC	Véhicule poste de commandement
	Temps variable
Z	
ZRT	Zone réglementée temporaire
ZUB	Zone urbaine

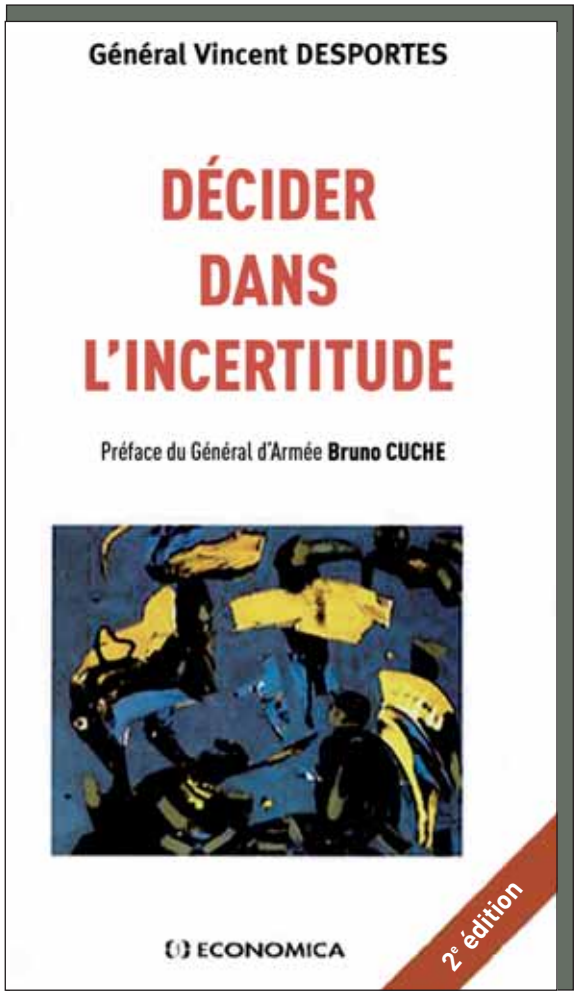
Deciding within Uncertainty[1]

(Editions Economica)

Preface by (French) General Bruno CUCHE

Interview

of Major General Vincent DESPORTES (CDEF)



The Army Chief of Staff has just prefaced the new issue of your book *"Deciding within uncertainty"*. Why writing a book about decision within uncertainty? With all the intelligence assets available, are we still all doomed to this difficulty?

It would be seriously wrong to think that we can access to perfect knowledge and to imagine that, one day, we can make a decision having in hand all the pieces of information required to make this decision. We can reduce uncertainty but it is impossible to eliminate it. Current conflicts are demonstrating that every day. The conflict which occurred in South Lebanon this summer was illustrative in this respect. In a quickly evolving world, we should be convinced that the conditions of decision-making are, from now on, marked by unpredictability: whatever the action is, it never happens in the expected conditions.

But what are the fundamental reasons for that?

The first reason, being fundamental, is that action is, before all, the confrontation of human freedoms: it is impossible to foresee the reaction of men who are permanently interacting. The second reason is that variables are so numerous that action always occurs in what Clausewitz called *"the war fog"*. When confronted reality in the field, it develops always differently from the way it was planned. The decision-maker, whoever he is, always acts then in fog, friction, random and in front of confusion.

Insofar as all that, can we act?

Of course we can, but with other methods than planning only. The fundamental principle is the capacity to adapt to circumstances. Two approaches are proposed to us: trust in man and systems flexibility. Man has a large capacity for decision self-sufficiency, initiative and adaptation. Man is the best tool for adapting to uncertainty. Being supported by this adaptation capability, we can achieve operational efficiency in spite of uncertainty. If I may, I would remind what wrote the Army Chief of Staff in his preface: *"only the initiative of leaders at the lowest echelons enables to exploit opportunities which are by nature fleeting"*.
But man-built systems for action should also be simple and deformable to easily adapt to the environment.

Are your theories applicable in peacetime and in particular to decision-makers from military administrations?

As soon as we decide and act with men, the principles are still the same. The fundamental principle is to free the capacity of initiative of one's colleagues while monitoring it in order for the collective action to mean something. Then I recommend this concept of ***"space for freedom of action":*** this ***"freedom space"*** is defined by the superior; the subordinate can act freely in it once the common objective of action has been known to him. This objective means ***the focusing point of individual liberties.*** In operational engagement as well as in peace time, ***the principle of subsidiarity being smartly applied is a multiplying factor for efficiency.***

Military efficiency in fighting assumes initiative: it is then up to the style of command to favor it, and up to peacetime to develop its spirit.

In a more structural way, we have to develop tools to have men ready for action. First is the development of an institution culture and a doctrine (the defined rules to guide action), these being common to border action and to identify the other's foreseeable nature. Then is the training of subordinates for taking initiative. Finally is the encouragement to a sense of risk's taking. Without any doubt, the only way leading to entrepreneur's spirit, initiative, capacity to adapt, risk taking is decentralization, subsidiarity, granted and tolerant confidence. Once the means of whole coherence are established from the top down, the only way leading from now on to success is indirect command: definition of the objective, general rules and of what should not be done much more than what should be done.

Is such liberty of initiative compatible with hierarchy structures?

For a system to work, we should comply with the principle of dialogue and participation in the decision conception: this is true with the military as well as elsewhere. But once this cooperative work is achieved, somebody should make the decision and everybody should comply with it. During the indispensable phase of consultation, anyone can explain his views and especially experts about the conditions of technical and legal feasibility. Then, it is up to the responsible in charge of the decision to make it and to the others to follow the rule. This is what I call the smart application of the principle of intellectual discipline: dialogue before decision-making and application of decision once it is made. ***The art of command is to know how to encourage individual initiative while knowing how to demand as and when needed formal discipline.*** All this is perfectly in the line of the pamphlet called "Exercise of command within the Army"[2] that you know well.

1 Décider dans l'incertitude.
2 L'exercice du commandement dans l'armée de terre.

NOTICE: THE HERE UNDER SET FORTH TEXT HAS BEEN REPRODUCED WITH THE KIND AUTHORIZATION OF THE REVIEW FIELD ARTILLERY PUBLISHED IN THE NOVEMBER-DECEMBER 2006 ISSUE WHICH THE READERS MAY REFER TO.

A Concept for Future Battlefield Air-Ground Integration

As a result of lessons learned during combat operations in Afghanistan and Iraq (2001 to 2006), the imperative to build joint integrated command and control structures has highlighted doctrinal and technical air-ground integration issues. This is demonstrated by the many ad hoc organizations created to deal with the challenges of the modern battlefield.

The key is **to enhance joint collaborative efforts to integrate joint assets rather than just deconflict them.** An example of this collaboration is represented by the joint air-ground control cell (JAGC2), a concept not yet established in joint doctrine but supported by combat operations. Established within the corps or division, JAGC2 provides the commander the ability to plan, coordinate, deconflict and control all third dimensional operations in the airspace overlying the division or corps area of operations (AO) in real time or near real time (battlefield airspace control[1]). With airspace control combined with the joint integration of intelligence, targeting and fires, the commander can employ his intelligence, surveillance and reconnaissance (ISR) assets effectively (unmanned aircraft, or UAs, and fixed- and rotary-wing). He also can leverage joint ISR capabilities to find, track and target the enemy and more rapidly decide, target, deconflict and precisely engage emerging highvalue, time-sensitive targets within his AO using a combination of organic and joint assets (called dynamic attack[2]).

BY COLONEL (RETIRED) CURTIS V. NEAL, US AIR FORCE

Background

The Air Force theater air control system/Army air-ground system (TACS/AAGS) is the combined command and control system that provides the interface between Army and Air Force tactical air support agencies in planning, coordinating and controlling air support operations. Evolving from the lessons of World War II, Korea and Vietnam, this system is the basis for requesting and controlling close air support (CAS) since it was formalized in a "Concept for Improved Joint Air-Ground Coordination" signed by the Army and Air Force Chiefs of Staff in 1965.

Within the TACS/AAGS, the Air Force is responsible for communications to request and deliver CAS, providing advisors and forward air controllers (FACs) in the form of tactical air control parties (TACPs) and establishing regional coordinating centers (now called air support operations centers, or ASOCs) that plug into Army maneuver headquarters. The Army commander, through his G2 and G3 air personnel and the fire support cell (FSC), specify the targets to be attacked, determine the priorities and coordinate tactical air integration with the fires and maneuver of the ground forces.

The TACS/AAGS is a "stove pipe" system that is satisfactory for rapid management, planning and deconfliction. However, it **was not designed for real-time (or near-real-time) coordination, deconfliction and control of all tactical air operations and fires or to quickly execute complex processes that require joint integration of airspace control, intelligence, targeting and fires.**

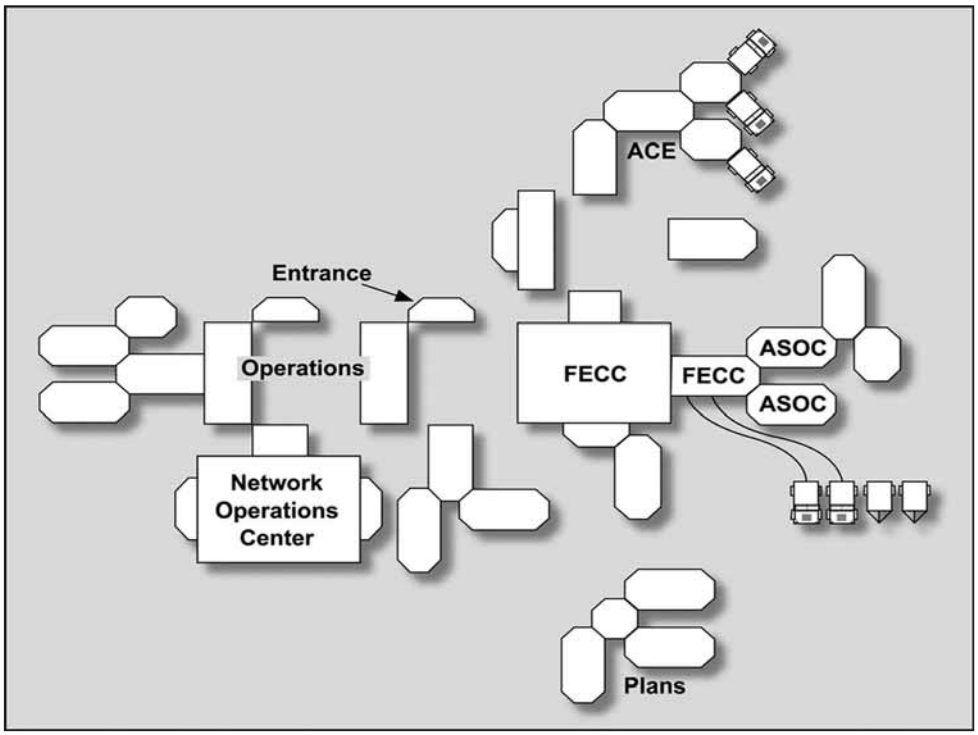


Figure 1: V Corps Main Command Post at Camp Virginia, Kuwait, during Operation Iraqi Freedom (OIF) I. The layout shows the relative locations of the fires and effects coordination cell (FECC), the all-source collection element (ACE) of the corps G2 and the Air Force's air support operations center (ASOC).

The Growing Airspace Congestion Problem

It's widely acknowledged that **airspace control within the ground commander's AO is becoming more complex and difficult.** In a 2005 Air Force Magazine article, author Rebecca Grant notes there are some 775 UAs - from miniature UAs to the high-altitude Global Hawk - now in operation over Iraq and Afghanistan[3]. Michael Heinz, who heads Boeing's Unmanned Systems unit, "sees an annual market of at least $10 billion by the decadeís end with growth continuing at double-digit rates for a decade or more[4]."

The airspace environment also is becoming more complex. Altitudes and ranges of new weapons systems are increasing. For example, the Army loiter attack munition (LAM) that will be organic to the brigade combat team (BCT) is being designed to cruise at medium altitude out to 100 kilometers with a 45-minute loiter time[5]. To meet the need for real-time ISR in the division, the Army recently decided to buy up to 132 extended-range, multipurpose UAs to operate up to 25,000 feet and out to 250 kilometers. In a mature theater of operations, the ground commander not only must contend with his own airspace users, but also with commercial flights, contract aircraft and other government agency aircraft. Lieutenant Colonel Roy Lembke, 4th Infantry Division G3 Aviation Chief, points out that political and economic objectives require the commander to facilitate all types of military and civilian air traffic while simultaneously conducting combat operations[6].

Joint Intelligence, Targeting and Fires Integration

Charles E. Kirkpatrick wrote the paper "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom" that was published in *The Land Warfare Papers* in October 2004.
In the paper, he relates how V Corps and its Air Force component, the 4th Expeditionary Air Support Operations Group (4th EASOG), collaborated by integrating Army and Air Force intelligence and targeting to focus and execute joint fires more rapidly. Achieving this level of integration required "organization and equipment the 4th EASOG did not have and a fundamental change in operating philosophy[7]". At the most basic level, it required an ad hoc integration of ASOC, TACP and corps command post (CP) cells and elements, an integration that had not been previously attempted.

"The critical ingredient in successful focusing of joint fires," as corps commander Lieutenant General William S. Wallace later commented, "lay in the organization of the main command post to place the ACE [all-source collection element], FECC [fire and effects coordination cell] and the ASOC in close proximity for current operations"[8]. This required collocating the ASOC and corps TACP so the intelligence and targeting elements were fully integrated with the corps G2, the fire support coordinator (FSCOORD) and the rest of the FECC[9]. *See Figure 1.* Although it was an ad hoc arrangement, Kirkpatrick concluded that it points the way **toward further and even more fruitful collaboration among warriors of all armed services.**

JAGC2

The imperatives to break down Field Artillery stovepipes and build joint integrated command and control structures that preclude the need for ad hoc arrangements form the basis of the **JAGC2**, conceptually represented in Figure 2. With many of the attributes of an integrating cell, the JAGC2 is composed of **various staff sections (functional cells or elements) and command and control facilities, such as the ASOC and TACP.** While some integration takes place in a functional cell or command and control facility, the focus is generally on maximizing the effects of a single warfighting function.

Integrating cells, such as the JAGC2, focus the efforts of multiple functional cells and command and control facilities on planning and preparing for or executing the overall operation within a time horizon. Integrating cells are not new. Current operations, future operations and plans are all integrating cells.

The "sweet spot" for joint integration is the division or corps CP where tactical control (TACON) of brigades and operations is exercised. This is where the ASOC and division or corps TACP normally are collocated[10]. It is also where the senior FSC directs and monitors fires and the senior Army airspace command and control (A2C2) element and tactical air defense element are located. The precise determination of the JAGC2 ís organization and technological requirements will depend on the processes it will integrate.

Brigadier General Richard P. Formica's Multinational Corps-Iraq (MNC-I) Joint Fires and Effects Cell (JFEC) during Operation Iraqi Freedom (OIF) II provides insight into who might lead this cell. In his organization, the corps air liaison officer (ALO), essentially, served as the deputy effects coordinator (DECOORD)[11]. Because the ALO already commands the ASOC and TACP, he is a logical choice. His designation as the corps or division DECOORD or deputy fire support coordinator (DFSCOORD) emphasizes the joint collaborative aspects of the JAGC2 concept.

Battlefield Airspace Control

The ability to plan and coordinate, deconflict and control all third dimensional operations rapidly in the airspace overlying the division or corps AO in real time or near real time is critical. Normally designated the airspace control authority, the joint force air component commander (JFACC) is responsible for theater-wide airspace control. However, current JFACC doctrine and equipment were not designed to provide real-time or near-real-time control of this increasingly complex and crowded airspace.

Requesting or changing a formal airspace coordination measure (ACM) outside of the normal airspace control order (ACO) cycle is time-consuming and unresponsive, taking up to 20 minutes to process a single request. Captain Rudy Cancino, Chief of Combat Airspace at the Combined Air and Space Operations Center Nellis (CAOC-N) at Nellis AFB, Nevada, notes that six to 10 additional real-time or near-real-time requests an hour, along with the other ACM requests, would pretty much overwhelm the airspace control cell (ACC) in an air operations center (AOC)[12]. This limitation is not conducive to the tactical flexibility required by the ground commander.

The solution is to **delegate airspace control authority**. The airspace control authority can delegate execution of airspace control to a component in the airspace control plan or ACO, using an airspace control sector for a large area or a high-density airspace control zone (HIDACZ) for a small area.

With their organic air assets, the Marine Corps and Navy routinely decentralize the execution of airspace control. However the Army and the Air Force normally do not allocate resources for decentralized control over the Army AO.

By integrating Air Force and Army controllers, the Army and Air Force can **build an airspace organization that can control an airspace sector over the division or corps AO.** This implements existing doctrine that in the past the Army or Air Force have not resourced. As part of the Air Force's ASOC transformation effort, an air battle manager function and manpower positions already have been added to the ASOC to monitor airspace control and deconfliction and provide command and control expertise for planning and employing air and space power. The air battle manager also is the link to the controlling and reporting centers and the airborne warning and control system (AWACS).

The revised single CP division design contains an ACE with Army airspace managers and en route controllers. Together, they provide the nucleus for an Army-Air Force ACE. The addition of USAF controllers provides the expertise to work with JFACC aircraft.

The ASOC, ACE, air and missile defense (AMD) element and FSC typically are collocated at the division or corps level, providing the linkage between airspace control, fires and air defense. The ASOC has a robust communications capability for controlling assigned aircraft and is linked through the theater battle management core system (TBMCS) to the AOC.

The tactical air integration system (TAIS) that the Army is fielding can provide a near-real-time air picture that includes link-16 and blue force tracker (BFT). Army battle command systems (ABCS) complement the organization by both digitally integrating the air and ground operational picture with airspace and fire control measures (FCMs) and disseminating the data to all units throughout the operational area.

From an Army perspective, using an airspace control sector moves decision making down to the lowest practical level, leading to more rapid decisions at the tactical level. For the Air Force, an airspace control sector supports the tenets of centralized planning (by the AOC) and decentralized execution (by the corps or division joint airspace control cell). Further, this joint teaming would "sew up the seam" between the airspace control authority and ground commander's operations.

In the Battle of Fallujah II, a HIDACZ was established around Fallujah with the 1st Marine Expeditionary Force (IMEF) delegated as the air space control authority. Within the HIDACZ, a 30-nautical-mile diameter airspace cylinder extending to 30,000 feet was established over the town, as shown in Figure 3.

The 3rd Marine Aircraft Wing Direct Air Support Center (DASC) collocated with 1st Marine Division controlled all air activity (fixed- and rotary-wing plus UA assets) within the HIDACZ and within the cylinder from 25,000 to 30,000 feet[13]. Control below 25,000 feet was exercised by joint terminal attack controllers (JTACs) in coordination with the division air officer. This required a level of integration between the DASC, division air officer, UA operators and fire support elements (FSEs) never attempted before[14].

Fallujah II was an ad hoc command and control system that handled the airspace demands of a hard-fought urban battle within a sizeable airspace control zone delegated to the ground forces by the airspace control authority. Delegation of airspace control provided the ground commander the tactical flexibility to clear airspace rapidly, allocate resources and coordinate and integrate UAs, fires, and rotary- and fixed-wing aircraft.

Dynamic Attack

In the V Corps OIF I 2003 example, the ASOC placed a team in the ACE, opening the way to exploiting many sources of information: corps long-range surveillance detachments (LRSDs), the Army ís A2C2 element that directed helicopter missions, Hunter and Predator UAs, joint surveillance and target attack radar system (JSTARS) aircraft and other external sources. The ACE (rear), a fixed facility at Al Jaber Air Base, Kuwait, focused on generating targets using national and theater feeds that were passed to the ACE[15].

According to Lieutenant Colonel Michael B. McGee, 4th EASOG Deputy Commander, targets generated by the ACE rear were passed to the main CP and then funneled to the FECC. The FECC decided to whom to give the targets for prosecution - artillery, rotary wing or ASOC (fixed wing). In OIF I, most went to the ASOC. If the targets were in the division AO, the ASOC passed them to the division to prosecute. If the targets were in the corps AO, the ASOC either executed the prosecution or passed them to the combined air operations center (CAOC) through both the CAS cell and the battlefield coordination detachment (BCD) if the target was beyond the fire support coordination line (FSCL); that didn't happen often because the ACE was focused inside the FSCL[16].

The ASOC placement allowed it to clear prospective targets easily and quickly via Central Command's (CENTCOM's) collateral damage estimate (CDE) process through which prescribed attacks or weapons effects on targets, such as mosques, hospitals or schools, were to be avoided. Armed with up-to-the-minute target data, the ASOC then directed sorties to targets, not just in direct support of divisions, but throughout the corps AO.

The June 2006 Air Force Virtual Flag exercise was conducted in conjunction with joint fire control measures (JFCMs) joint test and evaluation at the Distributed Mission Operations Center, Kirtland, AFB, New Mexico, and provided a venue to experiment with the JAGC2. An Air Force intelligence officer was collocated with the corps ACE, and one of the corps TACP ALOs was assigned to the ASOC as an air interdiction (AI) coordinator.

The FSE and intelligence element developed targets and established joint fires areas (JFAs), also known as kill boxes. The AI coordinator managed air-delivered fires into the JFAs inside the FSCL and coordinated with the AOC for attack of targets beyond the FSCL. Besides helping develop targets for the JFAs, the Air Force intelligence officer was valuable in keeping updates of maneuver units in or near the JFA and coordinating ISR assets with the AOC to obtain better intelligence resolution.

Under the JAGC2 concept, the cell integrates the functions of existing cells, elements, centers, parties and equipment. In doing so, it breaks down the stovepipes and builds joint integrated command and control structures that preclude the need for ad hoc arrangements. Through decentralization of airspace control and the integration of critical and complex joint intelligence and fires processes, command and control requirements for execution are minimized. **In other words, the JAGC2 will place the most firepower accurately on target with less command and control than required by today's centralized structures.**

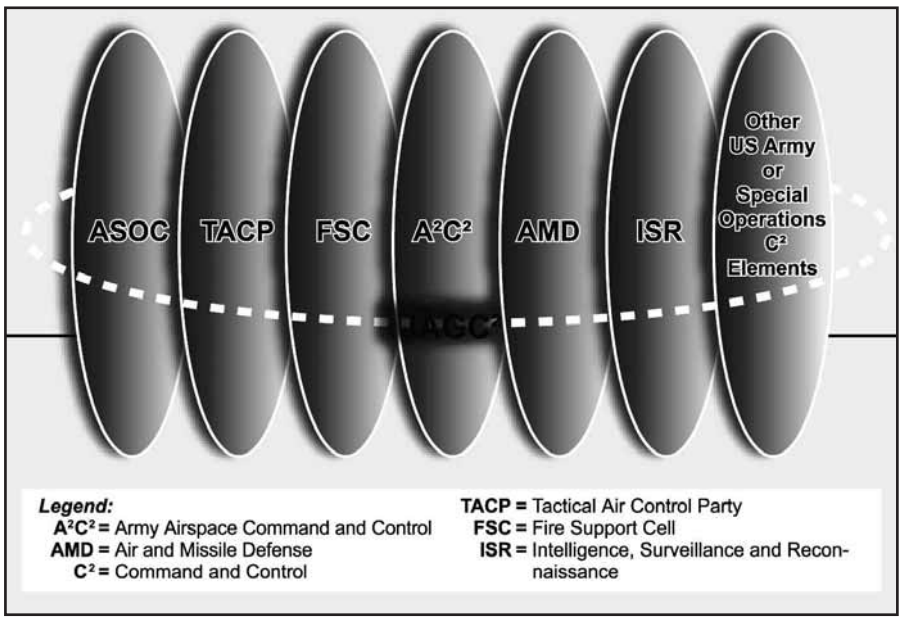


Figure 2 : Joint Air-Ground Control Cell (JAGC2) in the Division or Corps Main Command Post Other US Army or JAGC2

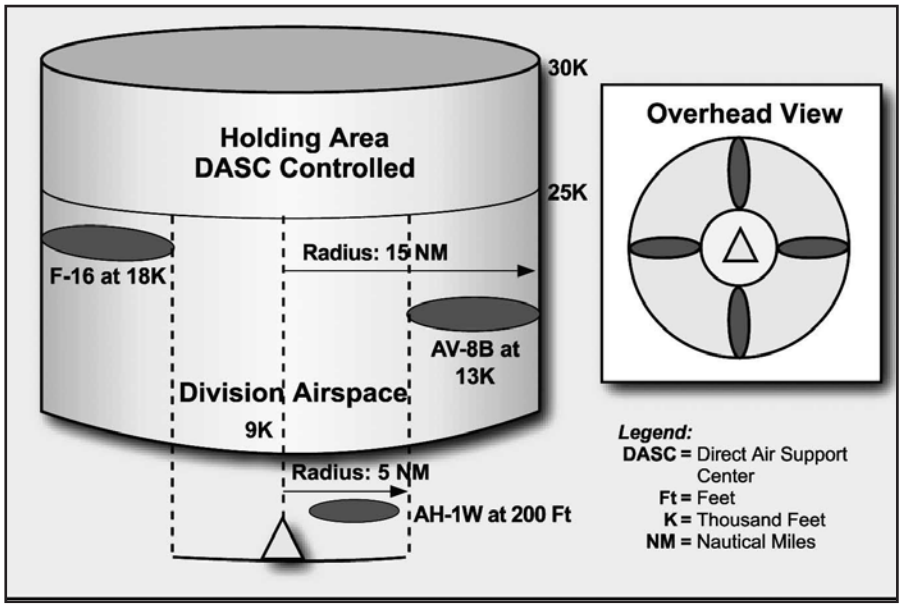


Figure 3 : A High-Density Airspace Control Zone (HIDACZ) in the Battle of Fallujah II in Iraq.

1. *For the purpose of this article, the focus is confined to airspace control within the division or corps commander's area of operations and within the fire support co-ordination line (FSCL).*
2. *The term "dynamic attack" implies three characteristics: speed, mass and precision. Where speed is always a desired attribute, mass and precision may be unique characteristics or used in combination. For example, speed and mass, speed and precision, or speed, mass and precision may be employed in combination.*
3. *Rebecca Grant "The Clash of the UAV Tribes", Air Force Magazine, September 2005 (Arlington, VA: Air Force Association).*
4. *Russ Mitchell, "The Pilot, Gone. The Market Huge", The New York Times, 31 March 2002 (New York, NY: The New York Times Company).*
5. *Colonels Gary S. Kinne, John A. Tanzi and Jeffrey W. Yaeger, "FA PGMS: Revolutionizing Fires for the Ground Force Commander", Field Artillery, May-June 2006 (Fort Sill, OK: US Army Field Artillery School).*
6. *Comments on JAGC2 Concept paper by LTC Roy Lembke, 4th Infantry Division G3 Aviation Chief to the author, email, dated 18 July 2006.*
7. *Charles E. Kirkpatrick, "Joint Fires as They Were Meant to Be: V Corps and the 4th Air Support Operations Group During Operation Iraqi Freedom", The Land Warfare Papers, No 48, (Washington, DC: Association of the US Army), October 2004, 2.*
8. *Ibid, 4.*
9. *Ibid, 3.*
10. *Corps and division headquarters habitually have aligned tactical air control parties (TACPs). On the other hand, the air support operations center (ASOC) is a command and control center that normally is collocated with the senior tactical fire support cell (FSC).*
11. *Interview with Brigadier General Richard P. Formica, former Commander of the Force FA Headquarters and Joint Fires and Effects Coordinator for the MultiNational Corps Iraq (MNC-I), "Part 1: Joint Effects for the MNC-I in OIF II" by Patrecia Slayden Hollis, Field Artillery, May-June 2005 (Fort Sill, OK: US Army Field Artillery School).*
12. *Meeting with Captain Rudy Cancino, Chief of Combat Airspace at the Combined Air and Space Operations Center, Nellis (CAOC-N), Nellis AFB, NV, 12 July 2006.*
13. *LtCol Keil R. Gentry, USMC, "RCT-1 Fires in the Battle of Fallujah", Field Artillery, November-December 2005 (Fort Sill, OK: US Army Field Artillery School).*
14. *Interview with Major Dawn Ellis, Direct Air Support Center (DASC) Officer, Headquarters, US Marine Corps, Department of Aviation, Command and Control Branch, Office of Transition Task Force, 8 September 2006.*
15. *Charles E. Kirkpatrick, 4.*
16. *LtCol Michael B. McGee, Deputy Commander of 4th Air Support Operations Group (ASOG) that worked with V Corps during OIF I; email to the author, 6 June 2006.*

JAGC2 -The Way Ahead

JAGC2 was first introduced in the ASOC Enabling Concept signed by the Air Force Chief of Staff on 1 June 2006. It is being introduced into Air Force doctrine as a vignette in *Air Force Doctrine Document (AFDD) 2-1.3 Counterland.*

Work is ongoing with the Training and Doctrine Command (TRADOC) Program Integration Office - Battle Command, Army Airspace Command and Control and the Army Combined Arms Doctrine Directorate, all at Fort Leavenworth, Kansas, and the Army's Center of Excellence for Joint Fires at Fort Sill, Oklahoma, to introduce the concept and gain consensus. The Air Force Air Combat Command (ACC), headquartered at Langley AFB, Virginia, is exploring future opportunities to experiment with and exercise the concept, such as in Urban Resolve-Future sponsored by the Joint Forces Command to be run out of Suffolk, Virginia, in April 2008.

After gaining consensus for the concept, **future joint efforts will define the joint integrated organization, its responsibilities and processes, and its chain of command, the latter either through Army or Air Force channels.** The goal is to move and share joint information, make informed decisions and execute air-ground integrated operations more efficiently and effectively.

NOTICE: THE HERE UNDER SET FORTH TEXT HAS BEEN REPRODUCED WITH THE KIND AUTHORIZATION OF THE FIELD ARTILLERY REVIEW PUBLISHED IN THE MARCH-JUNE 2004 ISSUE WHICH THE READERS MAY REFER TO.

Deconflicting Army Aircraft and Indirect Fires: Brigade-Level A2C2

Day Six of the fight. It has been a nasty one with horrible weather, rough terrain and lots of casualties. The guerrillas are hugging us close and wreaking havoc on our lines of communication.

The most damaging loss to the brigade combat team (BCT) has been the destruction of the platoon of UH-60s and two Kiowas-40 crew and passengers dead or wounded and $20 million-plus in equipment destroyed during the last 72 hours. The worst part of it is, we shot them down **accidentally with our own indirect fires.**

BY LIEUTENANT COLONEL DANIEL A. PINNELL, *US ARMY* AND MAJORS VICTOR S. HAMILTON, *US ARMY* AV, AND MICHAEL T. OESCHGER, *US ARMY*

Sound like a freak occurrence? Not at *Joint Readiness Training Center (JRTC)*, Fort Polk, Louisiana, rotations. The typical aviation fratricide at the JRTC takes one of two forms: over-flight of a unit (FA, mortar) while it is firing and flying through the sheaf of an indirect mission as it is being delivered on a target.

A typical over-flight incident involves assault and utility aircraft conducting resupply missions inside the airhead/forward operating base (FOB). These aircraft operate without formal constraints (routes/corridors), even though they fly to and from the same four locations all week; they are lulled into a sense of security because the firing units are quiet most of the time. When the artillery does fire, their tactical operations centers (TOCs) validate that they are clear of the impact point, but the TOCs never think to check the origin points.

Eventually, the pilots' luck runs out. In a typical terminal effects incident, a ground company commander or fire support officer (FSO) clears a fire mission for ground elements and forgets the Kiowa Warrior orbiting overhead or does not clear the Kiowa Warrior to a realistic minimum

distance from the indirect fire sheaf. The high volume of fire delivered in small areas at the JRTC coupled with the use of variable time (VT) as the preferred fuze lead to a high probability that a helicopter inside the sheaf footprint will be damaged or lost.

The cause of these incidents is that 90 percent of the BCTs don't plan for Army airspace command and control (A2C2) inside their areas of responsibility (AORs) - they just take the plan division gives them. They don't plan standard - use Army aviation flight routes (SAAFRs) or air-corridors to deconflict air and ground operations in intensiveuse areas for aircraft conducting repetitive resupply missions or transiting to and from combat operations in their AORs. They don't plan restricted operating zones (ROZs), restricted operating areas (ROAs) or informal equivalents to keep aircraft outside the surface danger area around firing units. Finally, they don't establish fire support coordinating measures (FSCMs), airspace control measures (ACMs) or clearance of fires tactics, techniques and procedures (TTPs) for the Kiowa Warriors in support of the close fight in their AORs. The average brigade S3 air literally takes the division A2C2 annex and publishes it as his own with no additions or refinements for the requirements of his AOR. Most FSOs don't know the dangers presented by the lack of an A2C2 plan or the doctrinal measures to correct them. Deconflicting Army Aircraft and Indirect Fires: Brigade-Level A2C2.

The average pilot is flying with a map that has outdated (or no) maneuver graphics, has no FSCMs or firing-unit locations posted on it and no ACMs. The pilot believes that, essentially, there are no constraints on his actions and no threat to his activities from friendly operations. He has received only a minimal situational awareness briefing before taking off and has no idea of the likely friendly maneuver or fires operations (and thus high-threat areas) for that day. He also has no visibility of active firing units and target areas because he is not monitoring the fires net. He is unaware, unconstrained and unafraid. **The failure to create and enforce effective A2C2 plans at the brigade level has three basic causes.** First, most brigade senior leaders and staffs don't understand A2C2 requirements and don't know they are responsible for planning and coordinating A2C2 at their and their subordinates' levels. Second, combat arms leaders are not taught A2C2 doctrine and techniques in our schoolhouses.

Third, based on this lack of leader knowledge, units fail to integrate realistic A2C2 training and events into their homestation training. This, in turn, leads to a lack of awareness of the dangers and required A2C2 corrective techniques needed in combined arms operations in combat.

A number of useful field manuals and joint publications are available to guide brigade and lower level staffs to create A2C2 plans-fire support elements (FSEs) should keep them handy and review them regularly. (See Figure 1).

FM 3-52 Army Airspace Command and Control in a Combat Zone clearly states that the brigade staff performs A2C2 at the brigade level and below. It further states: "Since no formalized A2C2 element exists at brigade, the brigade staff extracts information from various sources to perform A2C2. The brigade commander may form a brigade A2C2 element from the air defense artillery [ADA] liaison officer [LNO], the brigade FSO, the air liaison officer [ALO] and the Army aviation LNO (when he is not present, the S3 air performs his duties)."

When a brigade is operating semiautonomously as part of an early-entry force and (or) receives insufficient detail in an A2C2 plan from higher, it must assume responsibility for the A2C2 planning that its higher headquarters normally would perform. **Brigade staffs are responsible for the planning (or refining) and executing A2C2 within their AORs.**

While all ACMs should be (and in some cases are required to be) forwarded to a higher headquarters for approval, the brigade can enforce ACMs below the coordinating altitude as informal measures until approved by higher- ACMs such as routes, corridors and firing battery ROZs. Bottom line: the brigade always submits the A2C2 plan and modifications to higher headquarters for approval and inclusion, but it doesn't wait for approval before taking control of its airspace. In this article, we offer TTP for brigade- level A2C2 planning for small-scale contingencies (SSC) to help units

Figure 1 :

Publications to Guide Brigade and Below Staffs in Creating an Army Airspace Command and Control (A2C2) Plan

- *FM 3-09.4 Fire Support for Brigade Operations (Heavy) (Jan 90)*
- *FM 3-52 Army Airspace Command and Control in a Combat Zone (Aug 02)*
- *FM 3-52.1 ICAC2 Multiservice Procedures for Integrated Combat Airspace Command and Control (Jun 02)*
- *Joint Pub 3-52 Doctrine for Joint Airspace Control in the Combat Zone (Jul 95)*

(Online at http://www.train.army.mil)

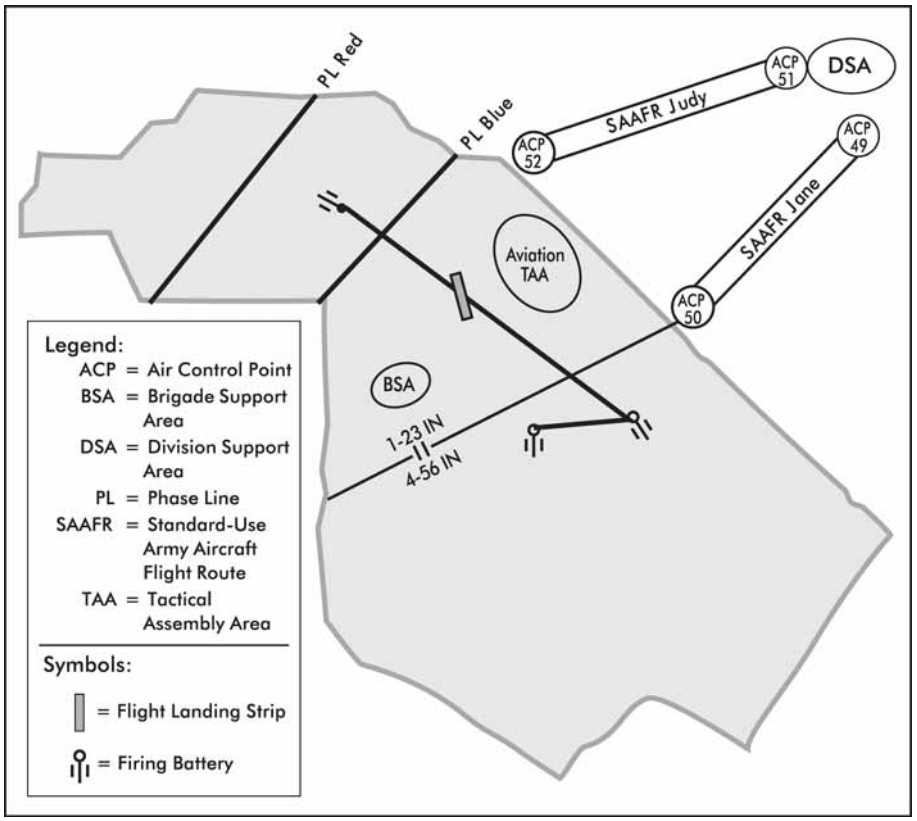


Figure 2 : This is a typical division Army airspace command and control (A2C2) plan given to a brigade at the Joint Readiness Training Center (JRTC).

translate the doctrinal guidance in Army and joint A2C2 manuals into viable, executable plans for both training and combat.

Deconflicting Aircraft in the AOR

The brigade staff deconflicts aircraft conducting logistics and assault operations inside the AOR using **air corridors built on a network of air control points (ACPs)**. To do this, the staff first links the routes from the division or joint task force (JTF) logistics nodes to the brigade logistics nodes. Next the staff links the brigade nodes to battalion nodes as well as to planned or potential future assault and medical evacuation (MEDEVAC) landing zones. ACPs and routes should be constructed to provide the most direct route from node to node while remaining outside the surface danger zone around artillery and mortar units and avoiding areas where large volumes of indirect fire are likely to be delivered, according to plan. To eliminate aviators' concerns that repetitive use of a small number of corridors might increase their risks of ambush, the staff provides a number of alternate corridors and periodically alters which ones are active.

Figure 2 shows a typical A2C2 plan given to a brigade by the 21st Division at the *JRTC*. It consists solely of two division-directed SAAFRs linking assets in the division rear area to the edges of the brigade AOR.

Figure 3 shows the various brigade and battalion nodes connected by air corridors and connected to the division SAAFRs at the brigade boundaries.

Deconflicting Air Operations Around Major Firing Units

During many stability operations and support operations (SOSO)/ counterinsurgency operations, FA batteries and, to a large extent, battalion mortar platoons remain fairly static for long periods. They occupy hardened firebases distributed across the AOR.

This predictability lends itself to **deconfliction using ROZs/ROAs**. Assuming a coordinating altitude of 300 feet above ground level (AGL),

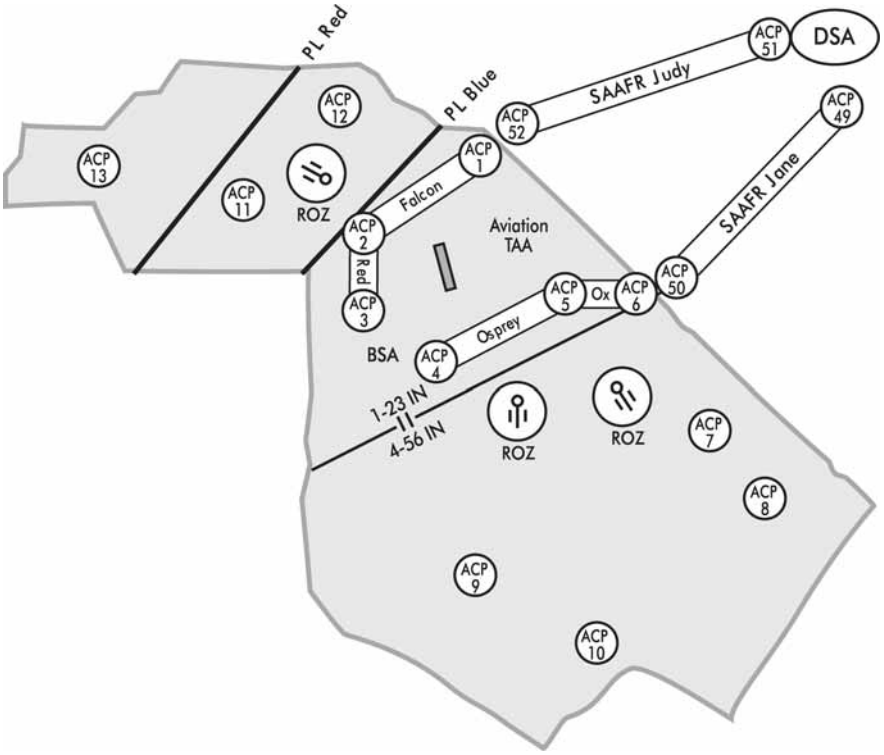


Figure 3 : Brigade and Battalion Air Corridor Nodes. The brigade and battalion nodes must be connected to the division's SAAFRs by air corridors: Falcon, Red, Osprey and Ox. The firing batteries have restricted operating zones (ROZs) around them. The plan includes additional ACPs (7 through 10) for building new corridors, as required.

the trajectory tables for the weapon determine the average range and highest charge expected to be fired that distance from the battery at which a projectile fired at low angle will "climb" above 300 feet AGL on its trajectory toward the target.

That distance, plus additional safety factors as desired, becomes the radius of the circular ROZ around the firing unit. The minimum altitude is surface, and the maximum altitude is the coordinating altitude of 300 feet AGL. This ROZ is closed to all fixed- and rotarywing aircraft operations. The same basic principle applies to mortar positions.

In the example shown in Figure 4, a 105-mm battery is firing Charge Five at a range of seven kilometers. Both the target and the battery are at the same altitude, which is near sea level.

According to the data from the trajectory tables, the projectile will pass above 300 feet AGL (approximately 100 meters) within the first 500 meters of the trajectory. Based on this, the brigade can construct a circular ROZ with a 500 meter radius that has a minimum altitude of surface and a maximum altitude of 300 feet-the coordinating altitude. In this example, the angle of fall of the projectile as it nears the target is just slightly steeper than its angle of departure from the tube. That means the brigade can use the same rough 500-meter radius cylinder to envision the danger area *along the gun-target line* at the terminal end of the trajectory, using informal airspace coordination areas (ACAs) around the target. Dimensions will vary based on several factors.

Deconflicting Attack Helicopters in SSCs

This is a little more complex. If the aviation task force (AV TF) has been given its own AOR, such as between the airhead line and the coordinated fire line (CFL) or in a security zone in the defense, and a tactical task to accomplish (i.e., screen), then its parent headquarters must clear fires within that AOR. No special ACM/FSCM are required at the brigade level inside the AV TF AOR in this case, but the aircraft should be restricted to **air corridors when transiting to and from their AOR and other locations.**

When attack helicopters are placed under the tactical control (TACON) of another battalion task force and operate inside that subordinate unit's AOR (i.e., in and around the terminal effects pattern), additional measures are required.

When indirect fires are requested, aircraft can be ordered easily to move beyond the effects range of the system by directing them to "Stay east" of a certain PL or outside of a specific unit's AOR until end-of-mission. Informal control measures, such as an informal ACA, can achieve the same end state, but they carry a higher risk of error in repeated use because not all leaders and aviators will have the same graphics posted to the same degree of fidelity on their maps.

Figure 5 shows the integrated A2C2 plan for a brigade AOR using a **combination of ACMs and FSCMs to deconflict indirect fires from aviation.**

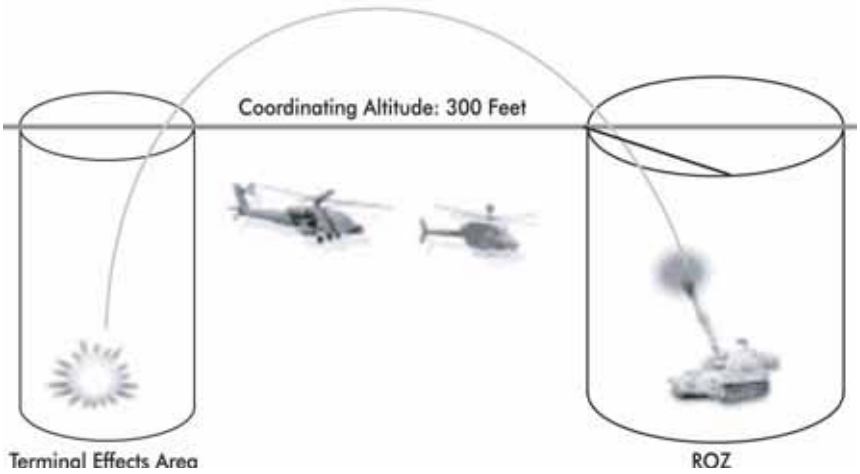


Figure 4 : Example of a ROZ. This 105-mm battery is firing Charge 5 at a range of seven kilometers. The trajectory tables allow the brigade staff to build a circular ROZ with a 500-meter radius that has a minimum altitude of surface and a maximum altitude of 300 feet, the coordinating altitude.
Coordinating Altitude: 300 Feet
Terminal Effects Area ROZ

First, when flying inside another unit's AOR, the aircraft must maintain a **communications link** with the unit that owns the AOR (battalion, company, etc.). When TACON to that subordinate unit, the aircraft's primary net should be either the controlling unit's command or fires net and the aircraft should execute movements only under the positive control of the supported unit. To affect this control, commanders and FSOs should first use existing graphic control measures (GCMs), such as phase-lines (PLs) and company/platoon boundaries, to separate aircraft from the effects of fires.

Controlling/Deconflicting Measures for Military Operations in Urban Terrain (MOUT)

Additional formal and informal measures help control and deconflict indirect fires and attack helicopters in high-intensity operations concentrated in small areas, such as MOUT. **Two techniques**, the holding area (HA) and the Kiowa Warrior cross, enable the combined arms attack of targets in village fights as well as in live fire at the JRTC. Both are examples of time and lateral separation techniques for

executing the formal and informal ACAs described in Appendix D *of FM 3-09.4.*

In the HA technique, the FSO determines that attack helicopters and indirect fires cannot safely conduct simultaneous attacks on a small objective due to terrain, foliage and (or) enemy air defense capabilities. During the military decision-making process (MDMP), he and the aviation LNO decide to use time separation in the form of HAs to facilitate the attacks. Together, they select four one-kilometer-in-diameter circular HAs for the aircraft located outside the effects area (and off the guntarget line) of the planned targets in the objective.

To ensure these HAs are protected from unintended attack by indirect fires, they are further designated as ACAs and built into the advanced FA tactical data system (AFATDS).

All HAs are distributed as part of the brigade's GCM/ACM/FSCM plan in the brigade operations order. In this case, the HAs are roughly two kilometres from the target area or approximately 60 seconds flying time at 60 knots.

As the attack unfolds, the ground commander, through his FSO, sequences indirect fires and attack helicopter fires into the objective. As he prepares to deliver indirect fires using an "At My Command" mission, he orders the attack helicopters to occupy one or more of the HAs. Once the aircraft have reported occupation of the HAs, he issues the command to fire to the firing unit.

At the report of "Rounds Complete" (plus time of flight), he clears the helicopters to depart the HAs and conduct their attack on the objective in accordance with previous guidance.

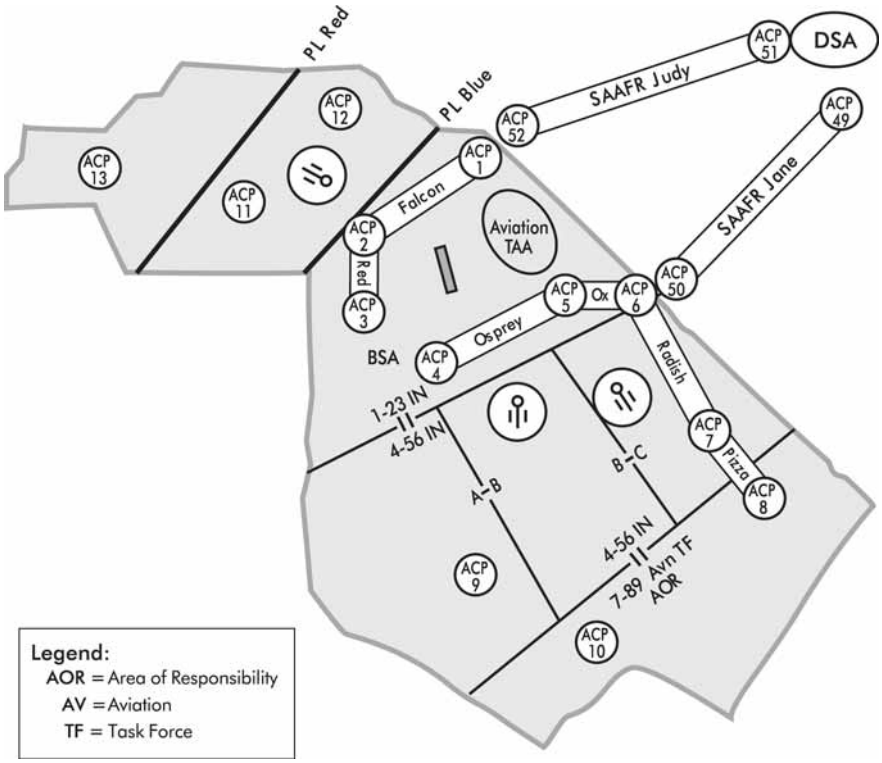


Figure 5 : Integrated Brigade A2C2 Plan. The plan includes a combination of airspace control measures (ACMs) and graphic control measures (GCMs) to deconflict indirect fires. It also includes aviation air corridors "Pizza" and "Radish" to support the movement of the 7th Squadron, 89th Aviation (7-89 AV) into its sector.

The Kiowa cross technique divides up the battlespace around a high-intensity objective into sections and then assigns a letter or number to each section. (See Figure 6). This provides a number of formal control measures in a small space to facilitate moving aircraft quickly and efficiently from one area to another and separating them laterally from the effects of fires. Attack helicopters can operate in one quadrant of the "cross" while indirect fires are delivered just outside the risk estimate distance (RED) in another portion of the cross. Where possible, the "arms" of the cross should be placed on easily identifiable terrain (roads, waterways, etc.) so they can be explained to aircrews and ground observers.

In Figure 6, the battalion FSO in control of fires for the attack on this village needs to attack a strongpoint in the northeast portion of the city (Target AF2001). Because of the size and complexity of the target (one T-72 tank being used as a pill-box, exposed troops at heavy machine gun positions on the roof opposite the tank and a heavy machine gun position inside the second story of a high-rise building), he uses multiple fire support assets to achieve his commander's desired effects. The FSO chooses to attack the target with a combination of 105-mm howitzer and OH-58D fires.

Thinking ahead, the brigade FSO and ALO created a circular control measure during course-of action (COA) development and imbedded it into the brigade's larger GCM plan. They divided the circle into a cross with four quadrants labelled A through D. The radius of the circle is 500 meters, and it is valid from the surface to the coordinating altitude (300 feet). The gun-target line of the supporting battery is roughly south to north (indicated by the arrow in Figure 6), and the unit is firing standard ammunition at roughly one third of its maximum range. The battery has met the five requirements for accurate, predicted fire and had adjusted on this target as part of harassing and

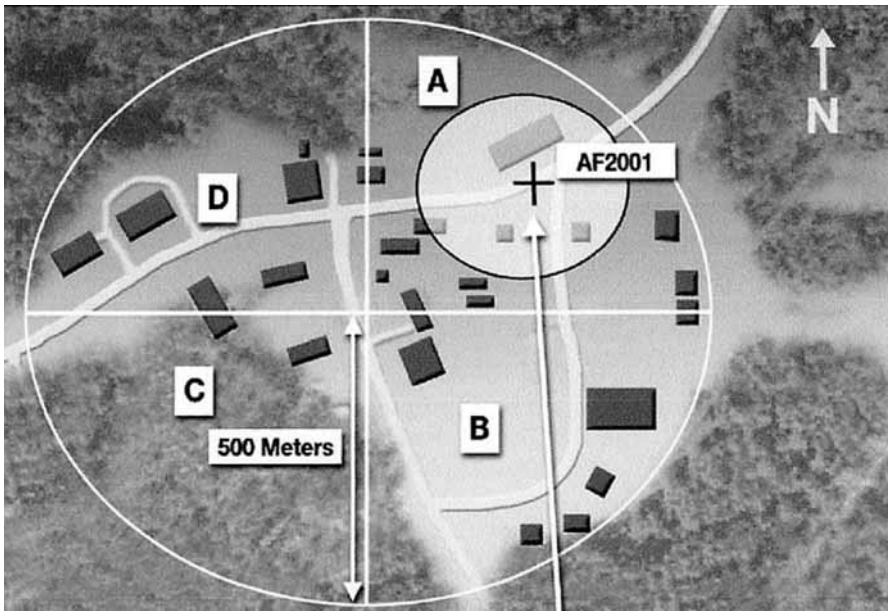


Figure 6: Kiowa Cross Deconfliction Method. This deconfliction measure is used in highdensity operations concentrated in small areas, such as those found in military operations in urban terrain (MOUT). The arrow on the right indicates the gun-target line. The 350-meter-diameter circle around the target (AF2001) is the risk estimate distance (RED) of the munition's impact. The unit is firing standard ammunition at about one-third of its maximum range and using a converged sheaf.

interdicting fires earlier in the battle. Additionally, it fires using a converged sheaf (all rounds aimed at the same central grid of the target).

Using a probability of incapacitation (PI) of 0.1 percent, the battalion FSO determines that the proper RED for this mission is 175 meters (see FM 3-09.4, Appendix A, for a complete discussion of REDs). The FSO does a quick plot on his map and cross overlay and determines the terminal trajectory and RED of the sheaf as it impacts (depicted by the 350-meter-diameter circle over the target) potentially will affect quadrants A and B. Based on this determination, the FSO (with the concurrence of his commander) "closes" A and B to helicopter use during the fire mission and advises the commander to have the helicopters conduct their simultaneous attacks from battle positions outside of those two quadrants.

Because the FSO devised a simple, standardized control measure, he quickly could separate artillery and attack helicopters in space but deliver their effects in a simultaneous, combined arms manner.

A2C2 within a brigade's AOR is the responsibility of the brigade S3 and staff. Failure to take responsibility could result in predictable, avoidable and unacceptable casualties in combat. The staff must be willing to accept the challenge and commit to finding workable real-world solutions based on doctrinal and TTP references.

The British Joint Helicopter Command

The Joint Helicopter Command (JHC) was established as a formation in Land Command in 1999 to bring together all the United Kingdom Forces' battlefield helicopters under one organisation whose purpose is to deliver and sustain effective Battlefield Helicopter and Air Assault Assets, operationally capable under all environmental conditions, to support the UK's Defence Mission and tasks.

By Lieutenant Colonel James RUTTER, British Liaison Officer to CDEF

The Command operates over **250 aircraft including the Sea King and Lynx helicopters of the Commando Helicopter Force; the Chinook, Puma and Merlin helicopters of the RAF and the Lynx, Gazelle, Apache, Bell 212 and Islanders of the Army.**
The Command headquarters are collocated with HQ LAND in Wilton, near Salisbury. The JHC comprises some 15,000 personnel, about 7,600 of whom serve in 16 Air Assault Brigade[1].
The helicopter units in the JHC comprise the RN Commando Helicopter Force, all operational Army Air Corps aircraft and all RAF support helicopters. Royal Navy helicopters that operate as part of ships weapon systems, such as Anti-Submarine helicopters, and both RN and RAF Search and Rescue (SAR) helicopters, are not part of the JHC.

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The JHC provides **a unified command structure for the integration of Battlefield Helicopter and Air Assault combat, combat support and combat service support units.** The principal focus of all JHC activity is the delivery of effective Battlefield and Air Assault combat power in support of operations. It strives to provide a coherent structure to ensure that the correct level of appropriately resourced, trained and sustained forces are available for employment by a Joint Commander in support of land, special forces or amphibious operations. To achieve this vision, it aims to provide an efficient joint approach to doctrine, structures, training support and working practices; harmonising these across the three Services. The JHC seeks to build on the skills and knowledge of individuals as well as the strengths and traditions of the single Services in order to raise standards of safety and quality. It also seeks to forge strong links across the Command. In short, the JHC values the individual and maintains the ethos of the three fighting Services, whilst focusing their joint capabilities to enhance the operational effectiveness of UK Battlefield Helicopter and Air Assault forces.

Commander JHC's overarching intent is that the Command delivers **a coherent and integrated Air**

Manœuvre capability to Defence, comprising an effective mix of attack, utility, surveillance and support battlefield helicopters and air assault forces all either supported by, or in support of the maritime, land, air and special forces components. Deployed Force Elements will be tailored to the mission with joint C2, fires, intelligence and logistics to conduct operations across the spectrum of conflict and in all environments. Units, equipment and Tactics, Techniques and Procedures (TTPs) should be configured for the most likely small and medium scale scenarios, but must be capable of adapting for large scale warfighting.

Units in the JHC break down into **five main areas.**

The Commando Helicopter Force (CHF) is based at the Royal Naval Air Station (RNAS) at Yeovilton and operates 35 aircraft. Whilst well-versed in the conduct of land-based support helicopter reconnaissance and surveillance missions, the CHF is **primarily a maritime force that is trained, equipped and organised for expeditionary joint operations in the littoral environment.** It is a self-contained operational formation, with organic C2, signals, Mobile Air Operations Teams (MAOTs), aviation fuel and logistics capabilities that allow stand-alone deployments of short duration, and sustained operations when supported by Amphibious Task Group (ATG) shipping, or when ashore alongside elements of 3 Commando Brigade, a Joint Helicopter Force (JHF), or similar formations. Its purpose is the provision of tactical mobility, ISTAR, and aviation combat support and combat service support primarily to 3 Commando Brigade during littoral operations. It is configured to provide the capability to conduct a simultaneous two company-group lift. The CHF is made up of a headquarters capable of provide a JHF HQ during amphibious operations and of four Naval Air Squadrons that provide the UK Amphibious Forces with lift, ISTAR, Light Utility Helicopter (LUH), training and Maritime Counter-Terrorism (MCT) capabilities.
Since 1968, the CHF has carried out annual Arctic training deployments to Bardufoss, 200nm inside the Arctic Circle. The purpose of these training deployments has been to develop and sustain the CHF's capability to fly in support of UK/Netherlands Amphibious Forces (UKNLAF), the only formation in the UK ORBAT specifically trained for and current in Mountain and Cold Weather Warfare.

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16 Air Assault Brigade is based in Colchester in Essex, with the majority of its units in the surrounding area.
It is made up of two AAC attack regiments, one AAC Light Utility Helicopter (LUH) regiment, four air assault battalions, an artillery and engineer regiment and other support elements. As **an air manœuvre brigade,** it is a unique formation within the UK order of battle. It is a highly capable and rapidly deployable force that offers wide potential across the operational spectrum. It is designed to secure or open points of entry for other Land or Air elements and to confer significant high utility combat power. As a result, it is used frequently on operations, most recently in Afghanistan.

Army Aviation units provide integrated aviation operations as part of Land Manœuvre within Land operations. In warfighting operations the principle task of Army Aviation is to form **the core element of Air Manœuvre.** Aviation units form Combined Arms Battlegroups (BGs) and are given manoeuvre missions, that see them using fire and manoeuvre and operating within the context of mission command. They are expected to operate in and dominate their own battlespace employing organic and non-organic (including Joint) systems to prosecute operations. Additionally, Aviation BGs or Aviation manoeuvre units are able to operate in support of other Component Commanders (Maritime, SF and Air). Attack, Utility and Specialist Aviation units support Land and Joint Operations in Combat, Combat Support and Combat Service Support roles in both war-fighting and Other Operations. The Army Air Corps (AAC) is organised into Regiments, Squadrons and Flights and these units are based around the world.

The RAF Support Helicopter Force, which includes Chinook, Puma and Merlin squadrons based at Aldergrove, Benson and Odiham, provides **helicopter support primarily to LAND components for a wide range of current and contingent tasks.** It operates a fleet of 68 aircraft. At RAF Aldergrove, the Joint

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Helicopter Force Northern Ireland is tasked to provide designated air and aviation capabilities for operations in Northern Ireland in support of the Police the defeat of terrorism and the maintenance of public order. RAF Benson provides a fully deployable, tactical headquarters and is responsible for Puma and Merlin training and exercise support, whole-fleet management, equipment procurement and support for deployed forces. The presence at RAF Odiham provides the same headquarters capability and is responsible for similar tasks as Benson involving the Chinook. RAF Odiham also houses the Joint Special Forces Aviation Wing (JSFAW) which is a joint RAF and Army unit comprising Chinook HC2, Defenders and Lynx in support of Special Forces operations.

The JHC is in the vanguard of the Joint approach within the British Forces. It has ensured a rationalization of battlefield helicopter support and has brought a central focus for the capability. It enables doctrine, structures, training, support and working practices to be harmonised across the UK's three Services. It provides a unified command structure for the integration of battlefield helicopters, with the air assault, combat support and combat service support units of 16 Air Assault Brigade. Recent experience has proven that **battlefield helicopters are an essential enabler for almost every operation in which British Forces are involved.** For that reason, it is in high demand, particularly in operations in Iraq and Afghanistan, where helicopter assets have proven pivotal, enabling unrivalled mobility to Land Forces. The JHC underpins this and provides a coherent, efficient approach, enhancing the delivery, interoperability and effectiveness of combat power for operations to the benefit of the operational commander.

1 The overall figure includes over 800 reserves from the Territorial Army, Royal Naval Reserve and Royal Auxiliary Air Force, plus 380 civilian staff.

Tactical Third Dimension in France

Bring the sky down to earth or raise the ground up to the sky ?

"War has no particular theater of operations, even if there are an air-land and an air-sea (sea and coasts) spheres of action. **(...) In other words, the concepts of air-land war and air-sea war should be substituted for the old concepts of war on land and war at sea."**

Admiral Bernotti, 1927.

Mastering the combined arms aspect of operations is one of the stakes of modern warfare, as the military began to realize it in the first half of the 20th century. As an expansion, then an extension of battle on the ground, the air-land battle, in the course of various conflicts, gradually turned out to be a specific tactical sphere of activity (and not a special feature of it), in which combat service support, combat support, maneuver and engagement are dependent on a shifting, heterogeneous environment, to be redefined on a permanent basis.

*Consequently, **the taking into account of third dimension by land forces** proves particularly complex, as tactical level results from the conjunction "of assets, in other words equipment, of the links uniting those forces and the spirit which drives them on".*

*Incorporating the air assets within the sphere of land units is therefore **the result of an evolution encompassing technical links, full and comprehensive integration, and human collaboration and doctrinal combination. This leads today to the integrated concept of "aérocombat".****

Keeping this pattern in mind, some founding elements in the field of air-land activities in France will be described here.

BY SECOND LIEUTENANT GILLES KRUGLER - DEFENSE HISTORY DEPARTMENT (ARMY) RESEARCH AND PROSPECTS OFFICE

1914 - 1945: How can a technical and geographical link be established between air missions and land operations?

"For technical, moral and administrative reasons, the aerial platoon is an integral and permanent part of the battalion (...)"

Colonel Estienne, draft for organization of aviation, May 1914.

During the **First World War** aviation gradually expanded and specialized. Within the French Supreme Headquarters (Grand quartier général- GQG) the Air service attempted to "coordinate" air activities with the ongoing battle. Right from the start of hostilities air cavalry troops were implemented. At the end of 1914, a **specific aviation force** was organized **to provide direct support for Army Corps.** Its main missions were artillery fire control, liaison, observation and battlefield surveillance. Unlike the other units (at army level for large-scale reconnaissance or "in reserve" for bombing operations), Corps aviation was operationally managed by the commander of the area of operations, advised by one or several officers experts in aeronautics.

The increasingly important role played by artillery during the war resulted in closer cooperation between fire control troops and batteries. The same association was implemented on behalf of infantry divisions. Empirical attempts were even made to have specific aviation units indirectly support battle tanks. Institutionalized for good during the limited offensive operations in the Summer of **1917, participation of a part of aviation forces in the land battle** was supported by more autonomous fighter aircraft formations.

The operating altitude of Corps airplanes and balloons was at the time between 450 and 6,000 feet. The end of positional warfare **at the beginning of 1918** was the landmark of a first step in the employment of aviation in what was then called **"combination of service branches"**. The general concept was that, as the first player to come on the stage, aerial observation ensured artillery fire efficiency, "prepaGred" terrain for the infantry protected by battle tanks. Then they operated in the basic interest of infantrymen who in turn provided information for aviation about their advance.

However the lack of reliable long-range communication means (infantrymen communicated with signboards or optical signals, and airplanes were equipped for reception only) put limits to the attempts at "air-land" management and coordination.

In the late 1920s even if projects like Colonel Doumenc's one, which consisted in organizing "mechanical divisions", organically included air flights, these were still confined mainly to specific support and combat support functions for major units.

The fielding of autogiros in the late 1930s gradually took up the idea. After long debate, the setting up of **"artillery air observation platoons *(SOAA)*"** in 1939, equipped with Leo C.30 autogiros, was intended to provide each army with its own organic air assets. Taking off and landing as close to the troops as possible, these aircraft could maneuver on a permanent basis together with land units. In February 1940, is was decided to assign them directly to batteries. The rest of the "cooperation" aviation still belonged to the Air force, which assigned it for operational purposes to Army major units. Organized into **air observation groups (GAOAs),** observation aviation therefore belonged to a dual organization. These groups were at the time ill-equipped by airmen and badly directed by the army's staff. Equipped with two-seat or twin-engined airplanes, air observation groups required landing strips and were therefore *"often located far from army's HQ, [which entailed] complications in telephone communications and exaggerated use of liaison by motorcar"*.

Even if defeat in June 1940 did not allow the implementation of an initial autonomous "land aviation" with an autogiro core, the acronym *SOAA* (artillery air observation platoons) was however taken up as of 1943 to refer to the various aviation platoons assigned to the French divisions of the French expeditionary force in Italy. Modeled on the American pattern, these new SOAA used a light airplane, the L4 Piper Cub, which enabled them to perform best the fire control missions for the units to which they were assigned.

Therefore, general employment of this type of short take-off and landing light airplanes enabled the French Army to obtain for the first time **concentration, permanence and responsiveness** from all forces within a major unit.

1945 - 1954: the dawn of common collaboration "between sky and land"

"The result of that close cooperation was crowned in the course of Operation TRAVINE, during which thoroughly permanent observation and the relevance of intervention requests enabled fighter planes to be among the most decisive factors (...)".

Major de La Salle, commanding southern tactical group, January 1949.

At the end of 1945, the 9th Colonial Infantry Division, and then the 3rd Colonial Infantry Division, were allotted 14 Piper aircraft in Cochinchina. Gathered according to a territorial and airfield basis, the aviation platoons of major units were organized into **air observation groups (*GAOA*)** in which specialist personnel (pilots, mechanics, radio operators) were detached from the Air force.

Increasingly integrated into the Army, the Piper airplanes, then the *Criquet* Morane 500s, gradually gave up fire control tasks to take up escort, **liaison and tactical reconnaissance missions.** Very quickly, it appeared that without aviation contribution land units had increasing difficulty fighting against an elusive enemy who made the best of a challenging environment. Missions of the "combat accompanying" type were the most typical examples, Morane airplanes orienting advancing columns, monitoring traffic on roads, enabling commanders to reorganize their disposition according to the evolution of the threat...

At the end of 1952, in Nan San, in the course of Operation Lorraine, the *Criquet* airplanes of 23rd air observation group took turns around the entrenched camp in order to guide and designate targets for B-26 and Helldiver bombers. On that occasion the Morane achieved Forwseard Air Control (FAC)-type missions and air assets coordination tasks in support of French positions. Thus they filled a gap between fighter aircraft and infantrymen. Making use of VHF equipment, Morane crews also took into account management of fire support, whether air or land support. Whereas pilots and observers learned to perform successive missions in compliance with the requests of troops in the field, they in compensation played a more and more important part in providing direct support for commanders.

In **October 1945**, the initiation in Mainz of an **aerial observation practical course (CPAO),** then as of 1953, of the **Army aviation academy of artillery observers (ESALOA),** enabled to train observers, then pilots originating from "land" forces. The originally strong combined arms oriented of Army aviation was still enhanced by the fact that it included volunteers originating from all branches; **Artillery observation Army aviation** (ALOA) still remained a service, not a branch.

"Operation with all branches, the work of every personnel in the field, are no longer for [aerial] observers challenges about which they know nothing. They experience these issues directly, as they experience combat, and they learn more through this than through all training sessions or lectures you can imagine. Diversity and variety in their trade constitute its main interest".

Operations in Indochina and initiation of a real training to "land flight" revealed the beginning of an **unquestionable solidarity between infantrymen and "their" airmen.** Flying at very low altitude, the pilots of Piper and Morane airplanes then shared the same risks as the men on the ground. The latter accepted more easily injunctions and advice from crews. Army aviation and units on the ground maneuvered together in an atmosphere of **cohesion** originating from intense fight **in the same conditions. Morale and leadership** then improved with close commitment of Army aviation platoons. Airplanes allowed better **coordination of efforts** and enabled **commanders to be fully aware of the ongoing battle.**

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1954 - 2004: how can Army aviation action be combined with the other land forces?

*"L'ALAT (French Army Aviation) is **now the decisive factor of land forces** (...) The ALAT issue should therefore no longer be a minor concern for the Army, but should appear first and foremost among its designs and programs."*

Army Aviation Commander, in official note, March 1956.

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The fielding of helicopters, with the establishment of the Indochina Helicopters Formation (FHI), definitely improved medical evacuation activities and strengthened the link between Army aviation personnel and combatants.

With the establishment of **Army Aviation (ALAT) in 1954** and its employment in the war in Algeria, helicopters brought about a gradual change in land combat operations. Initiated in Korea by the US Marine Corps during Operation Summit in 1951, air-assault with helicopters was expanded in Algeria. With modern and appropriate equipment (mainly H-34 and H-21), and meeting the requirements for the protection of assault helicopters, armament of aircraft was achieved.

With the activation of **heliborne intervention detachments (DIH)**, employment of specialized aircraft against point targets was generalized. Helicopters and light airplanes (Alouette, Djin, Piper) provided information for intervention forces, then coordinated heliborne assault operations according to the threat, while checking the efficiency of fire support provided by gunships.

While it had already been considered at the end of the Indochina War, active participation of air assets during battle at contact was performed in Algeria and became the basis for intense doctrinal thinking concerning the optimization of tactical combat effectiveness of third dimension, which has since been acknowledged.

The first step was the organic activation of Army aviation task forces at division level. The **Army aviation divisional task forces** (GALDIV) *"(...) are integrated into the land maneuver. Whatever the echelon where they operate, they are employed directly by the commander in the same way as those in any Army unit."* Supporting the other land units, those GALDIVs depended in a direct way on the maneuver of major units, as the helicopter formations had to perform specific missions assigned by the major units from areas controlled by friendly troops. Nap of the earth flight in itself depended on whether the other land forces had acquired superiority at any particular time or place.

"It is therefore possible to say that, within the combat zone, helicopters do not fly. They move through a series of bounds, from one terrain compartment to another. In order to avoid being silhouetted against the sky they stay within a slice included between the ground and the top of the obstacles which enable to escape visual detection."

The second step was initiated in 1967 by the **US Army** with the implementation of the first **autonomous helicopter major unit** (1st Cavalry Division - Airmobile). Battles in the Ia Drang valley and around the Khe San pocket were an illustration of the hot debates over the revolution of employment of gunships. The issue of autonomous employment of Army air assets then entailed an **evolution in the tempo of engagement** of the other land components as well as a **reorganization of the phases** of battle.

Initiated in 1977, the consolidation of a great part of combat and airmobile support functions was performed with the activation, at corps level, of **attack helicopter battalions (RHC).** As of 1985, partly modeled on the American Air Land Battle doctrine, an airmobile division (4e DAM) was established, including 4 attack helicopter battalions (240 aircraft equipped with wire-guided missiles) and 1 specialized infantry battalion. The other Army aviation units (with 360 aircraft) were still tasked with combat support and direct support to corps. Designed as an anti tank spearhead, 4th Airmobile Division, which was part of the "Rapid Reaction Force"(FAR), conformed to the new concept of ***airmobility*** illustrated by **heliborne anti tank combat ahead** of armored troops.

To strike quickly, hard and repeatedly the enemy field forces was the watchword of the division, which was nicknamed "the FAR of the FAR" ("the rapid reaction force of the rapid reaction force".)

In 1991, one of the first actions of the allied coalition in the Gulf was an almost single-handed raid performed by several AH 64 Apache attack helicopters, intended to destroy radar facilities along the Iraqi border. A few days later, 18th Aviation Brigade infiltrated 2,000 troops 200 km deep into the Iraqi disposition with 120 helicopters. In 1995 an **airmobile brigade** (3e BAM) was established within French Army Aviation, with the 2 attack helicopter battalions tasked with providing combat support for III (FR) Corps.

In 1999, as a sequel of lessons learned from the Daguet operation, from the fall of the Berlin Wall and the emergence of new regional conflicts, 4th Airmobile Division was tailored into a brigade, while a few years later 3rd Airmobile Brigade was disbanded. At operational level of war, even if anti tank combat was not given up as a possibility, a new emphasis was laid on a **more thorough integration of air assets within land brigades** according to their requirements and to the tasks they were assigned.

The development of night flight and night fighting, of air to air fighting, of diversity in the weaponry carried in flight, enables the new-generation attack helicopter (Tigre) to reach a level of versatility which has long been sought after. The gradual integration of its sensors with the other land forces makes of it a force multiplier which is integrated into the concept of the air-land operational bubble, capable of providing flexible and responsive support and of performing autonomous maneuver as well...

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"Aérocombat": a logical development?

In 1982, General Navereau said: ***"Yes, Army Aviation is definitely the vertical component of land battle,*** *because paradoxically it enables the Army to free itself from terrain, without changing the shape of combat, and to continue combat out of terrain. And to extend this paradox, Army aviation can conduct "vertical combat" only by remaining in the terrain which is its only safeguard".*

The history of tactical employment of third dimension shows that it is genuinely **a threefold impulse, of a technical, human and doctrinal nature, which is at stake in the connection between Army aviation and forces on the ground,** so much so that their combat operations cannot be envisioned separately today, considering the common nature of their mission. New-generation equipment in the pipeline today are an integral part of the logic of these developments, which eventually means that the Army will deal with only one type of combat, with full integration between action on the ground and action close to the ground: the *"aérocombat".*

A Revolutionary Tool to the Benefit of Counter-guerilla Warfare

Helicopters during the Algerian War[1]

In 1954, when insurrection broke out in Algeria, the French Army had only three helicopters in the whole of Northern Africa. **At the moment of the cease-fire, in March 1962, there were more than 300 aircraft in the operation theater.** Under the pressure of events, the use of helicopters increased and popularized, which supported General Beaufre's prophecy, who said in 1953: *"the use of helicopters will increase. Each Service needs helicopters closely linked to its organization and to its operations. In Europe, the Army has huge long-term requirements".*[2]

BY FIRST LIEUTENANT GUILLAUME LASCONJARIAS, FORCES EMPLOYMENT DOCTRINE CENTER/LESSONS LEARNED AND RESEARCH DIVISION

From observation aircraft to Army Aviation, a new tool?

Rotary-wing aircraft were not born with the Algerian war. During the interwar period, the Army thought about the assets it wanted to get so that artillery could become totally independent of the Air Force, in particular regarding observation and fire control means. **During the Indochina war,** these "Artillery observation aviation groups" *(GAOA)* completely passed to the Army[3]. Simultaneously, the span of missions increased; French forces in the Far East used helicopters primarily for MEDEVAC and rescue missions. These missions, scarce first, soon increased; helicopters enabled to carry out more than 10,000 MEDEVACs from April 16, 1950 - when the first two Hiller UH 12A aircraft were fielded - until the cease-fire in August 1954[4].

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But some people - like General Navarre - considered what could become possible with this new tool[5]. Considering more actions than the mere MEDEVAC missions highlighted by the Air Force, **it was thought about true heliborne missions,** inspired by operations carried out by the *US Army* in Korea. In late 1954, a commando was dropped in Central Annam without having been spotted, whereas in Cochinchina, a stick of airborne troops bailed out by night and held positions behind Viet Minh[6] positions. At that time already, studies recommended *"a tactical maneuver of a new kind completely overwhelming enemy forces moving on the ground owing to its mobility and safety"*[7]. And many officers and NCOs got accustomed to this new weapon: an armor captain told General Ély that: *"armored cars, MBTs (Main Battle Tanks), amphibious vehicles are no longer enough to carry out conventional armor missions.*

Should we not be able to maneuver in the three dimensions at tactical levels, we would still be one war late next time".[8]

"At the end of the Indochina war, land forces became aware of the new and very interesting capabilities provided by rotary-wing aircraft". However, we lacked time to develop an efficient commitment doctrine with still scarce equipment. LO (Law and Order) operations carried out in Algeria accelerated this process.

The helicopter, a "maid of all work"?

In the early stages of the Algerian war, the Air Force seemed not to be interested in helicopters. By the way, most Air Force commanders preferred to let the Army manage by itself conventional missions pertaining to observation and artillery fire adjustment on the battlefield, to devote itself entirely to operations with a strategic feature[9].

With the creation of helicopter group Nr 2 *(GH 2)*, land forces included this quite young *"ALAT"*[10] in their missions. It was rapidly taken advantage of lessons learned from Indochina and the Army Staff acknowledged **the operational usefulness of helicopters in the field of "C2 liaisons, traffic control, artillery observation and route reconnaissance"**[11]. Though the basic priority was about artillery observation and MEDEVAC, a change of course appeared and it was suggested that *"Army aviation assets, in particular helicopters, were to be more and more considered as combat, transportation and observation vehicles, similarly to jeeps and land combat vehicles. These assets were to be able to be included into the land tactical system and were to be capable of operating in symbiosis with combatants on the ground"*[12].

As to justify this requirement, on May 4, 1955, the first heliborne operation in history occurred at Mount Chelia[13]. It was successful; the very rugged terrain and the assault's speed enabled a few legionnaires from the 2nd BEP (2nd airborne battalion, Foreign Legion) - supported by two H-19 helicopters to secure the area within eleven minutes. From that time onwards, no operation was planned without helicopter commitments. Between 1955 and 1958, the number of helicopters increased tenfold thanks to heavy financial and industrial efforts, as well as in the field of personnel training. In 1956, the number of helicopters amounted to 64 aircraft, among which 31 for the Army. Still, it was not enough and General Salan required *"fielding and manufacturing 225 light helicopters and attack helicopters enabling to transport 3,000 personnel simultaneously (...). Time required to pacify Algeria closely depended on an important implementation of helicopters"*[14]. The political power agreed with this and Bourgès-Maunoury, Minister of Defense decided to make an important financial effort[15].

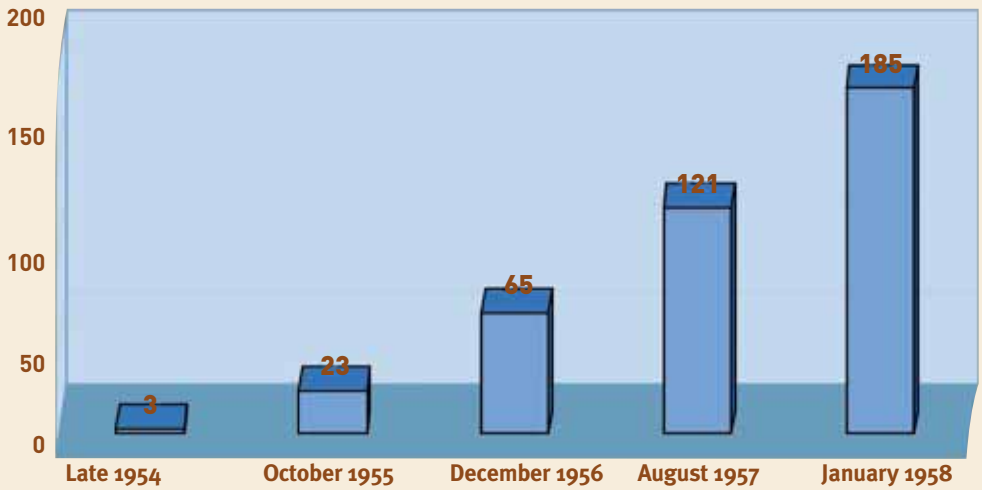
Indeed, **helicopters happened to be an essential tool in counter-guerrilla warfare.** In limiting environmental conditions, such as the Algerian ones (terrain features, temperature, wind...), these aircraft provided us with a high tactical mobility, speed and the surprise of land forces in front of FLN combatants. Helicopters were successfully committed into LO and restoration of order operations, in particular in protection, area control and intervention missions[16].

When facing an opponent that was perfectly aware of the terrain, that hit and broke up immediately after, land forces noticed that rapid and violent actions were to be preferred to large battalions. For General Lorillot[17], *"the outstanding features of these assets (helicopters) are put to their best use only if they get committed without any delay within a radius of 5/15 kms around a boarding point and transport a minimum of force in one rotation, i.e. a light 30-man strong platoon".*

The creation of ***DIHs* (Helicopter Assault Detachments)** enabled to use helicopter's capabilities to the largest extent. From that time onwards, for a specific mission, **a combination of light helicopters and transportation helicopters** was set up, including all the assets pertaining to C2, scouting, guidance, close support and transportation[18]. This *DIH* concept, invented by Major Déodat Puy-Montbrun, stressed the necessary combination of committed assets and it highlighted the direct co-operation between the operation commander and the commander of the heliborne task force: **helicopters became a basic component of combined-arms maneuvers.**

DIHs were located in the vicinity of combat zones and they move forward

Number oh helicopters committed in Algeria



according to the progresses achieved. They enabled to vertically outflank adversaries. To do so, maneuver transportation shifted to assault helitransport. Because the adversary had adapted himself; in face of fires from the ground, it was necessary to respond. After having proceeded by numerous trials and errors, we managed to fit light helicopters with heavy machine-guns, then with light guns, and eventually with rocket pods and with missiles. A slow specialization had emerged, to meet requirements and problem encountered on the ground.

1 *This articles owes a lot to Mr Alexandre KINNEN's study: "The French Army Aviation in stabilization missions: the Algerian example", Cahier de la Recherche Doctrinale (Doctrinal Research Review), CDEF/DREX, to be issued.*

2 *Memorandum Nr 428/EMIFT/4I, September 10, 1953, accepted by the French Minister of Defense.*

3 *The "ALOA" (Light Artillery Observation Aviation) was created by decree, March 2, 1952. The appellation "Army Aviation" was granted in late 1953, and it was confirmed by the Ministry of Defense in December 1954.*

4 *General (Medical Health Service) Régis FORISSIER: "Health services in Indochina" , in the Revue Historique des Armées (Military History Review), 1989-4, pages 3/16.*

5 *Memorandum Nr 428/EMIFT/4I, dated September, 1953, accepted by the Minister of Defense.*

6 *Colonel Paul GAUJAC, "Army Aviation", in Revue historique des Armées (Military History Review), Nr 4, 1992, page 159.*

7 *Ibidem.*

8 *Commander-in Chief in the Far East, Lessons learned from the Indochina war, 1954, so-called Rapport Élÿ (Élÿ report).*

9 *François PERNOT, "An Air - Land controversy; Air Force and Army Aviation", in Revue historique des Armées (Military History Review), Nr 3, 1990, page 49.*

10 *ALAT: (French) Army ("light") aviation.*

11 *SHD, 1 K 430, letter 9920/EMG.FA/G/ARMET, October, 5. 1959.*

12 *Letter to the Minister of Defense Nr 1834/EMA/ALAT, February 18, 1952, mentioned by A. KINNEN: "the Army Aviation in stabilization missions: the Algerian experience", mentioned book.*

13 *Jebel mountain Chelia is more than 2,330 meters high in the middle of Aures mountains.*

14 *Letter Nr 443 RM/10/23AAP, dated June 11, 1956 to the joint staff, mentioned by A. KINNEN: "Army Aviation in stabilization missions: the Algerian example", mentioned book.*

15 *Letter to the Under-Secretary of State for the "Army" Nr 6457 DN/CAB/ARM, August 31, 1956.*

16 *TTA 152 (FM): Using heliborne units in Northern Africa, approved by the Minister of Defense (DM 4894, May 4, 1956).*

17 *General André Martini: The history of Army Aviation 1794-2004, Paris, Lavauzelle, 2005.*

18 *Provisional memorandum about the use of DIH within the framework of a subversive war.*

19 *SHAT, 6 R 32, DM Nr 629/EM/A/ORG, March 1962.*

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Thus, the Algerian war was a basic stage for helicopters, a new tool, whose use was rapidly accepted and understood: it was the first concrete example of *"aérocombat"** before this term was used. Rotary-wing aircraft became successful because of their versatility and of their specific features. First used as transportation and MEDEVAC assets, helicopters gradually transformed themselves into a quasi self-contained airland combat tool. Employed because of their observation and guiding capabilities, some helicopters gradually specialized into ground force support.

Land forces took into account the major role and the challenges of the vertical dimension; **and air mobility became a new Military Training Area**. Utility helicopters enabled to react rapidly to events; its flying speed enabled to have rapid liaisons between commitment areas, while being able to get rid of obstacles.

These requirements intensified the setting up of specific helicopter detachments. If, as early as the late 50s, the Minister of Defense studied a possible common- Air Force, Navy, Army - management of the fleet of helicopters to optimize operating costs, this initiative did not succeed. The specific aspect of Army missions justified the availability of specific own assets, within a conflict where the Army was committed first. It was Pierre Messmer's will, at the end of the conflict **in 1962**, when he provided **each Service with a specific responsibility pertaining to the management, the organization and the use of its fleet of helicopters**[19].

Operation BENGA

"Aérocombat"* for EU Led, Military Expeditions

Between July and December 2006, 22 nations joined their efforts in a EUFOR-led mission -called Operation BENGA by the French- in support of the MONUC[1]. Its purpose was to secure national elections in the DRC.

A German general assumed[2] operational command of this mostly ground oriented operation, from POSTDAM-Germany. A French general officer was in command of the Force itself; it consisted of about 2,500 soldiers, half of them stationed in Kinshasa, and a multinational joint Force Headquarters (FHQ)-level 2/3- FHQ/CJOC was responsible for the conduct of all operations on the ground and at low-level altitude, whilst a JFACC was coordinating 3D issues related to them.

BY MAJOR PRIVAT TERNYNCK, FHQ4/OPS/PLAN*

Thanks to helicopters and drones apportioned to the force...[2]

A detachment of CH53 heavy helicopters[3] from the German Army Aviation and one battery of HUNTER drones from of the Belgium Air Force came up in support of the infantry troops deployed. Though no gunship-patrollers had been allotted to the task force commander, usually a must for such kinds of operation, *CJSOTF* did compensate for the gap out of the association of its gun-fitted and Viviane-fitted Gazelle helicopters[4]. The task force was mainly to operate within KINSHASA City and its suburbs, whilst keeping capable of punctual interventions in some other areas of the region.

Photo fournie par l'auteur

Technically, the Force's action relied on a permanent and visible presence of troops -including robust "shows of force" where needed- amongst the local population and/or close to a variety of Congolese military groups wandering about. The presence of MONUC battalions within KINSHASA was doing no good in terms of responsibility-delineation between troops, thus posing a potential risk of imbrications with EUFOR units. From the population's adherence required to the sensitive context where EUFOR was to demonstrate its capability, the whole mission demanded that all troops be suitably supported from the third dimension. I mean immediate Intel-support and where necessary, airlift and fire-support.

Being placed under TACON CJ2, the drones could quickly prove helpful to ground-operations. Typically, when troops are committed to urban areas where the situation shows particularly volatile. Along the mission, a cooperative practice of the drones has

developed across all combat-units, together with an easier identification of friends and foes and flexible procedures for curving flights towards a better appropriate destination. Thanks to the handy methods agreed upon between Staffs/*CJOC* and drones OPS desk officer, the former could directly guide the drones where needed and monitor the situation. In a few seconds, *CJOC* could get a screen - from a laptop- from which to watch at the mission and get an instant picture of the situation over the area observed. This was allowing for exceptionally quick analyses and real-time responses. To that extent, scouting/reconnaissance activities accompanying the units' advance to contact and visibility over most key-points have provided **a decisive advantage to the force in terms of effectiveness.**

... EUFOR could display quite a steady presence in the 3D

Indeed, landing a CH53 in the urban chaos of an African city would not have occurred without damages, which put limits to the helicopters employment; nevertheless, this employment was well planned and air-mobile, live-exercises were run in such places for the purpose of interoperability and best usage of the task force's capabilities. By the way, *CJOC* rarely missed observing the situation from the air every time an airlift, of personnel or supplies, was tested.

CJSOFT liaison detachment did help a lot for Intel-oriented mission with the employment of the mixed section of helicopters; in addition, its fire support capability was planned while addressing the technical limitations and possible collateral damages, especially when firing the 20 mm gun.

Clever use of CH53, Gazelles and drones, all of them combined, was allowing *CJOC* for a sustained presence in the 3rd dimension where the situation demanded, and real-time control over such assets throughout the course of operations.

Because support from the air is determining to force-protection and best effective maneuvers on the ground, the whole mission is got to turn into an air-land operation, fully and naturally. This is exactly what happened, with a battle space ranging from ground to an altitude of 5,000 feet, where drones would usually operate, and an intermediary zone, at 1,000 feet, that better suits to helicopters. Drones were made available to *CJOC* on request whereas this staff coordinating the CH53 squadron directly. This was short decision-making circuit, fully appropriate to **an optimized operational format,** by the way consolidated at the occasion of interoperability-oriented exercises.

* *Literally: Force Command HQ 4, Staff Division Plan & Operations. Major Ternynck has been serving as HELO/OPS specialist in the CJOC, EUFOR Command HQ deployed in the Democratic Republic of Congo (DRC).*

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1 United Missions in the Democratic Republic of Congo.
2 All intermediary headlines have been added by the editorial staff.
3 Familiarly called "hooks" in the US Army.
4 Equipped with an IR sighting device "Viviane", the Gazelle would normally operate HOT AT-missiles. French Special Forces have rather opted for the model armed with a 20 mm gun.

Operation EUFOR/DRC-BENGA demonstrates that a **ground-operation actually addresses the three dimensions** of the battle space or, in other terms, it is first *"aérocombat"*. Full effectiveness is granted where a unique commander is in charge; where land-forces run ground and/or close to the ground operations with the same corporate-spirit and culture; where all technical, tactical and human aspects are integrated. To that extent, **the land component should be assorted a slice of the airspace, where its commander could freely develop his maneuver and therefore keep controlling all military effects induced, at his level, by his own action.**

Co-ordinating 3D in South Lebanon

Upon UNSCR[1] 1701 following the Israel-Lebanon crisis of July 2006, a Combined Arms Task Force, "GTIA[2] LECLERC", was deployed to Lebanon. It was supported by an Air Defense sub task force (ADA-STF), actually one MISTRAL platoon armed with Armored Personnel Carriers VAB T20-13 and a radar NC1.

During the 1st UN mandate, this platoon from the 57th RA has been assigned air defense mission of the "GTIA", including its main HQ/compound at DAYR KIFA. A purely national asset, the MISTRAL platoon was placed TACON to Cdr, GTIA and OPCON to COS, UNIFIL[3] as consistent with his dual-headed role of REPFRANCE[4].

Under REPFRANCE's authority, an ADA liaison-team was to help coordinate all missions assigned to ADA-STF assets from within the Arty Operating Center. Therefore, this team started exploring 3D coordination issues immediately upon deployment, as a precondition to best handling ground-to air (G/A) weapon-systems.

By Major Laurent CHARRON, 57th RA[5]

57th RA

A bare minimum, 3D co-ordination status...[6]

Whilst taking over from UNIFIL-1, UNIFIL-2 was got to cater for Air Space management within its AOO immediately upon deployment, but with none of the technical assets required for that function. In fact, the radar NC1 newly deployed by the ADA sub task force was rather a target-acquisition than an air-surveillance system that remained tightly linked to the weapon system. Because of that technical gap, many aircrafts and UAVs Eaves happened to regularly trespass the UNIFIL no-fly-zone declared over South-Lebanon.

Realizing there was no much way to control and deny illicit flights over its AOO, the UNIFIL finally opted for a bare minimum 3D coordination process just in order to coordinate the flights of its proper aircrafts, i.e. the five helicopters assigned to UN airlifts and reconnaissance missions. Concretely, the UNIFIL used to address a daily Air Task Order (ATO) to the ADA sub task force and to the belligerents; Lebanese armed forces on the one hand, Israeli defense forces on the other hand.

This is how ADA-STF happened to start its mission. Actually, under a very low profile in terms of 3D co-ordination. This took only a few days to realize there was no effective air space control possible as long as this responsibility would rest with a multinational staff poorly inclined to supplying national elements with "strategic" capabilities. Even more, there was no question establishing dedicated zone for G/A AD weapon systems; should it be a Short Range Air Defense Engagement Zone (SHORADEZ), or a No-Fly-Zone. Thus, very restrictive ROEs for ground to air engagement, mostly based on self-defense principles, have been edited to avoid incidents potentially the cause of serious consequences.

... but counterbalanced by remedial procedures

Nevertheless, once a French Air Force officer could join the staff and deal with 3D Co-ordination issues, the situation happened to improve a little bit in the course of this 1st UN mandate. For example, the Force Commander had approved, early January 2007, a Standing Operational Procedure (SOP) applicable to the tactical drones (SDTI[7]) recently deployed in theater. Issued for the purpose of deconfliction, this SOP provisions for a Restricted Operating Zone (ROZ) that grants such aircrafts the safest flying-circuit possible where needed.

Further on, the Force Commander could sign and publish his permanent Air Coordination Order (ACO). This ACO consolidates all orientations detailed in January's SOP, especially on the subject of SDTI (drones). Yet, it does not provision for specific operating areas specially allotted to ADA weapon-systems in spite of repeated requests on the subject.

Compendium of acronyms and definitions

(1) REPFRANCE. French Representative.
(2) SHORADEZ. Short Range Air Defense Engagement Zone. The slice of space where short-range ADA weapon systems can operate and engage those hostiles flying over the ground-position they cover and defend.
(3) No-Fly-Zone. A large, often theater-wide area, where non-authorized aircrafts of all natures could be considered as potentially hostile. Trespassers will be therefore intercepted and/or, where necessary engaged by ADA weapon-systems.
(4) ROZ. Restricted Operating Zone. An air space held in reserve for aircrafts of the own or friendly forces ordered in a specific mission (air-supply; air-drops; drones flying circuits; etc.).
(5) ACO. Airspace Control Order. Joint-services order that provisions for 3D controlling and coordinating procedures. It also specifies those firing areas and ranges applicable to the own ADA weapon-systems and fighters.

1 United Nations Security Council Resolution.
2 French acronym GTIA means a Combined Arms Task Force.
3 NfT. United Nations Interim Force in Lebanon.
4 NfT. French Representative.
5 57th (Fr) ADA Battalion.
6 Intermediary headlines have been added by the editorial staff.
7 Literally: Transitory System of Tactical Drones.

To conclude with, UNIFIL-2 "entered the shoes" of UNIFIL-1 straight upon deployment in a situation where, decades long, the military component of that force had never been armed for air control issues in South Lebanon, and even less for fire control in the third dimension.

UNIFIL-2's entry with its reinforced staff was got to change the deal. **Co-ordination in the 3rd dimension is now a fact** though an abridged consideration is still paid to the French ADA assets kept under strict national control.

3D Co-ordination and operations

*To cease fire or shift artillery fires in co-ordination with an attack or counter-attack being launched are processes well known by combined-arms units committed into an operation. Exchanging liaison detachment between adjacent land units or between a supported unit and a supporting unit comes from the **same concern pertaining to a space-time co-ordination** of actions required to carry out the major effect.*

*Quite logically, the third dimension is no exception to this co-ordination requirement, a requirement for a wider freedom of action and efficiency. 3D co-ordination, a self-explanatory term, is **a set of procedures alongside specific technical assets** enabling to take into account the diversity and the speed of any flying asset transiting within this area. Its only aim consists in **supporting their use without hampering them or constraining them**. Lessons learned from past or current operations show it.*

BY LIEUTENANT COLONEL CLAUDE BLONDEAU, CFAT/DIVISION PLANIFICATION/BAC[1]

3D co-ordination aims: securing and optimizing the use of assets

The very **first aim of 3D co-ordination** consists in **securing friendly actors in the third dimension**. As a quite transverse function, it should make sure that air assets used by units at the various levels of command of the force do not collide with one another. For this reason, when operation FINUL II was launched in Lebanon, the Intelligence Operating Center[2] was set up in the vicinity of the HQ in Naqura. UAV's (Unmanned Air Vehicles) flights should not endanger ITALAIR[3] helicopters; and thus, exchanges of information should be easily carried out among the structures responsible for implementing both these kinds of air assets, all the more as no device dedicated to air control had been set up (surveillance radars, coordination centers...).

Even if the **various assets** flying within the third dimension have completely different features, they **sometimes fly within the same areas**. Thus, the more we move close to the FEBA (Forward Edge of the Battle Area), and the more air support fighters are being committed at altitudes normally assigned to helicopters and to some drones. An overall use of UAVs will still increase 3D co-ordination needs because one is likely to find any kind of aircraft, with any capability at any altitude. Moreover, they will be implemented by all the tactical echelons of the various Services' components.

In the vicinity of the FEBA, the likelihood of an air asset colliding with an artillery shell falling dead on target increases too. Because, if we have dealt with the hazard of collisions among friendly aircraft, there is also the hazard of fratricide fires. As regards ground-to-air units, this likelihood is increasing, as decision time is all the shorter from all the more succinct intelligence pertaining to threat analysis that they are not or no longer linked to the direct chain of control. Lessons learned from operation FINUL II are typical once again. The lack of a coordination chain with specialized assets led to set up an artillery operating center in Naqura. The ADA[4] unit should absolutely have had information available from the AOCC[5] cell from UNIFIL HQ about ITALAIR flights; it also applied to helicopters on board the ships that had taken part in operation BALISTE off the coasts. Setting up the artillery operating center and the intelligence operating center in the same place falls under the same principle. The ADA unit should have had information about UAV flights.

Commitment frameworks do not systematically include a no-fly zone. Thus, **accidents could occur between a force's air asset and a civilian aircraft**, whereas specialized assets to control

ALAT - ADC NIDAQUE

civilian and military airspaces do not always enable to observe the whole of the AOO (Area of Operation). To this should be added the fact that in Africa, handing in a flight plan is not systematically done. However, such a kind of tragedy, with important diplomatic consequences, could seriously prevent the force to be accepted and hence the mission to be completed. Therefore, the force should make every effort to have all information available that control towers could grant them by setting up liaison detachments.

3D co-ordination - often hidden by the security aspect - **is also a very important tool to optimize the use of *"aérocombat"** assets, in particular in an important commitment area.** First of all - and it has already been dealt with the example of the setting up of the artillery operating center and the intelligence operating center within the *UNIFIL HQ* - it eases the work of the ground-to-air defense that has thus a maximum of analysis data enabling it to carry out its mission in the best conditions. More globally, the direct chain of control enables to allot targets among the various ground-to-air systems while avoiding placing several fires onto a single target whereas other targets could happen not to be engaged. It also enables to allot each target to the weapon system that is the most fitted to carry out the interception timely, whatever it is: a ground-to-air unit or a fighter patrol.

From now on, the new technological break-through that mingles network interconnection, unit positioning systems, and data transmission - through battlespace digitization - increasingly extending the concept of real time, enables to consider the use of a **3D direct control chain by all actors in the third dimension:** air support aircraft, ALAT[6] units, UAVs, artillery. It will facilitate operation control by increasing response capability towards hazards in the contact zone. In other terms, we have to decrease to a minimum, the necessary time spans - linked to necessary requests for airspace allotments enabling to complete the tactical mission. In this new framework, a concept has come out from now on: **the co-ordination of land actors in the third dimension.** Regarding the Army, what 3D co-ordination brought forward to complete a mission - until now limited to ADA - will, from now on, be made available to the whole of the tactical chain; and MARTHA[7] - through higher level centers (CNHM[8]) - is clearly the climax of **an increasing freedom of action for a combined-arms commander:** selecting best fitted firing assets or intelligence assets (CAS[9], "ALAT", artillery... patrols, helicopters, UAVs...) available within shortest notice, when facing an unexpected tactical event requiring to be tackled immediately, and the whole of that in the best safety conditions.

3D co-ordination pillars: pre-established control and direct control

Let us start with a **prerequisite**. The 3D co-ordination chain is drafted as early as the **planning phase of an operation**. Depending on the conditions for a commitment - High Intensity Conflict or Low Intensity Conflict - the extent of the AOO, the kind and strength of committed forces, air threat, required assets devoted to the coordination chain vary. They could change, from the setting up of detection assets and transmission systems (AWACS, radars, L16...) enabling to permanently control the whole of the AOO in real time conditions, to a mere map on which strengths and airspace corridors allotted to the various missions and their activation time blocks are being displayed. Straightforwardness and common sense should remain the key words as they are a guarantee for a true efficiency.

The first **3D co-ordination** principle consists in **selecting an authority who will be responsible for it**. Its main objective will be to authorize, to deny or to amend requests for airspace sub-areas that will be forwarded to it, not according to a responsibility pertaining to the use of units, but because it will have carried out third dimension's deconfliction. In other words, the authority responsible for 3D co-ordination should trigger a decision by the commander that will enable to allot, depending on commander's priorities, the various airspace sub-areas dedicated to missions divided in time or space.

In order to have an overall vision and thus all possible decision-making criteria, this authority should be at the highest level of the force. Indeed, assets transiting in the third dimension are from the various joint components inside AOOs that could be in common, in particular in the contact zone. We could consider each tactical echelon to be responsible for its own AOO at ground level. Except for temporary exemptions, this is not true for airspace over it, as far as 3D co-ordination is concerned, as long as this airspace is likely to be used by other tactical levels of other Services' components.

ADA, with specific features from this point of view, is a good example enabling to show that **the coordination chain is absolutely not responsible for the employment of units**. An ADA unit integrated into the coordination chain is likely to be ordered or forbidden to fire by the direct control chain. Indeed, this last one has all assets available enabling to point out the hostile or unknown character of a track, and hazards likely to be encountered by air units flying at that very moment in the area; it can intervene on the allotment of targets between the various ground-to-air systems or fighter patrols. For all that, the authority responsible for 3D co-ordination has no authority to define the location and the mission tasked to this ground-to-air unit. This is the full responsibility of the operational commander responsible for this unit.

The 3D co-ordination chain operates at two different levels. "Procedural control" is to be set in parallel with planning. It operates under the principle of ACM request[10] to use airspace and through the validation of these requests after a possible third dimension's deconfliction. Even if it leads to time spans that cannot be shortened, as much for its definition as for possible changes, procedural control is a reference for any unit that is no longer in liaison.

"Direct control" is the almost real time implementation of changes that have to be taken into account within what had been defined with procedural control, owing to specific circumstances at that moment. Direct control relies on a specific network, which is based on "quasi real time" communication systems and on the knowledge of the instantaneous location of 3D actors: radar data, positioning system, IFF[11]...

Direct control provides all the required flexibility enabling to meet contingency situations. However, it is only possible with performing communication systems . In Afghanistan, during Operation SERPENTAIRE, an Army MIDS[12] station integrated in the L16 network, set up by the Americans on this territory, transmitted the whole of L16 actors' situation over the AOO in real time up to the Charles de Gaulle[13] through satellite communication links. Then, pilots were accurately aware of the situation over the Afghan territory, even before having taken off from the aircraft-carrier.

Obviously, **what is true for overseas operations is also true for homeland commitments.** Thus, the same rules apply when ground-to-air units are committed within the framework of the protection of major Navy facilities in the Finistère county, to protect a G8 summit or to complement the assets on FAS[14] bases.

* **"Aérocombat"** is the co-ordinated and integrated maneuver of tactical level units operating on the ground and in an air-space close to the ground, under the direct responsibility of the Force's Land Component Commander.
In addition to ground units, **"Aérocombat"** addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

1 Land forces Command/Planning Division[7].
2 Operating Center (dedicated to information collection by specialized sensors, set up by the Intelligence Brigade)
3 ITALAIR = Italian helicopter detachment within the UNIFIL.
4 Air Defense Artillery.
5 AOCC: Air Operation Co-ordination Center.
6 ALAT = French ("Light") Army Aviation.
7 Tactical Radar Network against Rotary-Wing and Fixed-Wing Aircraft.
8 MARTHA higher level center.
9 CAS = Close Air Support.
10 ACM REQUEST principle (Airspace Control Means).
11 IFF: Identification Friend or Foe.
12 MIDS: Multifunctional Information Distribution System.
13 Nuclear aircraft carrier.
14 Strategic Air Forces.

Technical improvements - through tools such as MARTHA - and battle space digitization enable **now** to consider **integrating third dimension actors to the direct control chain.** Taking "ALAT", UAVs, ADA into account - a field so far reserved to airmen and integrated ground-to-air units - is a **guarantee for a combined-arms commander to have an improved freedom of action to conduct operations.** Of course, it does not question the required planning, which is achieved through procedural control; it will bring **more flexibility, which is required to meet unexpected situations in the contact zone, while granting our forces with an optimized security.** Definitely, 3D co-ordination has become a fully transverse, allied, joint and combined-arms requirement, down to the lowest tactical echelons.

Operation *"Balbuzard Noir"*[1]: An Operational Model for Future Crises?

At strategic level, maritime shores (up to one hundred kilometers inside the dry land) have a prominent position. They control world trade, with more than three quarters of it carried out by sea; they have the same proportion of oil resources and they include two thirds of the world population. On the other hand and sometimes for other reasons, most crises have concentrated in these areas since the fall of the Berlin wall (Balkans, Iraq, Lebanon, Somalia, IC (the Ivory Coast), DRC (Democratic Republic of Congo), Timor, Palestine...). Thus, **it is required to have military capabilities operating from the sea.** They could have various aspects, among which one of them, particularly fitted to crisis situations, should probably be better defined and planned. It deals with **airmobile deep operations capabilities from the sea**. Lessons learned from operations carried out by France in Bosnia in May-June 1995 enable us to draw some principles out of them and to assess requirements.

By Major General Jean-Claude ALLARD, (ARMY AVIATION COMMANDER)[2] And Colonel (Ret) Jean-Marc MÉRIALDO[3]

Bosnia's example, May 1995

ECPAD

Violent clashes broke out between the Bosniac - Muslim - armed forces and Serbian armed forces in Bosnia. The FEBA traveled through the very heart of Sarajevo city. In an attempt to separate warring factions, scattered UNO forces - including infantry and light armor only, without any artillery, were particularly vulnerable. On May 26, in retaliation to an air strike on Pale, more than one hundred French soldiers were taken hostages by Bosnian Serbs.

The French President ordered a strong response. The Verbanja Bridge was stormed and a force was set up on the night of 26/27, to free the hostages. It included:

- a naval force composed of the aircraft-carrier Foch with its air group (Super Étendard, Alizé, Super Frelon), and two LCUs (Landing Craft Utilities), Foudre and Ouragan;
- a **"COS"** (French Special Operations Command) commando detachment - with a strength of more than 250 servicemen (Army, Navy, Air Force, GIGN (Gendarmerie)) aiming to carry out forceful action required to free hostages;
- a detachment from the 2nd REI (Foreign Legion Infantry Battalion) comprised of one infantry company and one heavy mortar platoon;

> ***"Withdraw by force all or part of the French servicemen held by Bosnian Serbs, depending on the situation. This operation was code-named Balbuzard Noir".***

- an **attack helicopter[4] TF**, with 20 UHs (Utility Helicopters) and 8 anti-tank and fire support (gun) helicopters - plus the OPCONed helicopter company-team from Split (6 UHs and 5 Gazelle); they were altogether the force's airmobile component.

On May 27, helicopters were loaded aboard the Foch and the Foudre in Toulon; they got under way late on May 28.

During the journey, the **staff** planned the mission: the 161 hostages were scattered over 8 different, heavily guarded locations, in the Southern and Western suburbs of Sarajevo. **"COS"** observation detachments, located nearby, forwarded permanently all the information required to set up the operation.

On May 30, the Armed Forces Joint Staff sent the OPORD (Operation Order). The mission was the following: *"Withdraw **by force** all or part of the French servicemen held by Bosnian Serbs, depending on the situation. This operation was code-named Balbuzard Noir"*. It was to be carried out under the operational command of the CEMA (the Chief of Staff of the Armed Forces), CECMED[5] being in charge for operational control during the maritime stage and the COMSECTEUR SARAJEVO (Sarajevo Sector commander), once forces had landed.

The selected maneuver consisted in **conducting the attack from the ships against both locations outside Sarajevo with 37 helicopter carrying 80 COS commandos,** in coordination with forces already in Sarajevo, tasked to simultaneously carry out other operations on the other locations.
The task organization included 6 modules:
- a C2 (Command and Control) module with 3 utility/air assault helicopters (tactical CP[6]);
- three *Modevacs* (evacuation modules) with 5 utility/air assault helicopters each (2 of them carrying the commandos, 2 for the hostages, one for the possible rescue of a damaged aircraft);
- a reception module including one Puma helicopter fitted with a CHLIO camera and 5 fire support helicopters (gun);
- a CS (Combat Support) module with 4 attack helicopters (anti-tank);
- a CSS (Combat Service Support) module including one Puma with a light maintenance team, 4 MEDEVAC (Medical Evacuation) Pumas helicopters, 2 Pumas in spare and 2 CSAR (Combat Search and Rescue) Super Frelons.

All these modules took **advantage of the AWACS aircraft** over Bosnia, of an Alizé to relay communications and of a possible air support by Super Étendards from the aircraft-carrier Foch's 17F flotilla.

Both objectives, BARE and OSIJEK, were located on the Western fringe of SARAJEVO city. The terrain was difficult, mountainous when getting close to it, half-mountainous and suburban for the action itself, compelling us to use avenues of approach that could have been easily protected, and high-tension power lines were very numerous. Within the Serbian lines, positions were defended against land and airmobile attacks. On the whole of the area, ADA positions were particularly dense and access to detention areas required to fly over the front line. Enemy armor units were prepared to operate within short notice.

Owing to distances, an advanced base was planned at Lipa, on the border of Croatia and Bosnia. This base was to be reached by night. Then, the avenue of approach would get through a mountainous area West of Sarajevo. The CP module would set up 45 minutes before the others, South of Sarajevo, on Mount Igman to take advantage of more reliable liaisons. The other modules were to follow within 10/15 minutes, first the evacuation modules, then the reception module, and the CS module. The CSS module would remain in the advanced base, ready to get committed. The operation would have to be conducted late in the night, in order to enable air support to be carried out, should a heavy response from Serbian forces in Bosnia have occurred.

On June 3, through negotiation, the Sarajevo Sector commander managed to have hostages made free. But, as early as the day after, the Serbians harassed the Sarajevo area with artillery fires. Thus planning was amended, and on June 8, the heavy mortar platoon and the infantry company were heliborne to Mount Igman and set into position, while being engaged by the Serbs.
The mortars, transported with the first wave, were able to react immediately and cover the following assault waves. The same helicopters were committed and the Lipa resupply point - 150 km away from the naval force and from Mount Igman - was used as a forward arming and re-fuelling point (FARP).

ADC DUBOIS/SIRPA TERRE

A required airmobile deep operations capability from the sea

First of all, we notice that the above-described overall operation framework occurred many times, as well in the Mediterranean as off Africa (Melten/Lebanon 1986; Baliste/Lebanon 2006; IC; Liberia, Congo...). Thus, **the various encountered situations required the same kind of operation.**

Of course, **this kind of operation is a joint operation,** with a naval air component and a land component operating in the three dimensions.

The first component provides us with the naval assault base and air space mastering, from which C2[7], intelligence, and CAS (Close Air Support) operations can be carried out.
The second one carries out operations on the ground by implementing integrated *"aérocombat"** (helicopters) and ground assets.
For each of these components, requirements come out pertaining to **interoperable assets**, to organization and to operational planning. In order to consolidate the whole of them, a common operational planning is highly necessary.

With the aircraft-carrier battle-group (aircraft-carrier, Rafale, Hawkeye) and the capabilities of new amphibious ships (**BPC** - command and amphibious assault ship), the naval air component seems to be going well to be achieved. But we still lack experience in this field to go further regarding assessments.

Building the three-dimensional land assets is in progress, but the achievement's objective and global capabilities are still unsettled.

The very land forces should hold a large span of capabilities and they should be trained to maneuver with their helicopters within the three dimensions.

Here, we focus on this *"aérocombat"* aspect and on its assets, i.e. the helicopters considered as weapon systems.

The TIGRE-NH90 team is an indivisible objective. Because of differences in speed and range, we sometimes skipped armed GAZELLE support for PUMA/COUGAR/CARACAL. But from now on, in any crisis theater, operations carried out by *HMAs* (Utility and Air assault Helicopters) and *HTLs* (Heavy Lift Helicopters) should be prepared through intelligence, supported and covered by ground-to-air fires, protected by **air-to-air fires from *HRAs* (Attack and reconnaissance helicopters)** operating at their own pace. Among these various components, the right ratio is still to be found. But operations' tempo, and the hardening of possible enemies lead us to think that we have to consider a high ratio[8]. UAVs (Unmanned Air Vehicles) will provide us with an additional tool for immediate situation information to a flying airmobile component, then to air-landed land forces, without any discontinuity. Its capability to be implemented from a naval platform is a requirement.

A necessary technical and tactical C2 capability should be added to these assets. CP helicopters with C2I (Command, Control and Information) systems in order to control the three-dimensional land operations from the ground or in flight as regards the technical aspects, an *"aérocombat"* specialized staff and command system as regards the tactical aspects which would be able to

detach a CP for the specific land phase. Improving and broadening the capabilities of the 4th airmobile brigade's HQ is both a favored and required way.

First of all, technical planning should have **an important part in operational planning regarding three-dimensional land maneuver:** night flights (in section, with night vision assets support), landing on aircraft carriers and flying over the sea, training to activate helicopter detachments from a sea platform by day and night (including all specialists: crews, mechanics, safety personnel, from flight deck to ship's crew).

Combined-arms tactical planning is an essential additional tool. It should include a technical/tactical level for units to be interoperable at the lowest level (mainly on-board combatants and crews[9]). It should also include a combined-arms tactical level to combine the various *"aérocombat"* and land combat modules in order to achieve the desired effect.

This **indivisible air-land unit** should then commit itself into joint operational planning. For the different units, developing know-how will be a basic requirement in order to take advantage of global positioning, communication support, and CAS provided by air components. Therefore, in-flight crews as forces on the ground should be able to guide CAS; if necessary, they could operate in addition to the internal fire maneuver.

As regards C2, the airmobile staff should focus on combined-arms maneuver concept and conduct of operations and on their capability to set their own maneuver into the joint environment. But, above all, **a joint operational level staff will have to be trained** to include this kind of maneuver accurately and to get familiar with three-dimensional land maneuver contingencies. Indeed, within a joint perspective, it is often considered either as a sole helicopter maneuver - wrongly considered as an "air" maneuver - or as a sole ground operation, with helicopters coming on top of it. Thus, the three-dimensional combined-arms integration developed by the French Army alongside with *"aérocombat"* would loose all its advantages.

1 "Black osprey".
2 Officer commanding the 4th Command and Utility Helicopter Battalion (4e Régiment d'hélicoptères de commandement et de manœuvre) 1993-1995.
3 Officer commanding the 3rd Combat Helicopter Battalion (3e Régiment d'hélicoptères de combat) 1993-1995 - Temporary Helicopter Battalion Task Force's Commander during Balbuzard Noir.
4 3rd RHC = Attack helicopter battalion, 4th RHCM = Command and Utility Helicopter battalion.
5 French Commander-in-Chief, Mediterranean Command.
6 Tactical Command Post.
7 Command and Control.
8 A minimum requirement to conduct an efficient protection maneuver is two TIGRE. A fleet of HMAs and HTLs is likely to maneuver in section or with single aircraft. Regarding these aircraft, each "sortie" would require an HRA section; if we add to this specific HRA missions, we should have - in a logic of right economy of forces - as many HRAs as HMAs/HTLs at least. Clearly, we cannot afford this ratio, but let us find the best balance to warrant the protection and the efficiency of our assets; and let us not sacrifice TIGRE helicopters while chanting "let us get peace dividends..."
9 Infantry, SFs (Special Forces), artillery, engineers, etc.

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In addition to ground units, **"Aérocombat"** addresses all the aircraft and delivery vehicles that transition across this dedicated air-space, especially helicopters, drones and artillery ammunitions; it is conducted in close coordination with the Air Component Command.

A recent history of our commitments and geostrategic thinking about hot spots and the future kinds of crises show the extent to which the development of this capability to conduct deep operations from maritime platforms seems to be **a vital component for the French necessary military power**. It should contribute to its security, preserve its interests and meet its obligations towards the international community [this air/amphibious assault capability is also a dual capability as it can be part of humanitarian operations (of the Béryx type...)].

But **this French approach could certainly be applied to Europe.** Today, France is the only European country that can reach this aim, with its equipment programs in progress, its tactical experience, and the concept of helicopter employment in land warfare; this aim - consisting in being able to carry out another operation of the *"Balbuzard Noir"* type - is ambitious, but it is a requirement for our own security. Thus, France would be **able to provide the build-up of modern European military capabilities with an important, even essential added-value.** It would be coherent with its proposal about providing a multinational helicopter brigade CP.

Towards a New Type of Air-Land Combat

In Afghanistan, just like in Normandy in 1944, air power plays a crucial role. The campaign that currently takes place there is indeed joint down to the lowest tactical echelons as rotary and fixed wings aircraft intervene frequently to the benefit of the land forces at the contact.
The difference with the 1944 Normandy lies in the fact that there is no frontline anymore, at the best there are zones of higher insecurity. The notion of discontinuous battle space is fully relevant there.
The terrain where the enemy operates is very much compartmented, on the one hand due to the valleys and mountains and on the other hand due to the "green areas", actual artificial oasis established thanks to irrigations canals coming from the rivers; the dwellings that are surrounded by high and long walls reminded us of the Normandy edged farmland. This explains why mutual support can be very uneasy, especially at ground level and even from the top of a vehicle.
The patrols that control the terrain are manned by platoons, seldom more due to the insufficient number of combat troops engaged in Afghanistan[1]. They are often out of range of the artillery which is logically deployed in protected areas.

Under these conditions and taking into account the distances, **only aircraft - fixed wing and armed* helicopters[2] - are capable of intervening fast enough and with enough effect and accuracy to make the force ratio that is often unfavorable at the beginning of an action incline in favor of friendly forces.** They enable friendly forces to regain initiative in order to counter attack or to withdraw, **provided that the unit which is under attack has a *JTAC*[3]**. In Afghanistan, that requirement for aircraft support is rightfully expressed several times a day by units at the contact. In June 2007, during the Valley of Chora battle, in the south of the country, fighter A/C and attack helicopters were the main assets to fight against the Taliban who were installed in a coordinated way in the valley to inflict losses to Alliance troops and to demonstrate their strong hard liners' determination. According to *COMISAF* himself, without air support, the number of friendly casualties would have been much higher. The air component focused thus on providing the land forces with close air support in that area with about 70 % of its assets engaged for 72 hours.
At the operational level, air component support is thus decisive to control an immense country, which is difficult to travel through, with a limited number of forces on the ground.

The integration process leaves no room to improvisation. Air land maneuver, whatever might be the level of engagement must have been conceived, anticipated, and thus planned, in order to avoid friendly and civilian casualties. **The deployed unit is at the very heart of this process** since it initiates it; it conceives the land maneuver and sets its objectives and tempo. **The air component,** which provides the land forces with an indisputable guarantee of security, **responds to the requirements by optimizing its zones of effort.** This is the well known *"supported - supporting"* principle.
It has to be noted that the "supported-supporting" notion is currently being reviewed by the Joint Force Command (Norfolk) to try to by-pass the air component vertical-type chain of command which is regarded as being too cumbersome; simultaneously the land component must leave more space to the aircraft by adding in its concept of operation one or even several time blocks that would be reserved for the fighters A/C which will become a maneuver element on the battlefield. We are thus being led towards an interdependency of both components' maneuvers which, at all levels, combine their efforts to defeat the enemy ...

BY BRIGADIER GENERAL PIERRE KOHN, COLONEL LIONEL JEAND'HEUR, MAJOR FABRICE ALBORNA AND MAJOR JEAN-MARC BRENOT**

*This employment of helicopters in "close air support" (CAS) is a possibility, but it ought to remain an exception. Indeed the efficiency of tactical commitment of land forces implies a tight inter mingling of ground assets and Army assets operating in the third dimension. Naturally it is only possible through a really integrated maneuver that would combine as early as its conception, the employment of all the available means either they operate on the ground or nearby the ground. The maneuver is only one and has nothing to do with "combat support to maneuver", even if the latter may appear to be a necessity, like Air Force CAS that has become again in the current operational engagements the most essential and unavoidable contribution of the Air Force weaponry. Modern land forces maneuver is an integral and integrated one, under the orders of only one tactical leader who controls at his level all the operational vectors.

JTAC, a new guarantee of an efficient fire support coordination[4]

Air ground integration requires thus a perfect synchronization between the force on the ground and all aircraft.

JTAC's job consists in simplifying the operations of all these means. To be a JTAC is an actual full time job that cannot be envisioned as a potential dual hated position. JTAC have a very high level of technique for what regards air land combat. He must have an extensive knowledge of all the assets involved in that phase of the battle: from mortar to field artillery, the ranges, and the altitudes of the ammunitions' trajectories. In addition, besides that Field Artillery Forward Observer qualification - which all US JTAC currently have - they must also master the doctrine of the land force to which they belong and can thus anticipate since they have been involved, as of the outset, into the operation planning process. And they must also have a perfect knowledge of the aircraft - fighters and attack helicopters - of their employment in bombardment, their ammunitions as well as all of their night and day sensors. They must perfectly master English language, aircraft integration procedures as well as those related to field artillery engagement.

JTAC is thus the air-land orchestra conductor[5]. Training a JTAC up to his full qualification requires 4 years of hard work that include practical exercises in the field during training and actual operational deployments. In the future, it will become thus indispensable to make that function become a military occupation specialty (MOS) by itself.

There are three terms that relate to that air - ground guiding function: JTAC, FAC and TACP. The definitions of JTAC's attributions as well as the competence requirements for the job have been described above.

CFAA

FAC[6] is a NATO and not a US denomination; FAC is an air support integration actor just like a JTAC. What makes the difference between them is that the FAC has no competence in matter of field artillery fires management. He doesn't know field artillery pieces characteristics. He cannot synchronize land fire support with aircraft fire support. He is only trained to guide the aircraft. He has full competence to guide air land strikes but **only the air component's ones**. Training a FAC up to the NATO standards requires between 3 and 6 months. A FAC has much less know how than a US trained JTAC.

A TACP[7] (NATO term) designates a built up and inseparable team. They are usually comprised of 6 to 8 troops whose competences and functions are complementary: a specialist in guiding and coordinating air component elements, a sniper, a driver, a signal specialist, and one or two pairs of soldiers specially trained for ensuring the close protection.

Another actor can be found in Afghanistan as well as in Iraq: the **"senior JTAC"**. The senior JTAC is an expert; he is firstly a qualified JTAC with a lot of experience, his mission being to coordinate other JTACs operating in his area of responsibility. He supervises these JTACs and designates for them which aircraft patrols they will be responsible for in accordance with the effects to be achieved on the enemy as they have been described in the combined arms commander's scheme of maneuver, or in accordance with the declared TIC (Troops in Contact) and the current tactical situation.

As an example, during the battle of Sangin in April 2007, the senior JTAC had 2 to 3 attack patrols under TACON; those were staged vertically within a ROZ[8] that constituted a cylinder with a radius of about 10 nautical miles. This senior JTAC was also responsible for assessing the ground situation and allocate assault patrols available to one of the JTACs engaged with the ground forces. More than 15 JTACs and 2 senior JTACs were distributed within three infantry battalions in the town of Sangin. The pilots of the aircraft embarked on the Charles de Gaulle CV which participated in that operation reported that it was difficult to get access to the ROZ due to the quantity of fixed and rotary wings aircraft engaged into that cylinder of a rather small diameter (20 NM). With such a density of aircraft operating in and around the ROZ, the radar control centers (CRC or CRP[9]) had a lot to do and they limited their action to organize the patrols entry and exit. Managing the inside of the ROZ is a responsibility that belongs to the senior JTAC working from the TOC[10], where he ensures a real time deconfliction in coordination with the battalion or brigade's FIST[11].

A JTAC working to the benefit of a unit, whatever the level of that unit, platoon, company, battalion, is responsible for ground forces security, for choosing the weaponry to be engaged, for target designation,

for assessing collateral damages, and for conducting battle damage assessments. He integrates the aircraft's attack within the airland maneuver in accordance with the contact units' movements and fires. He is thus an essential factor for the coordination and integration of the aircraft to the combat units' benefit. This is a difficult job that doesn't leave any place to amateurism, part time job or dual hating. It is not possible to be in command of a platoon at the contact while simultaneously conducting an attack by several aircraft. These glorious times when forward air controllers (Army officers) were directing our Jaguar aircraft towards pro-Libya troops in Chad appears to be over. Under-trained or under-equipped JTAC are not welcome on a modern battlefield, and even more within a coalition where interoperability means quality of service. The nation which would accept to participate in an operation by engaging its combat forces and air assets but that would not have understood how to develop an interdependency concept, and how to train CAS specialists, that nation would thus have to accept not to participate, at the highest level, in the conception and management of the engaged means. **It is thus easy to understand immediately the political weight of that reality which was observed daily in Afghanistan.**

One last form of aircraft guiding exists: the ECAS[12] that can be requested by any unit at the contact that do not have any JTAC or FAC. This is an exceptional type of procedure, a second best, which should not be confused with an actual qualification. The aircraft pilot is then the only responsible of the action, of the type of ammunitions to be used, of the direction of attack, of the collateral damages assessment, and of the fire mission itself. That procedure can only provide for an air defensive action to the benefit of ground forces at the contact, enabling them to disengage, for instance from an ambush.

JTAC constitutes today in Afghanistan the indispensable connection between ground forces and air assets. It saves lives every day by providing forces under fire with a solution that is immediate, accurate and efficient, which prevents casualties (that could have been caused by the enemy's direct or indirect fires during a difficult bypass maneuver, always complex and risky on a difficult terrain). JTAC, which inflicts casualties to the enemy and adds value to the contact force, becomes thus a high value target for enemy's snipers. It is thus understandable that a Norwegian JTAC goes to combat protected by 12 elite commando troops and reciprocally that a commando or infantry platoon never goes on a mission without its JTAC!

A new joint military job?

It is thus absolutely necessary that armed forces, whatever the service or branch, had at their disposal **enough JTAC or FAC to support their ground forces,** be they special or conventional forces or even inserted[13].

The requirement is as follows and it must **respond to three questions:**
What should be the JTACs' military qualities?
At what level should they be positioned? Where should they be trained?

JTAC must know perfectly both embarked and disembarked forms of combat, he must be able to "read the terrain" and anticipate enemy's movements. He must also be fully aware of the characteristics of the fire power he delivers to the units while being able to move at the speed of the embarked or disembarked units he supports.

It is important that any unit that would require the presence of a JTAC, could receive one: that means that a platoon, that would conduct a patrol mission out of the reach of friendly artillery or within an area where field artillery cannot be used, should be provided with a JTAC; a company size unit that would operate autonomously in a vast area or in a discontinuous battle space, should now have its own JTAC. Each GTIA[14] should have a number of JTAC that would correspond to its missions, i.e. a minimum of one per company, like in Sangin (April 2007). The senior JTAC should be posted at brigade level.

It would thus be necessary to **create and maintain a JTAC reservoir**, which would each have his privileged connections with identified units (e.g., the armored GTIA 2e BB, or the infantry GTIA 9e BLBMa), but which would be trained in a centralized way, for economy purposes.
In France, the joint and interallied training center for air support ("CFAA"), where FACs are trained and qualified, is located in Nancy. NATO, in the light of the lessons learned in Iraq and Afghanistan, studies the possibility to create a NATO center of excellence for training JTAC. Nowadays, almost all nations have their own training school for FAC; however there is not yet any interallied standard developed. A US school in Spangdalhem (Germany), center of excellence for joint fires, trains European JTAC to US standards.

It seems today that our forces are not yet capable of training a sufficient number of FAC and even less JTAC, since that training is long and expensive, and it requires periodic updates and follow-on training periods which make it hard for the units. In addition, when the trained person reaches a certain level of rank, his skills cannot be exploited anymore.

Under these conditions, it would be appropriate to **develop a new line of training (a function/branch of the joint maneuver)** since the requirement covers all ranks and responsibilities. It would probably be necessary to regroup all these air support

SIRPA Air/Anthont JEULAND

professionals within a joint unit, like the "GIACM[15]", that would regroup all JTAC and their protection detachments.

The initial training school already exists, it is the CFAA. It would thus be necessary to develop the curriculum of a career for these new major actors of the battlefield which would be regrouped in a unit that would be located in a specific garrison and provided with a budget adapted to its professional vocation.

** BG Kohn - Army - chief J5 ISAF - January- July 2007, Jeand'heur - Army - J5 ISAF - January- July 2007, Maj Alborna - Air Force - CJOC ISAF - April - July 2007, Maj Brenot - Army - Air Group embarked on the Charles de Gaulle CV April- May 2007.

1 Currently ISAF is 4 combat battalions short; Afghanistan's size is equivalent to 1.5 France's.

2 That employment of helicopters in a close air support role is a possibility, but it is and must remain an exception. Land forces tactical engagement's efficiency requires a close interconnection between ground assets and those assets of the land component that operate in the third dimension. This is only possible if the maneuver is fully integrated and combines as of the planning phase all of the assets available that operate on the ground or in its immediate vicinity. This constitutes a single maneuver that cannot be compared with the notion of a "support to the maneuver", even if this one may become indispensable, just like close air support, that became, once again, in the current types of engagement, the most indispensable support that air forces was able to bring. The maneuver of modern land forces, is an integral and integrated type of maneuver under the command and control of a single commander who, at his level, controls all of the operational vectors (NDLR).

3 JTAC: joint terminal air controller.

4 Intermediate headlines have been added by the editorial staff.

5 Recently a JTAC was using mortars to hit the southern wall of a group of houses where the enemy was hidden while he was guiding aircraft bomb attacks against the northern wall.

6 FAC: Forward Air Controller.

7 TACP: Tactical Air Control Party.

8 ROZ: Restricted Operation Zone.

9 Co-ordination Reporting Center - Co-ordination Reporting Point.

10 Tactical Operations Center.

11 Fire Integrated Support Team.

12 Emergency close air support - Reference: CAOC AUAB Operation Enduring Freedom Baseline Special Instructions (SPINS) Version 6.4 Dated 24 Apr 06 - ISAF Standard Operating Procedure 311 Dated 29 June 06.

13 For instance for OMLT - Operational Mentor and Liaison Teams.

14 Combined Arms (battalion) Task Force.

15 Groupement interarmées des actions civilo-militaires (Joint CIMIC Group).

The requirement for JTAC is obvious in the framework of the operations that are conducted today and probably in the future within "discontinuous types of battle spaces". The presence of a JTAC within the units should thus become the standard since it guarantees the provision of a support that is rapid, accurate and efficient to a unit that would be under the fire of an enemy often more numerous and operating on a terrain that is favorable to its actions.

Airland operations, as they are currently conducted and observed in Afghanistan deliver a message that is strong and undeniable: renouncing to establish a favorable force ratio because of an inability to plan, inability to command and control, and inability to guide air fire power is simply unacceptable. Obviously, any opportunity aiming at reducing friendly casualties on remote theaters of operations, in front of enemies that are often more numerous, should be exploited.

Finally, the increased engagement of our OMLT in the Afghan conflict, as it was announced by the President of the French Republic, bestows a very special relevance to **the need to adapt our airland combat doctrine to today and tomorrow battlefields.**

The Problematics of Third Dimension as Seen by Intelligence

A study of recent conflicts demonstrates a necessity for providing committed forces with efficient support in the field of information superiority, including during offensive actions. Outstripping the opponent in all his initiatives presupposes permanent surveillance of the theater of operations. One should be enabled to forward collected information in time to authorities responsible for the conduct of operations. That information will then be collated with other intelligence sources through a reliable and responsive information system, enabling the combined arms commander to grasp the situation.

Beyond combat assets, the core issues in crisis resolution are information and the time factor. Technological progress in the field of aeronautical robotics and data communications today enables the employment of UAV systems which, thanks to their capabilities, contribute and will contribute to increased operational efficiency.
Today, the intelligence function cannot rely only on platforms and sensors moving within land space, and the third dimension problematics should not paralyze employment of UAVs.

Aerial picture shooting from airborne platforms, and more particularly from UAV systems, is crucial for providing imagery information, or even target acquisition information. But integration of these assets within third dimension will bear a number of consequences on the intelligence function.

BY LIEUTENANT COLONEL PATRICK LEGIOT, FRENCH ARMY INTELLIGENCE TRAINING AND RESEARCH CENTER

CCH Jean-Jacques CHATARD / SIRPA Terre

Means for third dimension integration without major constraints

An inventory of imagery assets dedicated to land forces will reveal that satellites rank first among those which can support a force. This imagery support is effective as early as the conditioning phase for force projection, and is again used on theater through the forwarding of satellite imagery down to tactical level. The fact that there are no limitations of employment or judicial constraints in space invests it with a **non intrusive nature, without any risk for the political authorities.**

Moreover, platform neutralization hazards are almost non-existent considering the capabilities of our most likely opponents.

Our main assets for images shooting are lower down and find employment in the atmosphere. In the first place, we shall focus on **manned platforms**[1]. Here man is directly involved in the piloting loop and performs flights while abiding by the rules enacted by the military air traffic organization. Aircraft are certified and navigability certificates conform to ICAO[2] rules. Man is responsible for the SEE AND AVOID rule, which applies to all vehicles moving in third dimension. Therefore, today on all theaters of operations, digital views taken from manned aircraft (GLOBAL SCAN, VIVIANE, on board cameras) play a decisive part in providing imagery information.

If we take the continuum of operations into account, views taken from manned aircraft are obviously favored during stabilization or normalization phases, when integration within third dimension is facilitated by the presence of a pilot, but also in the notion of **crews taking calculated risks.**

Issues linked to employment of UAV systems

Unlike manned vehicles, UAV systems do not entirely conform to certification and navigability criteria as defined by ICAO. UAVs may cause damages to property and persons. They are regarded as having no anti-collision system, in other words unable to SEE AND AVOID other aircraft.

Consequently restrictions on employment are enforced by state agencies and compel users and employers to conform to strict regulations, most of which to be found in reference texts of DIRCAM[3] and COMALAT[4]; these documents have been used as a legal basis for UAV flights since 2004.

Two possibilities should be considered.
In Metropolitan France: restrictions on employment originating from navigability certificates and the various reference texts *(IP[5] 2250 and IP flight security)* do not enable to optimize the capabilities of UAV systems. Flight constraints actually result in **restrictions on flights over urbanized areas and in tailored air zones to ensure safety of other users.**

For domestic missions and within the framework of standing security posture, UAVs are employed mainly for ground surveillance on behalf of a sensitive compartmented protection area ("protection bubble") on national occasions (G8, D-DAY, official visits). Restrictions on employment hinder intelligence collection direction. Then the point is **to think more according to flight constraints, not according to the clues to be discovered.**

During training, implementation of UAVs is performed over almost deserted areas, which restricts training efficiency, particularly during investigation missions over urbanized areas.

Concerning overseas operations, it is relevant to distinguish between intervention, stabilization and normalization phases. **Integration into third dimension** will have to provide the combined arms commander with the freedom of action necessary for conducting his maneuver. Constraints of airspace planning 72 or 48 hours before action are necessary but may appear as a hindrance on responsiveness. Even if there are emergency procedures which enable the launching of UAVs, G2 of the Force conducts the information collection maneuver thanks to a synergy of assets which cannot be obtained without some flexibility of employment of the airspace dedicated to players in the third dimension.

As an example, employment of the HORIZON or RASIT systems alone does not enable to identify a moving target. It will then be necessary to direct an imagery investigation asset to define the nature of the target. It is not always possible to plan this measure 48 hours beforehand. It requires some flexibility in employment, which will ensure the desired efficiency.
In the long run, the MARTHA system should provide the efficiency and responsiveness expected by optimized management of third

ECPAD

dimension users. The Air Force should dedicate airspace areas under control of the MARTHA system which will be enabled to visualize, and even to identify all vehicles within the air-land battle area, and to provide direct control over players.

Concerning stabilization and normalization phases, the issues are different. UAVs may operate within the overall air traffic of a sovereign country where ensuring the **security of civilian airspace users** (NGOs, airports, passengers' transportation...) is necessary.

A case in point is Chad, where *D-CAOC* provides air traffic control of French military aircraft but does not know the civilian flight plans such as those of NGOs. This situation considerably hampers the deployment of a system like the CL 289 which today is not enabled to provide the responsiveness required by control agencies to guarantee the safety of airspace users.

1 "Manned"("habité"): refers to an aircraft whose pilot has direct control of aircraft. He sits in the cockpit, where he is capable of implementing the basic rule SEE AND AVOID
2 ICAO: International Civil Aviation Organization
3 DIRCAM : Direction de la circulation aérienne militaire = Military air traffic control direction.
4 ALAT: French Army Aviation.
5 Provisional directive.

As a conclusion, even if we have been provided since 2004 with a regulatory basis for performing UAV flights, the limitations enforced by state agencies are very restrictive on an optimized use on behalf of the intelligence function. The fielding of mini UAVs, down to combined arms task force level, is likely to bring about a different problematics: **combatants whose main job is not merely operating mini** UAVs **will have to acquire aeronautics proficiency, but they will also be required to maintain the responsiveness necessary for operational employment, while ensuring security of flights within an ever more coveted airspace.**

3D Co-ordination at Lower Tactical Echelons

Current Army commitments are characterized by **combined-arms (even joint) integration, down to the lowest tactical echelons.** Though most often managed at BIA (combined-arms brigade) or division levels, we could also consider that some augmentation forces operating within the third dimension (3D) would be likely to be attached - in some specific cases - to a GTIA (Battalion Task-Force) operating on its own within a specific framework.

Thus, a battalion commander, the combined-arms commander of his battalion task-force, is likely to have to **organize a three-dimensional volume and coordinate the operations carried out by various actors in this area.**

In this article, we deal with the assets that are likely to be attached to the lowest tactical echelons, the coordination assets that could be implemented at battalion task force's level and a simple deconfliction method is provided.

BY MAJOR CHRISTIAN VLADICH, CENTAC[1]

3D co-ordination at battalion task force's level[2]

An either infantry-heavy or armor-heavy **battalion task force** already has attachments, usually a FA (Field Artillery) liaison team and an engineer platoon with its own liaison team.

Artillery - either FA or mortars - is already operating in the vertical dimension, by virtue of shell trajectories.

To these so-called "customary" attachments, Army Aviation, and ADA (air defense artillery) assets, as well as CAS (Close Air Support) could be added, without forgetting intelligence operations and its UAVs (Unmanned Air Vehicles).

A typical *ALAT*[3] attachment could be organized around a fire support module composed of a 2/3-helicopter section, mixing guns (Attack or Utility Helicopter fitted with guns) and missiles (HOT-carrying attack helicopter), reinforced with a *HM*/IMEX[4] (Utility helicopter/Immediate extraction). This module will be tailored according to the target and the desired end state.

A *SACTCP*[5] (VSHORAD) ground-to-air platoon could be linked to it, including its NC1-30 or 40 detection radar, and 4/6 *MISTRAL* missiles, either mounted on T20/13 VAB wheeled armoured vehicles, or on *PAMELA*[6] platforms.
As for CAS (Close Air Support), it could be carried out by fighter patrols fitted with specific weapon systems[7].
Eventually, short range reconnaissance drones of the DRAC type - that are not yet fielded within battalion task forces - would operate among the various 3D users that we have just dealt with.

Setting up such assets to the benefit of battalion task forces (an even for one of them only) would necessarily require a liaison team (ADA, ALAT, Intelligence) and/or a FAC[8], on the one hand as technical assistants to a combined-arms commander, but also as experts, whose task will also and especially consist in managing the use of their assets within a common space.

Who says setting up assets flying in the air, also says setting up a specific volume[9]. The *"High Density Airspace Control Zone" (HIDACZ)* seems to be the best fitted one, as shown by its description in the POPDSA[10] manual:
"HIDACZ is a part of airspace located above a specific area, in which a large number of weapons is being used, and where 3D actors are operating simultaneously. It is being used to synchronize airland operations carried out in support of land operations.
Within an HIDACZ, the land force commander is usually responsible for controlling airspace. Aircraft cannot fly into HIDCACZ without any previous authorization from the authority responsible for the coordination of these parts of airspace. Similarly, aircraft that do not have to carry out missions within an HIDACZ should avoid it..."

Such a part of airspace would provide a "reinforced" battalion task force with any freedom of action to control its assets, should it be handed to it.

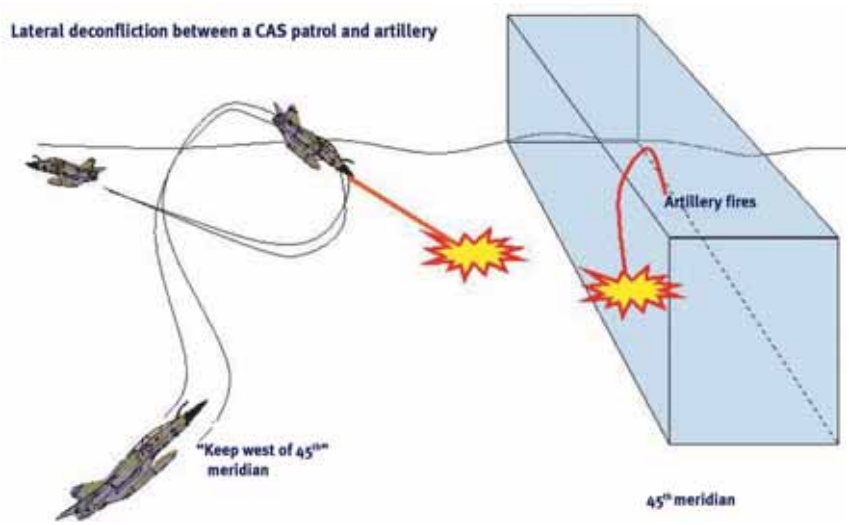
A *3D*/support cell at a battalion task force CP

Coordinating the above-mentioned assets and deconfliction within an HIDACZ provided to a battalion task force requires - as mentioned - **setting up specialized liaison teams at the TF operation center.** However, **two overall modes** could be defined: with or without any radar detection in the considered part of airspace.

Even if we have to set up a radar directly toward a battalion task force or to receive the images of an asset set up in the theater on mere monitors, even on a laptop computer, there are **detection assets** for this purpose. Their added-value consists in providing an awareness of the location of friendly or enemy aircraft in this part of airspace. On the other hand, spotting helicopters at very low altitudes will remain hazardous and spotting light drones will be impossible.
From the lightest one to the heaviest one, there are among others:

- **The "*NC1*-30 or *NC1*-40"**, VSHORAD *MISTRAL* platoon assets to spot and coordinate, with or without their weapons. Comprised of two heavy trucks, it can have - if necessary - specific assets enabling to retransmit radar data directly to a battalion task force CP through a *PR4G* radio set. Its detection capabilities are poor, about a 20 km-range with a 3,000 meter-altitude. Within a near future, it will be able to retrieve radar tracks coming from higher echelon assets with Link 16.
- **The "HAWK[11] detection module"**. This module enables to spot any in-flight aircraft up to 80 kms at low altitude (3,000 meters) and 110 kms at medium altitude (18,000 meters). A radar data retransmission nicknamed RTU (Remote Terminal Unit) could be set up through *PR4G* within the operation center of a battalion task force. The HAWK detection module could be directly set into a control center thanks to its Link 11B.
- **"CNHM (MARTHA Higher Level Center)"**. This piece of equipment is currently being tested and it has no specific detection device. Should it be deployed, it cannot operate on its own and thus, it should be linked - through data links (L11B or L16) - to an independent Army radar of the *NC1*-30 or 40 type, medium-range/ground-to-air, tactical control module, or an Air Force AWACS, an anti-aircraft frigate, a *BPC*[12] (command and amphibious assault ship), a *FREMM*[13] (multimission frigate) or the aircraft-carrier Charles de Gaulle from the French Navy. CNHM's version 2 should enable to directly link an Air Force radar by taking the CETAC[14] (Air Force tactical cell) capability into account.

However, it is necessary to mention that these assets (*NC1*, HAWK, *CNHM*) are originally ADA fire control systems and that crews are not allowed to execute air control.



Specific Air Force consoles - of the *STRADIVARIUS* or *CHAMELEON* types - should be added to these assets; they also enable to receive the air situation through data links, or its *GIRAFFE* radar that couples coordination cell and detection radar. Despite their own specific capabilities, these assets would considerably make a battalion task force heavier for it to have only a fragmentary display of its airspace. Moreover, video "decoding" requires specialists as scopes are not topographic maps understood by everyone. And above all, **setting up such assets and the required links** to coordi-nate two CAS patrols, a few helicopters and possibly a light drone seems to be disproportionate. Eventually, this display **seems to be useless** for operating liaison detachments.
Indeed, because of their specific training, **the liaison teams and a FAC operating at the battalion task force CP** are able to monitor mobiles flying inside its assigned 3D volume, and this, **without any radar detection**. In other words, it means that we have **to set up some divisional 3D/support cell within a battalion task forces' CP,** at a smaller scale. These elements, manned by liaison teams (FA, *ALAT*, ADA, Air Force), were able to manage division HIDACZs when they had one, and to deconflict - on the radio - all elements involving the third dimension implemented in these parts of airspace.

Located at the same place, in direct liaison with their own assets and aware both of the maneuver and of the battalion task force's requirements, liaison teams are the simplest and the most efficient structure able to coordinate and deconflict within the airspace and among *3D* assets provided to a battalion task force. Whatever it is, on a map or thanks to battlespace digitization, even to both, they are aware of their assets' locations, capabilities, features and limitations in quasi real time. They are able to make them interact in complete safety[15-16].

Co-ordination methods at battalion task force's level

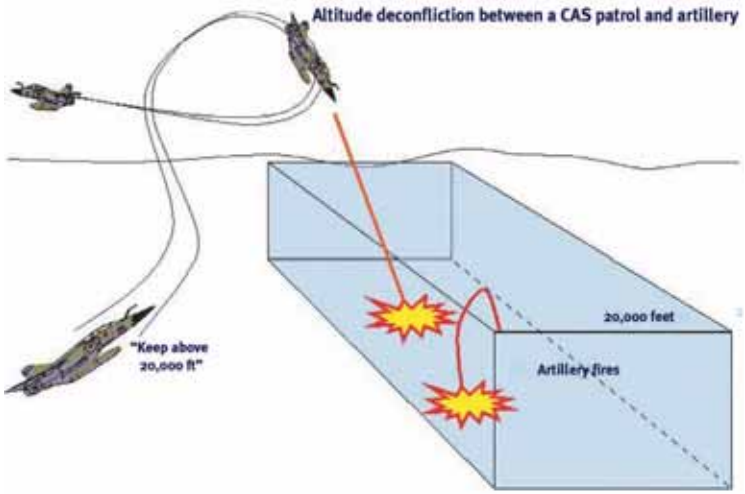
Co-ordination and deconfliction **methods** that are likely to be used by liaison teams within battalion task forces **are simple and they have proved to be** efficient: indeed, they are described in ATP 3.3.2.1 (A). They also rely on the basic principle pertaining to *3D* co-ordination: "everyone at the same location but not simultaneously or everyone simultaneously but not at the same location".

These methods are nicknamed "informal ACAs[17]". They could be set up at liaison detachment level, under the responsibility of the combined-arms commander, within the allotted airspace and for a limited span of time in order to control and to immediately deconflict the actions of several assets implemented within this very airspace. Thus, they enable to meet coordination requirements from a battalion task force in its area. **There are fours kinds of basic informal ACAs:**

- **Lateral deconfliction:** according to this term, we have to set up horizontal layers within the HIDACZ. Set up areas are given to the various actors operating in the third dimension. The areas correspond to UTM grids or geographical grids, or to specific terrain features (a large river, a major road...) visible to all actors. An aircraft pilot at an altitude of 10,000 meters does not see a terrain the same way as a helicopter pilot does, 15 meters above the ground. This kind of deconfliction enables to simultaneously carry out several missions or to deal with different targets.

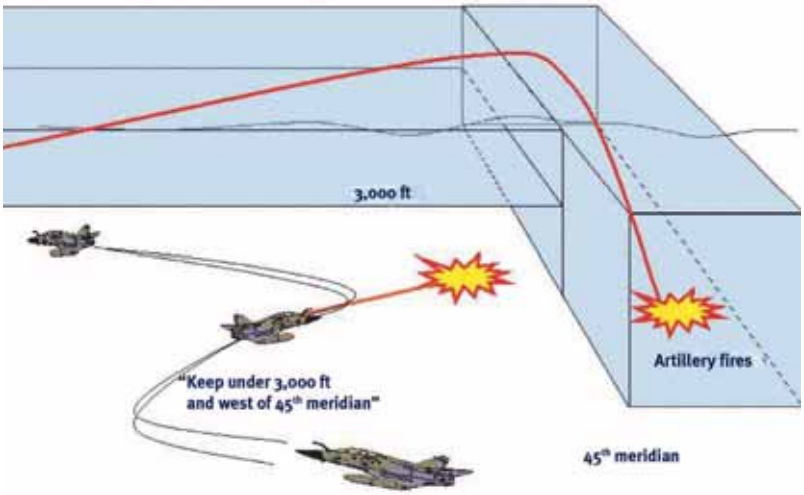
- **Altitude deconfliction:** now, we have to set up vertical layers within the battalion task force's airspace. Thus aircraft can fly one over the other, or fly under or over artillery shells' trajectories. This method enables to engage the same target with additional means or to carry out several missions within the same area and during the same time span.

- **Lateral and altitude deconfliction:** combining both previous deconfliction methods; this simultaneous parting enables to coordinate operations carried out by the various actors operating in the third dimension at different tactical depths.



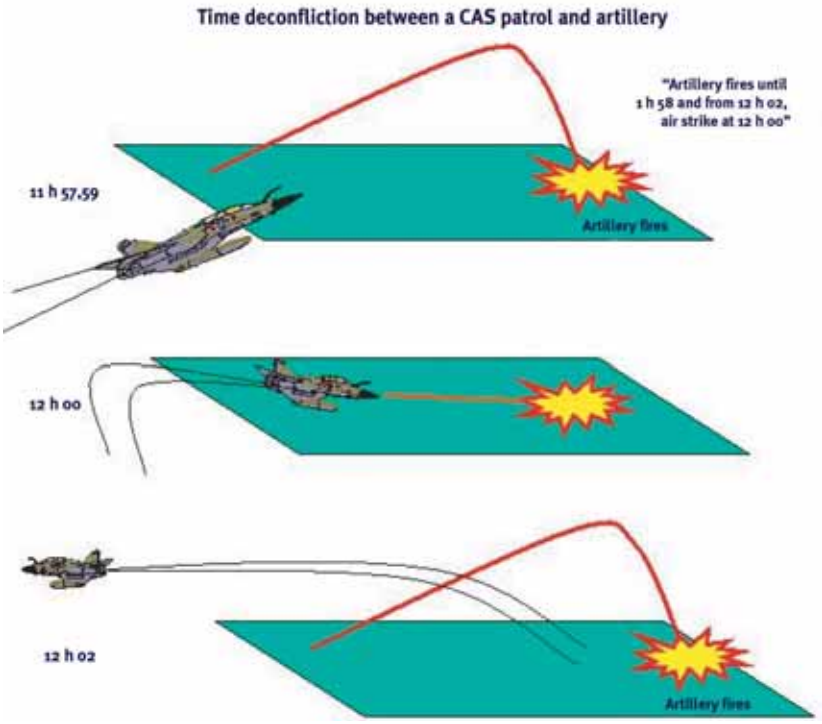
- **Time deconfliction:** setting up time parting among the various actors operating in the third dimension and concerned by this operation. This method enables to engage the same target or several targets made close from one another with additional assets, or when a threat close to the target or on the target (for example enemy ADA) should be neutralized before engaging this very target.

"Keep under 3,000 ft and west of 45th meridian"



ADA and its missiles that could be a threat for other elements operating in the third dimension, is included into this deconfliction process by its liaison team. Associating firing and simple and accurate ROEs (Rules of Engagement) directives with pre-warning and implementation messages to 3D actors - without forgetting IFF (Identification Friend or Foe) - is the most efficient way to avoid any fratricide fires within the HIDACZ allotted to a battalion task force.

Thus, **using all these four methods enables the various flying assets to move safely within the same part of airspace, while being separated**. But it requires liaison teams to be perfectly co-ordinated between one another, common data processing, and the appointment of a cell commander with a good awareness of 3D coordination and of all elements operating in the third dimension.



1 French Force on Force Training Center.
2 Intermediate headlines were added by the editorial staff.
3 ALAT : (French) Army ("light") Aviation.
4 Immediate extraction.
5 VSHORAD = Very Short Range, Air Defense.
6 SATCP platoons can operate either within the PROTERRE concept (Translator's note: multipurpose capability for French soldiers to be committed in home territory land protection) configuration and thus, they can easily take part in a battalion task force maneuver; this is what they usually do at CENTAC (force-on-force training center) and when being committed.
5 (Translator's note: PAMELA = light air transportable MISTRAL platform).
7 Air assets could also carry out reconnaissance, deterrence, and convoy escort missions to the benefit of battalion task forces.
8 Forward Air Controllers. These people are experts specially trained to guide aircraft carrying out CAS missions.
9 It could not be automatic: it will depend on the number of actors and on the use of this specific space.
10 POPDSA: French ADA Standing Operating Procedures. They come from several NATO documents, among which SUPLAN 24610 M "Copper Canyon".
11 If necessary, firing assets could be added to it.
12 Command and Amphibious assault ship.
13 Multi-mission frigate.
14 French Air Force tactical cell.
15 This method is efficiently used in the force-on-force training center in order to secure helicopters during artillery fires simulated by smoke-shell fires. Before firing, its location is forwarded to the ALAT liaison team in the battalion task force's CP by the FA cell thanks to a standardized map and firing only occurs when - on the ground or out of the area - helicopters reports have been forwarded to the FA cell. We do the same when fires are being completed so that they have freedom of action again.
16 As for FACs, because of their specific training, they are able to conduct deconflictions pertaining to the various actors operating in the third dimension, in their areas. They are able to set up combined operations on the same objective, including both airplanes, helicopters operating according to NATO rules, and FA.
17 Airspace Co-ordination Area.
18 On the average, FACs should carry out 8 guiding operations in medium altitude and 12 in low altitude per year, within 6 months time spans at most, in order to retain their qualifications (NATO standard).

Obviously, it would be an exception if a battalion task force was isolated enough and had to simultaneously carry out a specific action requiring setting up specific combat supports operating in the airspace. Nevertheless, it is **absolutely necessary to train the various actors to this occurrence** so that - if necessary - everyone at best is trained for it or at worst knows each other.

As we have just seen, there are deconfliction methods. We only have to be "tailorable", to adapt them to the specific level and to allotted means, while being simple. *"Keep it simple"*, our airmen friends say. And it is true that **the simplicity of an organization or action could be one of the keys to its success.**

Therefore, it is necessary to master them by f**ocusing on training**. Setting up a real 3D coordination military occupation speciality, **professionalizing all 3D functions,** setting up common (NATO) procedures for all the various actors operating in the third dimension, could be paths to be further explored. For example, the *FAC* job is a specific function among our Belgian, Dutch or American friends, whereas it is the 2nd or 3rd hat for a French First Lieutenant. Hence, problems for our personnel to be trained, to get or to maintain the required knowledge, or just to retain their qualification[18].

DRAC (Short range Investigation UAV) will be delivered to the land forces in the fall of 2007. Tactical experimentation will take place from September 2007 to September 2008 and should result in the drafting of a doctrine of employment and in the distribution of the systems inside the brigades.

All the operational functions are part in the study of the potential employment of that UAV and participate in the tactical experimentation under CDEF's leadership.
21 DRAC UAVs will be distributed inside the forces (Mainly to the 7th Armored brigade) for the purpose of that experimentation.

Simultaneously, the brigade intelligence unit ("URB") tactical experimentation, that will be conducted from September 2007 to September 2008 by the 2nd armored brigade, will operate 4 DRAC UAVs within the IMINT section of that newly created unit.

A total of 25 DRACs will thus be used during these two tactical experimentations.
135 additional systems will then be delivered, in three successive packages, after the operational fielding has been decided.

Integrating
Tactical DRAC UAVs

The use of UAVs is increasingly common nowadays amongst the armed forces with high technological capabilities. Tomorrow, the French infantryman might be using a mini UAV in urbanized areas operations to observe safely a crossroad or the entrance of building before taking control of it.
The DRAC's arrival actually meets a requirement and it should enable combined arms commanders to improve their freedom of action.

That new tool should be delivered at GTIA's[1] level, to provide its commander with the ability to take the advantage by anticipating the opponent's maneuver. As a matter of fact, it will facilitate the acquisition of information which cannot be delivered by higher headquarters' intelligence division, about elements that cannot be detected by its leading units.

After a presentation of that tactical UAV, this article will describe how it is expected to integrate it within the land forces maneuver, before explaining its integration within the flights coordination and security chains of responsibility.

By Lieutenant Colonel Frédéric GOUT - CDEF/DEO

A new system for the land forces

The Army staff mandate

"The DRAC mini UAV is an aerial means of reconnaissance intended to collect image information transmitted in real time by day or night, to the benefit of a GTIA or of one of its leading elements... It is a stand-off observation asset that should allow them to maneuver or to collect information within a combined arms brigade or a land component's AOR while reducing the level of their direct engagement in the vicinity of the risk area."[2]

The Army staff's mandate for the tactical experimentation defines precisely its general framework. **Two main points** can be highlighted:

- The first one relates to the **system's own capabilities. T**he words "stand-off observation tool" express the fact that *DRAC* is not an Intel tool. The real time observed image, even if it is not recorded, is not intended to be analyzed by specialized image interpreters before including it into an Intel type synthetic document. The NCO responsible for monitoring the images transmission will be in charge of reporting elements of information by radio just like any other combatant present on the site would have done it. It remains however possible to extract certain images which can then be forwarded thanks, for instance, to a USB jump-drive.

- And the second one relates to the **UAV's level of implementation**. The mandate defines it precisely: *GTIA* is the *DRAC's* privileged framework of employment, and the study should however be conducted down to the SGTIA[3] level. *GTIA's* **commanding officer (CO)** would thus be able to provide a SGTIA with a tactical UAV for a specific mission and for a limited period of time, under his own responsibility.

That framework being well defined, the tactical experiments' conclusions should be used to confirm or amend these initial orientations.

The system's technical characteristics

DRAC is 1.4 meters long with a wingspan of 3.4 m and a weight of slightly more than 8 kg. It is rather discreet when it flies. Its electrical engines reinforce that trait and provide it with an **autonomy of one hour and a half with a maximum range of 10 km**. Its speed can be set between 60 and 90 Km per hour and its altitude optimized between 80 and 300 m above ground level (AGL). Above 300 meters, it becomes easily detectable.

DRAC carries either a **day-payload** enabling it to detect a vehicle at a distance of 1500 m and a man at 700 m, **or an infrared-payload**, that can be used by night or day enabling it to detect a vehicle at 400 m and a man at 250 m. The type of payload is selected by the user according to the desired effect and to the local weather conditions. **No weaponry** can be attached to that UAV.

EADS

One of the system's specificities is that it is fielded with one ground station and two flying elements, which allows to easily cope with failures or partial damages.
Weather influences directly the *DRAC's* implementation: a ceiling lower than 80m AGL, strong winds (over 15 m/s at ground level) or heavy rains constitute parameters that preclude its employment.

Programming the flight is a task that is rapidly achieved. 15 minutes are required to assemble the UAV, to program flight parameters and launch it. Navigation is conducted from point to point with a programmed return point in case of a GPS failure.

DRAC's capabilities as well as its rapid set up allow an **on request type of employment that can be often repeated.**

The implementation team

GTIA's DRAC platoon is today comprised of reduced size teams. A system will be served by two operators who could very well be dual-hatted. That point should be confirmed during the tactical experimentation, several of the operational branches being willing to develop a new UAV-adapted MOS. In any case, these users (an NCO and an enlisted) will be initially trained on the system and should attend periodical follow-on training for being allowed to use it. They'll be rather autonomous as far as technical implementation is concerned and will work directly with the *GTIA* operations cell to define precisely the mission. Radio reporting will not require *DRAC's* ground station to be collocated with *GTIA's* HQ.

The flight security officer is not directly part of the *DRAC* operating team. He will however have a role to play as the CO's advisor for what regards flight security and thus UAVs' employment. To that regard, he will be permanently connected with the users to advise them and monitor their training and practice.

Integration within the land maneuver

Employment within a *GTIA*

***GTIA's* CO** will make use of the *DRAC* mainly to collect, in his area of interest, information that he cannot be provided with by higher echelon of command. More particularly, "GTIA" will intend to get more details about:
- enemy's lay out at the contact and in the depth,
- terrain and routes,
- suburban areas and specific points,
- paramilitary forces, militias and population,
- damage assessment.

Its use will be **perfectly adapted to extended or inaccessible zones of action.** It will provide the *GTIA's* CO with freedom of action and thus facilitates his anticipation of future maneuver. *DRAC's* employment will always be linked to the actions conducted by the *GTIAs* or SGTIAs' reconnaissance, combat or combat support units. It will allow an economy of human resources for specific actions. There are, of course differences between infantry heavy or armored heavy *GTIAs*, but they are minor and before all linked to the weapons systems which are being implemented.

For specific utilizations

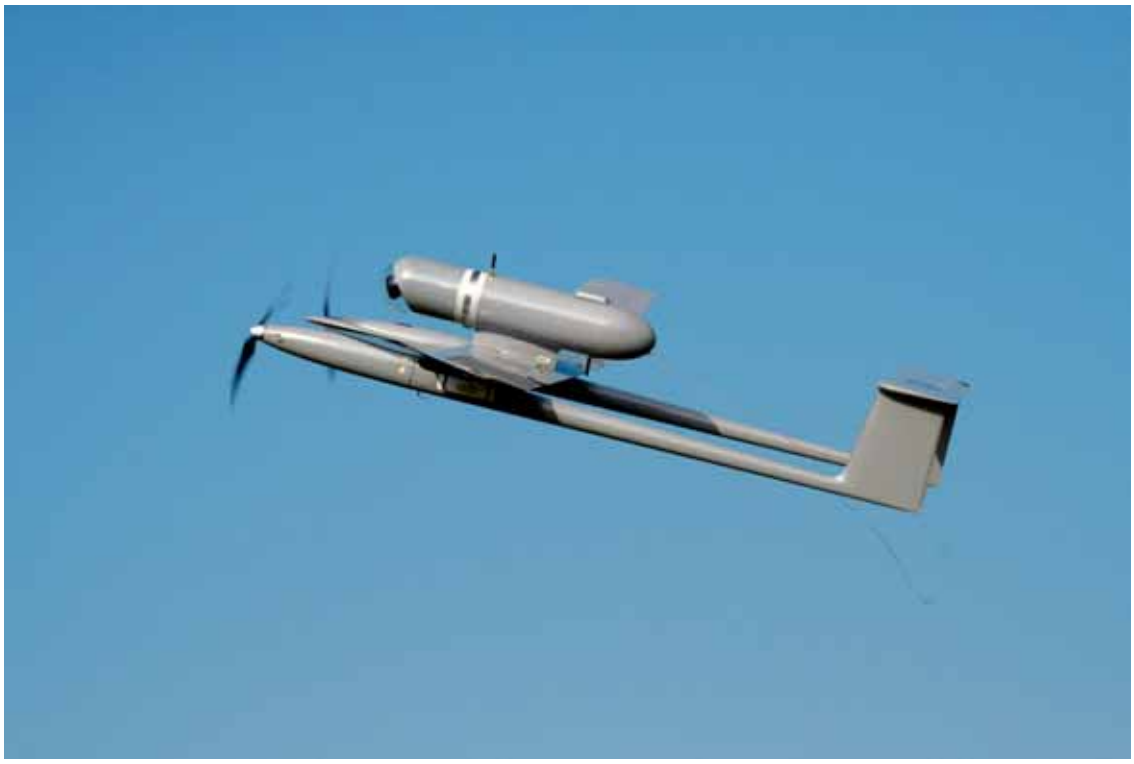
All operational functions[4] have expressed an interest in the capabilities that DRAC presents.

The "Indirect combat" operational function would like to include the *DRAC* within the liaison and observation detachments as well as within the deep operations liaison and observation detachments, and also possibly attach *DRAC* to the field artillery target acquisition radars. It would thus be used as an acquisition asset, usually as a complement of another sensor. Associated to the ATLAS[5] system, it could be used as an acquisition tool for target processing.

The "Land space management" function would use *DRAC's* capabilities within the framework of collecting environment intelligence. Its framework of employment could be the liaison and reconnaissance platoon (SLR). *DRAC* could thus be used as part of most of the engineers' missions.

The "Intelligence" operational function, would envisage a decentralized type of employment at the squad/patrol level for either collecting information to their own benefit, or within the framework of the intelligence cycle, especially in the depth of the opponent's disposition.

The "logistics" operational function could use the *DRAC* in support of the road traffic control as well as for the transportation and resupply units. Within the framework of road traffic control units,



EADS

the UAV could provide information on specific key points, it could also monitor routes and even participate to escort missions. In some cases, it could allow the rapid implementation of a by-pass route or a change of itinerary. Within the framework of the transportation and resupply units, it would mainly be used to ensure the logistical deployments' security and reconnoiter future alternate deployments.

***DRAC* can thus be adapted to the various operational functions.** It never fulfills, by itself only, an operational mission, it is however capable, in many cases, to bring a significant assistance to its achievement.

The IMINT platoon of the brigade's intelligence unit

DRAC will be used within the framework of the IMINT platoon of the brigade's future intelligence unit ("URB").
The "URB", attached within the combined arms brigades will be in charge of multi-sensors intelligence collection. The IMINT platoon (1 officer, 6 NCOs and 10 enlisted) will use at their best *DRAC's* technical capabilities to analyze and exploit received imagery. The tactical experimentation's conclusions will be useful to discuss the potential adaptation of that UAV to make it become an intelligence sensor.

Integration within A2C2 co-ordination and flights safety

Tactical co-ordination in peace time

DRAC flights will be performed in accordance with the military air traffic regulations. Several possibilities exist to make these UAVs fly.
The first is to make them fly within areas that are referred to as areas reserved for flying model aircraft. These areas that can be established rather easily, should allow user training and practice without too many of the constraints linked to control and coordination measures. Another potential solution would be to establish temporary restricted areas. These areas that would be requested by the Military Regions' Army Aviation/A2C2 cells, would allow the *DRACs*' implementation within the framework of planned exercises without endangering the other users of the airspace.
One last solution would consist in having the *DRAC* to fly within an airspace with controlled military air traffic. Agreements would

thus have to be established between the control organism and *DRAC* users in order to guarantee the security of the other airspace users as well as the one of the people on the ground and of their belongings.

Tactical co-ordination in operations

The tactical UAVs fielding changes the land forces combat dimension. The combined arms commander will make use of the third dimension to anticipate his future maneuver in his AOR but beyond direct line of sight.
He will thus need **real time coordination** in order to implement these new systems, while allowing rotary and fixed wings aircraft's flights, field artillery fires, and other UAVs flights. A simple planning process and an activation of these areas during the execution phase respond thus perfectly to all users' expectations. This coordination will be always achieved under higher echelon's responsibility. It will be planned for the units' potential zones of intervention and will be activated during the execution phase. The GTIA will thus be able instantaneously to require the activation of an area which, most of the time, will be available for *DRAC's' la*unching and flight.
In the near future, the arrival of the C*NHM*[6] will increase *DRAC* employment's flexibility during the execution phase.

Flight security

That area appears usually to be reserved to rotary and fixed wings aircraft. When the Army fielded ultra light aircraft within the framework of the traffic control and transportation branch, flight security then applied to these new users. UAVs' arrival within the air-land "bubble" and more particularly within most of the land forces units will thus **have consequences on the application of flight security regulations.** They are developed in the Army's provisional guidance about UAVs' flights security and execution within the land forces. They will also be described in the *DRAC's* employment manual that will also include a part dedicated to that issue.

The *GTIA*'s commanding officer will be responsible for flight security; he'll be assisted by a flight security officer. This officer who will probably belong to the operations cell will attend an one-week training at the Army Aviation branch command center. He will acquire sufficient knowledge to resolve an incident or even an accident and, above all, to advise the commanding officer, his major subordinates and *DRAC* users about flight security.
A flight order will be used to precisely define the mission's details. *DRAC's* implementation will not be made more complicated by the application of these flight security regulations. On the opposite, the permanent taking into account of flight safety should allow a more flexible and sensible employment of the tactical UAV.

1 Combined Arms Battalion Task Force.
2 Excerpt of lettre n°705/DEF/EMAT/BPO/EO/14 dated 09 May 2005.
3 Company team.
4 With the exception of the airmobile function.
5 ATLAS: automatization of field artillery fire missions and radio communications.
6 CNHM: MARTHA Higher level center.

DRAC is the first UAV used by all of the land forces. Its fielding will have a direct impact on units' maneuver down to the lowest levels. It allows elementary tactical level to make the best of the third dimension within its zone of action.

It also allows foreseeing a future when UAV will be present everywhere and where its integration will be facilitated by its regular and widespread employment with fully well-tried implementation procedures.

DRAC is the first tactical mini UAV in the French land forces; its employment will be even more simplified in the near future with the completion of forces digitization.

This first mini UAV's system tactical experimentation and operational fielding will thus lead to almost certainly develop further UAVs' development and employment.

What is Left of the "Transformation"?

"Nothing dies or pours from out of the blue.
Everything is pure transformation".
Antoine Lavoisier (1777)

Observing there was no much sense developing new stronger force in response to some obscure threats ahead, D. Rumsfeld[1] was convinced that suitable creativity and technology could cope with such kind of impediments. In that scope, he had instigated a **"transformation"** in 2001, whose innovation-based spirit was pledged to forge up those ideas relevant to meeting a newer security challenge.
From that time on, many events have brushed off the original promise and D. Rumsfeld is gone, thus chiming the bell for some draft payback report. What is left of his visionary enterprise? Which lessons learned from its implementation?

There are no easy answers since, after a conceptual-innovation period, which was central to that "transformation", the capacity-generation proces is now focusing on the subjects of operational preparation and integration. On the other hand, support issues regarding US forces presently committed to an operation often take precedence over any longer-term preparation plans.

One must get wholly familiar with this purposeful project of transformation applied to the US Forces in order **to capture which status they have achieved until 2007** and grasp where the plan have failed or, conversely, which secure pay-backs are worth informing some French think-tank running on similar matters.

BY LIEUTENANT COLONEL MARC HUMBERT, FRENCH LIAISON OFFICER TO US JOINT FORCES COMMAND (USJFCOM)

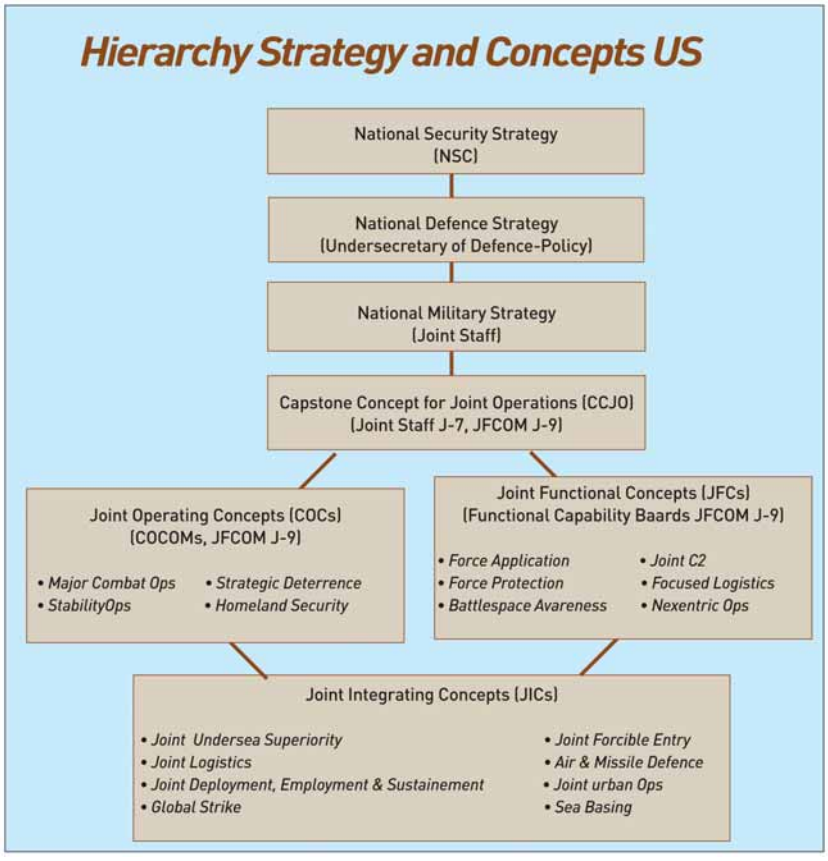
A deliberate approach

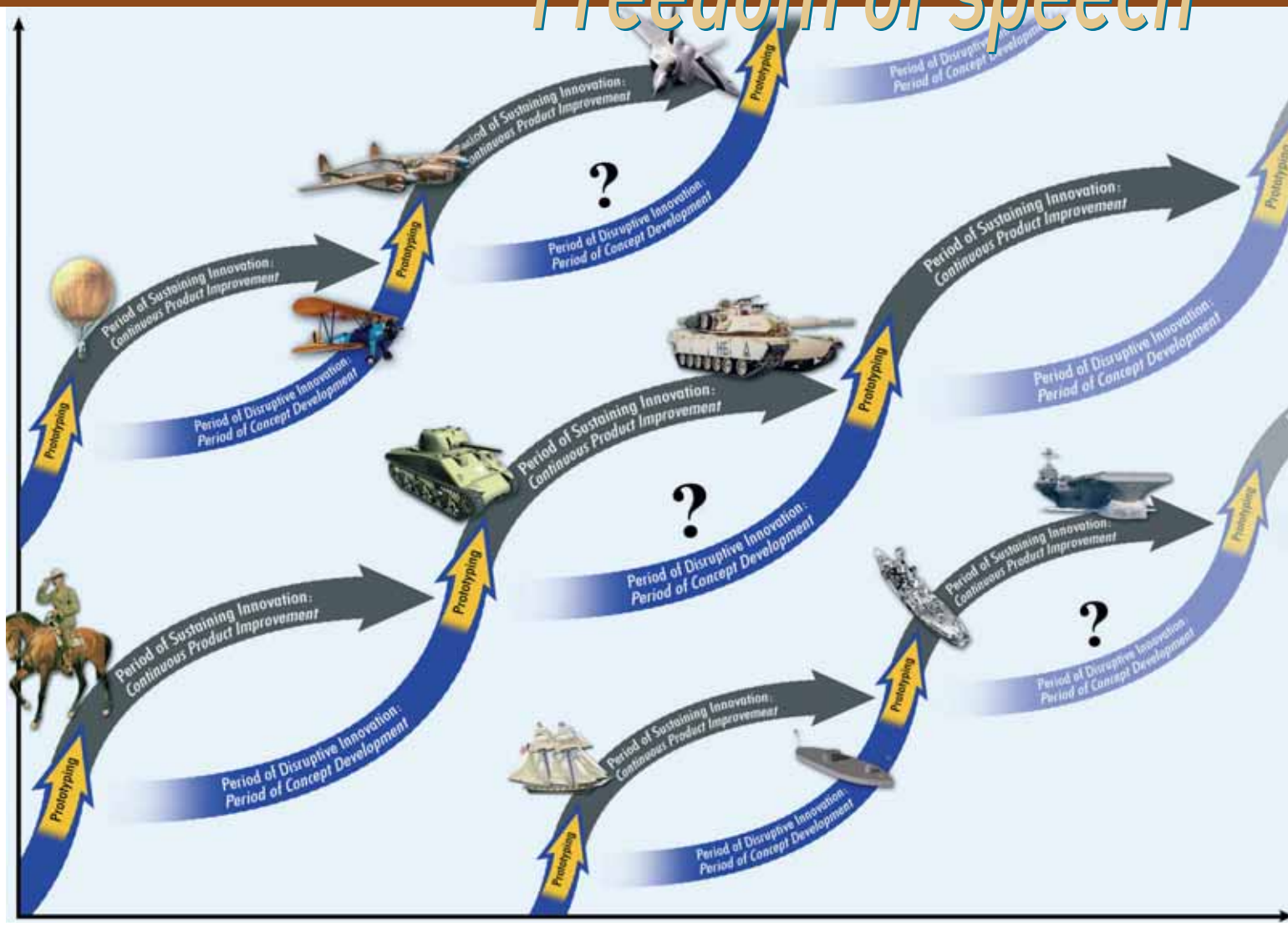
The term of "transformation" clearly fits in the revolutionary spirit SECDEF D. Rumsfeld was willing to introduce into DOD's working-procedures. For him, "Innovation" was the unique remedy where no one knows what the threat might look like in the future.

A *"top-down"* process

The US Administration intended to **impose a "transformation culture" to the military out of a top-down, joint-services oriented reforming process** applicable to all forces. Therefore, the related bulk of formal guidance-documents issued to them is meant to overarch all concepts developing from the newer threats considered.

Through his Deputy under Secretary for the US Forces Transformation, SECDEF himself sees that the whole system keeps running fine, because component military authorities could resent the joint-oriented mode of arbitration introduced in the plan as a risk posed to the interests of their proper force-component.





CD&E² and Innovation issues

The US Forces are being developed in line with regular requirements expressed by the military community. In 2001, intend was **to structure them as of the capabilities identified in the US Concept Development and Experimentation.**

The CD&E approach is meant to shortcut most innovation cycles and accordingly speed up the transformation program. Best responses to some given problems are going to be identified and evaluated prior to validation.

Finally, there will be a consistent **"transformation package"**[3] designed for the purpose of implementation. In that sense and though keeping central to the transformation, the CD&E actually fits in a broader bulk of separate tasks.

Transformation Command/Authority

To make a success of the transformation, it was essential that the coherence between all functions keep under control; also that some authority could decide on and impose each solution selected.

The leadership was thus to rest with an independent agency, free from the Commanders' sway over their organic and/or adjacent spheres of duty. The idea was that no user of the present concepts could actually make for an R&D policy of new ones, which would be going to kill his habitual credo and practice.

No longer a regional command since 1999, the Joint Forces Command (USJFCOM) appeared to be the best candidate, in 2001, for this particular mission divided into five main tasks, each of them corresponding to one aspect of the Transformation Package. Namely, e.g.:

- Develop and experiment concepts on which US military capabilities are to be based in the future;
- Integrate such capabilities in accord with the US Forces' actual needs;
- Foster interoperability with regard to the growing complexity of most devices and systems equipping US troops;
- Design operational preparation doctrines that can support a united understanding and practice of all rules flowing from the concepts developed;
- Generate the appropriate, mission-ready tailored large units.

Setbacks identified in the Transformation Program

From 2001 on, cracks have appeared in many assumptions initially taken for granted. The joint, full integration work or "Big Joint" is not yet achieved; states of mind keep moving as slowly as ever and, in Iraq, high-tech upgrades have not made the victory handier.

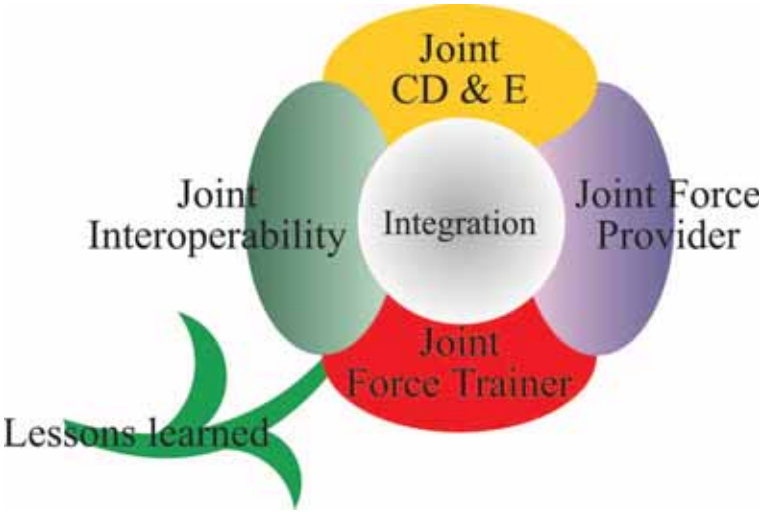
"*Big joint*" runs out of steam

The joint, fusion process was supposed to cut with deconfliction sequences and allow for perfectly integrated forces. Though huge progresses can be noticed in the domain of forces employment, the perfect state expected will but remain far from mouth until military funds are joint-wisely administered.
In fact, the main obstacle posed to the plan lies with **persistent disputes between services,** where each of them would hunt for a self-beneficial settlement from the political side. To that extent, the blending approach of the transformation program is precisely what all services involved are most fiercely opposed to.

As an example, a virulent lobby from the *US Marine Corps* could simply kill the 2004 project of creating one unique land force, consisting of two specialized components, one Army-resourced battle corps entailed of combat missions and one Marine-resourced security corps for stabilization ones. A project that could have prevented from duplicating such regular functions.

Also, the **division between operating allowances and missions expenditures** happens to complicate budgetary debates in a system where each service shall organize, equip, train and commit forces as well as various regional and/or functional Commands/HQs[4].
From 2002 on, the Combatant Commands have been granted the conduct of operations at the first place. Though reading exorbitant, their yearly supplementary allowances cannot actually cater for full-time, combat-capable units. Each service must hence compensate for the difference, but to the detriment of its proper equipment program. This is how the Army's Future Combat System has turned into an adjustment-variable for the Army's budget.

In sum, all budget-lines separating organic from missions-related subsidies for each service are reading like waste and resentment multipliers. As such, these keep hindering the dissemination of the transformation-spirit required in support of the "Big joint".



Minds transformation droops idle

An axiom for meeting security-challenges ahead, a **permanent "cultural revolution"** was imagined; but it was without counting with the human beings' inborn aversion for changes.

The revolution never reached minds because changes chief assimilation-vectors, namely education and training, had been neglected. American soldiers actually think they are the best. They are not willing to change but to export the advantages of the US civilization.

In other terms, success of the CD&E and other forceful methods of transformation is based on some improbable cultural revolution, **which pays but no heed to how minds can actually evolve.** Indeed the model works fine for solving mere technical problems, such as joint fire-support management, but it cannot respond to broader questions of a salient cultural aspect. This is probably why **exchanging pieces of intelligence** between US agencies and/or across a coalition **keeps posing a crucial problem.**

Meanwhile, the "understanding-gap" is getting deeper and deeper between over equipped US soldiers committed to some crisis areas, by nature the poorest places in the world, and the local populations living there. A source of resentment, this inability to communicate results from the excessive technology-focus put to the transformation.

Strategic aspects are missing

Though an unrivaled technology would grant them the success of arms in combats, **US Forces are not proving, apparently, that they can convert their tactical/operational gains into any strategic advantage.**

Such incapacity lies with a military tool -doctrine; organization; education and methods- disconnected from what today's conflict are made of. To that extent, the transformation has failed blowing the dynamics required for defeating a newer breed of hostiles now at work. Because of the race for hi-tech responses, US Forces are got to fight the "adverse party" of today with the means and methods of yesterday.

Military Intelligence is a striking example of that. Where US forces operate amongst the local population, they keep deploying a profusion of electronic sensors and other simulation systems, whereas fitting HUMINT assets are cruelly missing. The US military would taste high-intensity combat-situation much better than any lower-intensity operations possibly smelling like the Vietnam War. This aspect also plays a role in the **disproportionate weight given to technical assets.**

On the subject of Iraq, D. Rumsfeld alone has been blamed for not having ordered any reconstruction plan; but the US Command, excessively focused on strong combat issues at the time, is also answerable for that.

In addition, the US expeditionary corps can hardly patch up, in the eyes of the population, the negative effect of lethal hunt-downs for hostile Iraqi factions. Such purging methods utilized at the tactical level might simply kill the delicate state of adhesion initially met and create, de-facto, **the very conditions for a strategic setback.** In sum, the transformation was to run at odds where minds could not be changed.

Lessons learned from the transformation

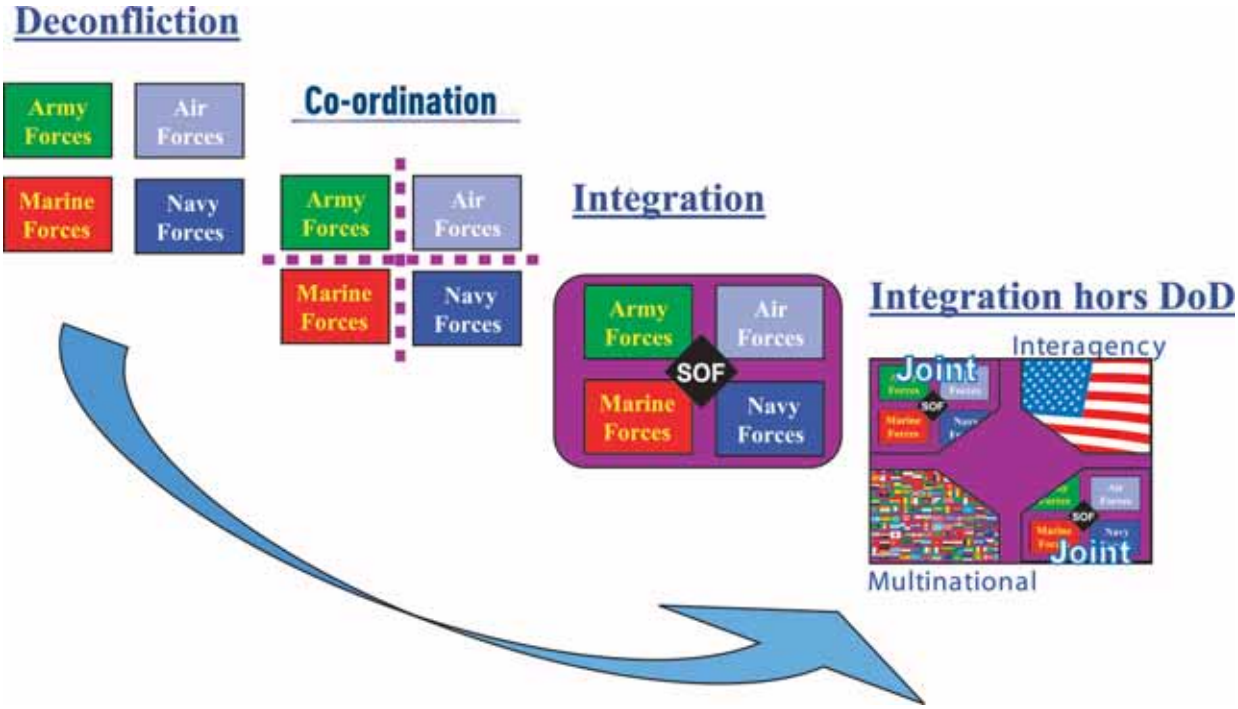
In spite of all, the **redeployment of functions achieved within JFCOM** can actually serve **as a model for tried and tested force generation capabilities** where the integration of forces and their operational preparation are central to the transformation program. As well, the inter-agencies reached format can help reconcile political goals with military objectives where needed.

Capability generation process

Whilst maturing, the transformation has grown up **a generator of military capabilities** cleverly based on a short decision-cycle, where all lessons learned (LL) are innerving the many functions attached to the "transformation" process.

Where some failure is identified, a solution is developed, tested and validated (CD&E). Once done, this option gets beefed up with a supporting fabric (Transformation Packages), then translated into operating procedures (Doctrine) and finally disseminated across the relevant units for application (operational preparation).

This cycle hardly fits for military capabilities possibly required in the far future since, in that case, the informing process does not lie with lessons learned but with the right assessment of threat for the future. In turn, **this model works very well** where a proactive and ever-present LL practice helps **maximize existing capabilities** for missions foreseen at a shorter/medium term, such as dealing with improvised explosive devices (IED).



Integration and training become central to the transformation

Priority has been given to short-term issues under the stress of conflicts running and the poor productivity reproached to the *CD&E*. Integration and operational preparation efforts have thus replaced CD&E where the transformation needs boost. Such reversal clearly appears in 2006's budget-lines allotted to JFCOM, staff-divisions and mirrors the stress put to getting mission-ready forces straight on.

So, the huge Joint Warfighting Center (JFCOM, J7) machinery works on education and training exercises specific to the demanded Joint Task Forces, whilst the integration process is addressing interoperability issues, especially for CIS assets.
Already a touchy subject as a joint matter, integration and training issues enter into another dimension where cooperation between agencies is going to be tackled.

Inter-agencies platform in progress

Centuries long, most political goals contemplated by the warring parties have been much lying with a military defeat inflicted to the enemy, and each politician, diplomat or military commander could freely play his role within the own sphere of duty.

This logics no longer suits to the present conflicts. Subject to a wavering opinion from the International Community, most political objectives are unclear. There are no declared enemies but manifold opponents. There is no victory ensured but hopes in some positive result from the stabilization phases of an operation. Winning a sustained adhesion-status from the local population where troops are to operate is crucial to them. In such conditions, **there must be a permanent coordination of all efforts displayed for reaching unclear or, possibly, unrealistic objectives.**

The inter-agencies platform is meant to meet the demand. The plan is to help optimize all tools made available to the political side and offer a salutary alternative where, like in Afghanistan, hostile factions and bandits would exploit any possible inconsistency during our operations. There is obviously no easy way establishing a dialog between conflicting trades where each of them has developed a corporate culture of its own. This said, the idea of an inter-agencies platform starts gaining credit in the USA.
The growing number of civilians participating in its related trials[5] confirms that and augurs well.

1 Former SECDEF.
2 Concept Development and Experimentation.
3 The Transformation Package includes corresponding doctrine, organization, training, equipment, education, personnel and infrastructure.
4 Nine unified Combatant Commands, are assigned C2 responsibilities over Regional and Forces HQs. These are Eucom, Northcom, Southcom, Centcom, Pacom, Jfcom, Transcom, Socom, Stratcom. A tenth Command/HQ, Africom, will soon complete that list.
5 JFCOM led, Multinational Experiment 5 and State Department led, Unified Action.

The transformation happens to have produced much contrasted results along the 6 years passed at resolutely keeping the project alive. Those having dreamed of quick changes of mind however start realizing this was just utopia. As well, the absence of any joint-subsidies in the Defense's budget would preclude from achieving the "Big Joint" as expected.

In contrast, all integrated forms of capacity-improvements and operational preparation, also the creation of an inter-agencies format, are looking like durable and promising solutions. As such, they could usefully inspire our proper studies on how to prepare the future and instill more synergy across our military structure.

Such studies could also take advantage from the analysis of what went wrong during the US venture. On this subject, the wording of "asymmetric war" reads as an excuse for the inability at crisis settlement. Such a mental barrier just prevents from building a military tool that could respond to the very nature of today's conflicts.

Finally, **technology is great, but that winning card is supposed to stay in human players' hands and serve them.** As far as the Defense structure is concerned, the priority should rest with education courses. General knowledge, typically, should be promoted. As a matter of fact, no weapon system would equal brainpower. Our American friends are cruelly learning from that, at their own expense, each day. Might such blindness show us a clearer way.

Digitization within the Armed Forces:

National Doctrines' Similarities and Differences

For several years already, the main western armed forces have undertaken long term modernization efforts which led them, inter-alia, to make a choice for all-professional forces – France and Italy, for instance – and the development of joint cooperation – United Kingdom, France.

The armed forces digitization is part of that large evolution process into which France and its main partners have engaged. Digitization which is being achieved within the forces constitutes **currently a recurring theme for doctrinal studies**. New information and communication technologies are widely exploited within the armed forces in order to allow the interconnection of all the force's building blocks – i.e. to link them through a network – in order to establish what is called a "tactical intranet" and to thus develop the **"network centric operation" concept.**

Although western armed forces' evolution illustrates concerns that are common to several countries, it however shows **clear divergences among the priorities that are set by each of the national modernization programs.** In the same way, the analysis of the different digitization doctrines illustrates, beyond the existence of a theoretical common basis, the specificities of each of them.

By Ms Tiphanie GRALL, Intern at CDEF DREX[1]

ADC Olivier DUBOIS/SIRPA TERRE

Armed forces' modernization: between common perspectives and national priorities

Adapt to global strategic environment's evolutions: a common challenge

All countries intend to improve their forces operational efficiency. **The implementation of a "transformation" should allow the forces to gain better efficiency, flexibility, reactivity, and polyvalence, in order to be able to confront a widened array of threats.** Armed forces intend also to improve their deployment capabilities, since operations take most often place outside of their national territories.

Holding one's rank on the international stage: a European challenge

The United States have initiated that armed forces modernization process through the Revolution in Military Affairs (RMA) and then the Transformation concepts. The choices that the Americans make never leave their allies indifferent, and this is even truer in matter of defense. Within that context **the efforts undertaken by western forces in order to improve their operational efficiency illustrate their willingness to continue holding a position on the international stage.**

Indeed the United Kingdom, France or Italy have the ambition to play the role of framework nation and thus to be able to legitimately lead a multinational operation of which the US would be absent.
In addition, these countries allied to the US that would acquire an increased level of efficiency or technological level could have a significant weight within US led coalitions and develop a satisfying level of interoperability with the US procedures and systems.

Diverging priorities in matters of interoperability

The British priority is clearly stated: forces modernization, especially the implementation of network centric capacities, should allow British forces to be interoperable with the US. That hypothesis is based upon the fact that the future American choices in favor of unilateral or multilateral interventions will depend on their allies' interoperability with them. In that same logic, the relations with NATO – which is also undergoing transformation – are privileged by the United Kingdom which regards the Organization as being a first-class vector of the transatlantic link.

Italy within the framework of its armed forces' evolution plan, **envisions also focusing in priority its interoperability efforts towards transatlantic cooperation;** Italy believes that the European defense just constitutes a complement to NATO.
Sweden – an EU member but not a NATO one – intends to play the role of a lead nation in the European Security and Defense Policy domain, especially within the Nordic region. Swedes, who are very much involved in the development of interoperability with their European partners, have even slowed down their modernization's pace in order not to outrun the other European nations which would be undergoing modernization, favoring thus a combined evolution.

France, in accordance with its strategic independence ambitions, **gives a major importance to European cooperation in matters of interoperability.** Although it simultaneously works at developing common standards and procedures with the US and NATO, France's willingness to develop a European integrated defense, induces it to favor its European partners. And last **Germany** believes that the large adaptation and reform processes into which NATO and several EU members have engaged does not leave it any other choice than to initiate also a modernization process.

Specific national objectives

The American ambition is to guarantee the United States' supremacy over the entire spectrum of the international crises management, from humanitarian interventions to high intensity operations. Positing that their technological advance will necessarily guarantee them an operational advantage, they intend to develop a superiority tool thanks to the transformation of their forces. It is undeniable that the Americans are conscious of the impact that the initiation of their transformation process has on their partners' security and defense policy. It is thus reasonably possible to wonder if that choice for modernization which they initiated doesn't illustrate as well a willingness to develop an influence tool, i.e. a tool that would allow them to both encourage other western countries to improve their forces technological level while they'd observe the potential rising of a **peer competitor.**

France, at the difference of its partners, states its willingness to keep its independence and strategic autonomy in matters of defense and foreign policy: the operational efficiency improvements that France achieved thanks to its modernization efforts will serve that state ambition. As a matter of fact it is not a question for the French forces of following rigorously the American conception precepts, but rather to adapt these new doctrines to France's requirements and military culture. France hopes thus being able to build up a pole of influence in Europe and to imprint with its philosophy the similar evolutions that are going on in European neighboring countries; France intends to preserve, in addition to its national strategic independence, a European culture and identity in matters of defense.

The Americans, British, French, German, and Swedes, among others, have all placed the network concept at the very heart of their armed forces' modernization and adaptation process, since it is a means to achieve the objectives that have been set. Although the development of the American Network-Centric Warfare (NCW) theory has inspired the elaboration of similar doctrines in other countries, this concept doesn't correspond to a unique definition. Each country has tried to adapt NCW to its own objectives, means and ways of thinking.

The various "Network Centric" concepts

A common theoretical basis: to achieve information superiority...

The interconnection of the sensors with the command and control systems and the weapons systems aims at achieving information superiority. **Information acquisition, processing and dissemination capabilities that have been significantly improved, allow the development of a common operational picture (COP)** that facilitates sharing situation awareness and understanding (SA/SU).

Information control provides the commander with an invaluable support since it reduces the uncertainty that is linked to combat operations. Decision making is thus more reliable since the commander may concentrate his efforts on knowledge management, reflection and actions planning. He is able to elaborate orders that are more precise since he knows that all echelons share a common picture of the operational situation.

The decision-making process has become faster thanks to the possibility to gain awareness of friendly and enemy situations and to an increased capability to disseminate orders and reports.

And last, the **use of information and communication technologies allows a decentralization of the decision process:** each person in charge of an operation, whatever might be his place in the hierarchy, has more freedom of maneuver which allows him, if required, to seize

any opportunity that arises. This autonomy in matters of decision acquires an importance that is all the more significant so the current forces' engagement context makes the armed forces operate among the populations and demands rapid decision making.

... in order to achieve operational superiority

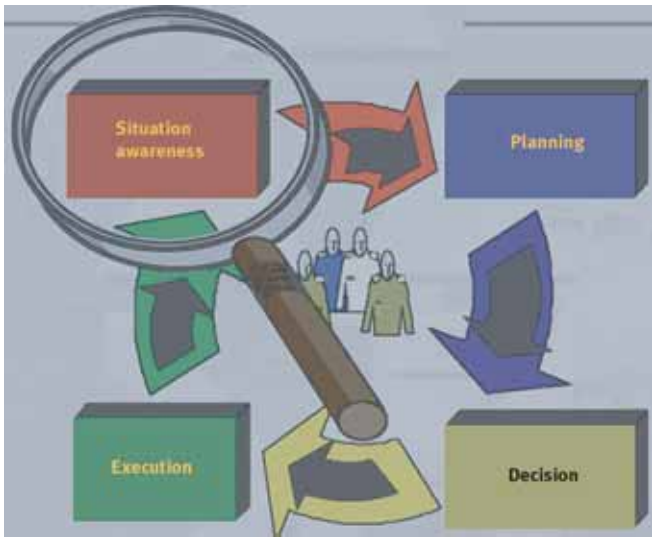
And last, in the action domain, the decision making process acceleration and the improvement of the navigation and positioning capabilities allow a faster execution. High level operational tempo allows taking advantage over the opponent, thanks to surprise, provoking thus more uncertainty within enemy forces.

The maneuver capabilities are also improved. In fact forces can disperse over larger areas and focus on the decisive points.

Since the main effort can be clearly defined, **forces and assets can be used in a more efficient way.** In fact they are concentrated at the right place, at the right time and according to the principle of strict sufficiency. Operational situation awareness contributes to the economy of resources and to reducing forces' vulnerability.

A similar conception of the digitization benefits cycle

Information > Awareness ☞ Planification > Decision ☞ Action > Effects

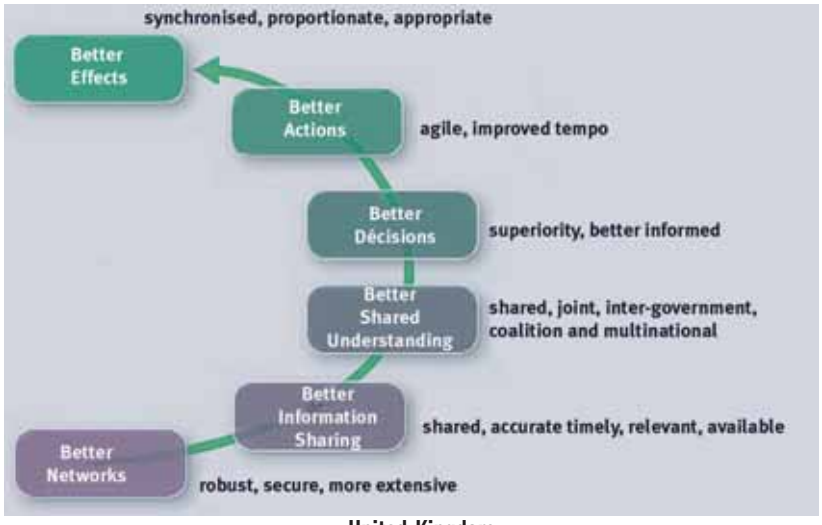


France

Source: http://www.eai.terre.defense.gouv.fr/sir/doc/sir.pdf

United-States

Source: *Doctrine #1*, december 2003, "Digitization within the US Army "



United-Kingdom

Source: *Network-Enabled Capability*, JSP 777 Edn 1

Specificities of the American, British and French conceptions

For the US, information constitutes by itself a combat environment and a strategic concept. Informational superiority is perceived as a "vital requirement" for the US security, e.g. **the development by the Americans of the "infodominance" concept which is described as being the final stage of the struggle intended to control the information and which gives access lastingly to the ultimate stage of awareness.** More complete than superiority or supremacy, dominance is characterized by its qualitative aspect and it provides the forces with a decisive advantage while informational superiority relates to a quantitative aspect and is only temporary and without any real power. "Information Dominance" has reached the rank of a strategic weapon within the American military arsenal; it has up to this day no equivalent in European military doctrines[2]" However that ambitious objective seems to have been reduced in the Joint Vision 2020 document, to the benefit of the more modest and pragmatic Information Superiority concept.

In addition, **the American Information Operations (IO) concept turns information actions into an actual combat branch.** Defensive IOs aim at protecting American capabilities to conduct actions within the informational domain. Offensive IOs aim at harming enemy capabilities in that same domain, by manipulating its perception on information, by electronic warfare actions against its communication and information systems....

The British concept emphasizes the impact of digitization on the command and control function

The British concept differentiates from the American NCW by emphasizing the network capabilities more than the digitized resource itself. Among these capabilities, the British focus on the improvement brought to command and control as well as to battlespace management. **The NEC concept developed in the UK adopts a so-called commander centric approach which intends to adapt the British vision of command and control to the new digitized environment.** Consequently, procedures aiming at preventing from too much interference by the commander will have to be defined in order to keep the control function at the minimum level possible and thus provide the subordinate echelons with the freedom of action required to be able to seize opportunities, which guarantees an increased tempo of the maneuver.

The French approach to crises resolution: "the military and the politicians go hand in hand[3]"

France, which, as of the outset of the intervention phase, prepares the basics of what its action will be during the stabilization phase, intends to manage simultaneously the crisis and the exit of crisis. The military victory doesn't guarantee the end of the conflict: the **armed intervention should only be envisioned if it helps the implementation of political solutions and the achievement of a desired end state.** EBOs (Effect-Based Operations), that aim at creating conditions favorable to an exit of a crisis, are part of that process which takes into account operations' continuum.
Network centric operations must serve that crisis general management policy which constitutes a strong feature of the French posture in that matter. This ambition is on the right track since French digitized systems that were developed initially to be implemented during the intervention phase are also perfectly adapted to a use during stabilization.

1 *Research & Lessons Learned Division/Forces Employment Doctrine Center.*
2 *Info-dominance : enjeux et perspectives du rôle de l'information dans la stratégie américaine depuis la parution du QDR 2001, Sihame ZANIFI, DAS, Sous-direction Technologique. ("Infodominance : stakes and perspectives of the role of information in American strategy since the publication of QDR 2001" , by Sihane ZANIFI, French Directorate, Strategic Policy, Technological under directorate.).*
3 *General De Gaulle, quoted by General Bruno Cuche, Army Chief of Staff, at the CDEF/CEIS symposium 19/10/06.*

The differences that can be outlined through a comparison of the approaches of network centric capacities' implementation by various national doctrines **allow somehow to understand the state of mind of each of these nations, and illustrate each of the forces' traditions and culture**. They thus put into perspective the extent of the American influence, each country being able to get ownership of the NCW concept in its own way and in accordance with its identity.

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