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.

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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...

* **"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 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.