Air Surface Integration, the Basis for Air-Ground Combat

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If you can knit up the power of the Army on the land and the power of the air in the sky then nothing will stand against you and you will never lose a battle (Field Marshal Bernard Montgomery).

Air Surface Integration (ASI) appeared about ten years ago in the framework of joint operations and since 2017 has had its own doctrine to define its boundaries: ASI is the collection of processes set in motion by several components during the planning and conduct of operations that combine the operational activities of air, ground and/or maritime assets with aim of fully exploiting the complementarity between components thus allowing accumulation and conjugation of the effects produced by each in order to improve the effectiveness of manoeuvres at the tactical level and the overall efficiency of the joint force.(1) ASI includes Air Land Integration (ALI) and Air Maritime Integration (AMI).

The ASI concept is not really new, since it goes back to the beginnings of exploitation of airspace in time of war and the increasing presence of the air component as the third armed force. Despite that, it is still too little used in operations, largely through lack of knowledge, and is even considered by some to be too novel. A few significant events illustrate its origins:

• The success of Operation *Overlord* in June 1944, with 11,000 air sorties on D-Day in Close Air Support (CAS) of ground forces and Air Interdiction (AI) on the rear lines to allow consolidation of the bridgehead by slowing down the arrival of German forces, was in part the consequence of lessons learned since 1943: *Army and Air Force commanders must work in closest consultation throughout all stages of the formulation and execution of the plan, to ensure that the land and air operations interact to the best advantage* (General Ira Eaker, United States Army Air Force, 1943).

• With the experience acquired in post-Second World War conflicts and a need to reinforce coordination of joint force action, in 1956 the Air Force began to create specialised units, the air parachute commandos (*Commandos parachutistes de l'air*—CPA), to facilitate the interface between air and ground during firings and intelligence action.

Preliminary note: This article draws in part on the thinking of ASI experts, and in particular Generals Laurent AUBIGNY and Laurent LHERBETTE, and Lieutenant Colonel Pierre BASSETT.

(1) [French] Joint concept, doctrine and experimentation centre (CICDE), *Intégration Air-Surface/Air-Surface Integration (ASI)*, Doctrine interarmées DIA-3.0.3_ASI(2017) No 134/ARM/CICDE/NP, 7 July 2017 (www.irsem.fr/).

The Cold War environment pushed this concept onto a back burner for several decades. Today's renewed interest in ASI and its incorporation into doctrine is above all the result of feedback from operations conducted in a very changed environment:

• In their feedback from Operation *Anaconda* in Afghanistan, US armed forces reported from 2002 that insufficient coordination between land and air components posed a problem, essentially because of the lack of frequent and formalised contact between specialists in the two components' staffs.(2)

• After operations in Iraq (Operation *Telic*) and Afghanistan, the British armed forces took note of a loss of capability to conduct integrated air/ground operations, and that led to the Coningham-Keyes project, aimed at developing ground-air-sea interoperability through the introduction of tools, procedures and training.(3)

• In Afghanistan, French Special Forces always favoured a high level of ASI to achieve the effects required of their combat or intelligence gathering activity, and to optimise use of the available air assets. This is a particular reason why the Special Operations Command is today at the forefront of experimentation and of the progress that is being achieved in the field, from both tactical and technical points of view.

• Closer to home, during Operation *Inherent Resolve* (OIR) in the Levant, coalition forces fighting Daesh took fully into account the feedback from past operations and set up an ASI chain which allowed efficient management of available assets, including aviation, artillery and Special Forces.

Several things arise from recent operational experience. The first is that no operation today can be conducted without use of the air. The second, that the air is a uniform and continuous, but also complex space that offers the flexibility that favours a combination of military activities. The third is that the air is the sole space that can guarantee reactivity for action in depth. That said, it needs skilled management in both planning and conduct of operations by true experts in the matter.

What Does Air Surface Integration Actually Cover?

Feedback from the preceding examples shows that in order to optimise employment of effectors and captors and to fully exploit the complementarity between components a joint operation cannot be designed today without enhanced integration of firing and intelligence activity, and of the mobility of the different components, in both planning and conduct phases. This is supported by a number of determining factors.

First of all, ASI has to **respond to changing threats and the current operational environment** (asymmetric operations, hybrid war, anti access and action in depth, for example) by controlling the entire combat space. For the air, it must guarantee the air

(2) Headquarters, United States Air Force, *Operation Anaconda, An Airpower Perspective*, 7 February 2005 (https://apps.dtic.mil/dtic/tr/fulltext/u2/a495248.pdf).

(3) See in particular Wing Commander S.P. Kilvington, *Delivering effective Air-Land Integration (ALI) in the next war: what enduring lessons can UK Defence draw from historical and contemporary operations to generate and maintain an efficient, joint ALI capability that is fit for future conflict?*, 2003 (www.raf.mod.uk/).

forces the capacity to conduct all of their missions including those that need interaction with ground forces (the changing proportion of missions between CAS and AI, deliberate and dynamic, and control of fires).[4] Reactivity and the ability to concentrate action in space and time, dimensions in which the combination of capabilities of the air forces with those of ground forces is often decisive, must permit coverage of large operational spaces while ensuring management of considerable overlapping of forces on the ground, avoiding counter-productive action and fratricide and being able to respond to transient threats.

Then, it has to **take into account new capabilities** (drones, missiles), **the multi-role nature of new aircraft** (like Rafale) a**nd new equipment**, which undeniably improve effects. In particular it means preparing for the arrival of the next generation, the Future combat air system (FCAS, *Système de combat aérien du futur*—SCAF). Modern multi-role aircraft mean that a succession of different tasks can be fulfilled during a single mission as a function of real-time need, for example, a sequence of CAS, AI, offensive counter-air, show of force and ISR missions.[5] The same goes for platforms conducting ELINT/IMINT,[6] airborne C2,[7] electronic warfare or transport, which are increasingly multi-mission. The most recent equipment also allows sharing of a common tactical picture, easing exchanges between the components as well as between airborne elements and the ground segment. This includes laser designation pods for Non Traditional ISR (NTISR)[8] tasks, the real-time retransmission of video data to forces on the ground, the evolution of information and communication systems in general and the wider use of tactical data links in particular. They also augment the effects brought to bear by the air component in asymmetrical operations: adaptability and accuracy of mission equipment and airborne sensors, improvement in high-altitude drops of personnel or materiel, and improvement in platforms and their persistence, including armed drones, C3ISTAR,[9] ALSR,[10] and C-160G/CUGE.[11]

Finally it concerns the **essential optimisation of C2 and air and ground segments to increase their effects**. Optimisation is imperative for greater effectiveness of assets that today have better performance and are more diversified (missiles and drones), but are also fewer in number and operating in more complex intervention frameworks. It also needs to be applied to C2 and working practices in order to achieve flexible processes and to guarantee the freedom of action of the players involved. There is a real need for tools to aid decision-making that can absorb the multiplicity of information, merge it and ensure its continuous, secure transmission to the deciding authorities.

(4) Standard NATO terms to describe missions. CAS=Close Air Support; AI=Air Interdiction.
(5) Intelligence, Surveillance and Reconnaissance.
(6) Intelligence from electromagnetic (ELINT) and imagery (IMINT) sources.
(7) Command and Control.
(8) These include 'unconventional' ISR assets, and cover capabilities fitted to some aircraft of the special operations command.
(9) Command, Control, Communications, Intelligence, Surveillance, Target Acquisition and Reconnaissance.
(10) *Avion léger de surveillance et reconnaissance* (light surveillance and reconnaissance aircraft).
(11) *Charge utile de guerre électronique* (Live EW load – the future C-160 system to replace the Transall).

ASI therefore responds to the double aim of overall conceptualisation of manoeuvre and achievement of more rational use of available airborne effectors to reach the objectives, be they strategic, operational or tactical. If on first sight this appears to relate mainly to opening fire, it concerns intelligence and mobility action just as much. Since its end state is the effectiveness of the joint force and the guarantee of its unity of action, it clearly goes beyond the limited vision of an air-ground bubble that constrains the air component to a simple support role.

Some Fundamental Principles

ASI is an important part of an overall approach that stimulates synergy between effectors and exploits the complementarities between the components to the benefit of the manoeuvre, with the desired military effects top of its priorities, of course. It requires dialogue between the components and above all mutual knowledge and confidence among the players. Whilst it is at the tactical level that it produces the most convincing results, it does not only apply there: indeed, it is applicable across all domains of operations. Moreover, it is essential to develop technical and organisational interoperability and joint processes.

Technically it relies on all components' synchronised and coordinated planning and conduct of operations. Hence the aim is to optimise the contribution of air and surface assets (including artillery and missiles) by better understanding between the players involved so that air manoeuvre can play its full part in the overall joint manoeuvre. This will require an integrated tactical approach and instilling an 'ASI state of mind' based on:

– Joint operational processes for planning and execution to optimise the use of the capabilities and effects of the players and to identify new modes of action hitherto little considered because of systematic resort to organic assets to produce the desired effects in the right place and at the right time.

– Synchronisation of processes for the conduct of the different forces to adapt their tactical manoeuvres dynamically when the situation demands.

– A shared tactical picture, especially when live firing in a situation where force units overlap each other. Joint, reactive prioritisation is needed to ensure correct understanding of the need. To this end, digitisation of the battle space is fundamental, as are tactical data links.

ASI should be based upon a recognised community of experts in the third dimension that is integrated into the operational structure via a command chain appropriate to each theatre that is able, for example, to set up links from the Combined Air Operations Centre (CAOC) to the Joint Tactical Air Controller (JTAC) on the ground.

These fundamental principles, whilst already essential to current operations, will have to be fully taken into account in developing the future capabilities of FCAS,

Scorpion[12] and the joint fire support project (*Appui feux interarmées*—AFIA).[13] Though especially adapted to military operations, the principles are transferable to other environments, notably civil and other security forces.

Some Challenges to Overcome

Although coherent with the current operational and technological environment, ASI still has a number of hurdles to be overcome before it can be adopted universally.

The principal hurdle is **adaptation of current C2 structures**. OIR coalition forces in the Levant today have adopted a joint C2 organisation close to the Joint Battlespace Management (JBM)[14] concept, which favours choosing the most effective effector to reach a target. Nevertheless this principle is not yet in general use within the French forces operating the Sahel other than the Special Forces, which already have ASI experts in their task force command structures. Recent conflicts in the Levant and in Ukraine have show the importance of managing effectors much more efficiently when faced with anti access situations which affect all components, or with hybrid war environments where the solution lies in part in the reactivity in transferring effort from one effector to another. ASI suits these contexts well since, apart from facilitating the coordination of effectors for much greater tactical effectiveness, it optimises the choice of principal effector right from the planning phase. On the other hand it is primordial that each component be led from within and that it has its own authority for action in order to optimise the effect of the manoeuvre delegated to it. This also implies that the command responsibilities of each component should be backed up by higher-level assurance that its efforts are integrated to the benefit of the joint manoeuvre right down to the lowest tactical level. That in turn requires the presence of experts from each component in all levels of the C2 structure if there is to be true ASI capability. The experience of the Air Force in the sky makes it the natural choice for the integrator of effects coming from the third dimension.

The second of the challenges is **changing the culture of the entire operational chain**, which is still dominated by organic thinking. History shows that the latter acts as a brake on adoption of ASI. Because of that, it seems essential that personnel be subjected to the culture change from the very first cycle of their training so that they think in terms of overall effects, rather than tactical or local ones—an ASI state of mind needs to be inculcated from the start. Conscious of this necessary change, the Air Force has committed to instilling this culture in its initial officer training schools and throughout officers' careers.

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(12) *Scorpion*: *Synergie du COntact Renforcé par la Polyvalence et l'InfovalorisatiON* ([approximately] Contact synergy reinforced by multi-tasking and improved quality of information), a programme to create a flexible tactical combat system for all current and future operational missions of the Army.

(13) Future replacement for the Army's current *Atlas* (*Automatisation des tirs et liaisons de l'artillerie sol/sol*—automation of artillery ground-ground fires and liaisons) system.

(14) The Joint Battlespace Management concept looks for better added value in the use of all the assets committed, together with their coherent, efficient and realistic integration from the very start of operational planning.

The third challenge is the creation and maintenance of **a pool of real experts in the field**. This is not only to guarantee expertise in the C2 structures, but also among the engaged troops. This is already the case in fire support, with advanced tactical controllers and the JTAC, but is less so in other segments of ASI, such as mobility and intelligence. Currently, only Special Forces can guarantee the permanent presence of such expertise in the manner of the US forces' Combat Control Teams. Whilst air Special Forces already have specific ASI training, with regard to the wider need a bigger reservoir of qualified, trained and updated specialists should be generated. For that, we must have qualifying training that is performed within the centres of xpertise, rather in the way that the Air support training centre (*Centre de formation à l'appui aérien*—CFAA) does for JTACs. Again, with its expertise in the domain, the Air Force seems the right choice for ensuring appropriate training.

The last challenge is not the least: we must **possess equipment optimised for ASI**. Ensuring high-performance ASI requires near-real time dialogue between the various players on the ground and in the air, itself quite constrained by discrimination and security needs. In turn, this implies having a service that can optimise airborne effectors and captors, and can optimise in near-real time the benefits of each of the components in a joint force operation, from the tactical to the strategic level, and especially in a highly contested environment. In the end, it is a matter of offering the command a reactive and permanent system that can handle the multiplicity of data.

Connectivity is the cornerstone of ASI, and yet it is too limited today. Its job is to facilitate the collection and merging of databases (from ground, air or space units, cartography, altimetry and so on), and to update all information in near-real time (friendly and enemy positions, data from captors) in order to maintain an updated plot and guarantee the link between the information collected and the communication systems for broadcast to the community. Technically this requires high performance sensors, standardisation, security, permanence and fluidity in the data exchanged between information systems as well as almost direct transmission from source to receiver. Furthermore, although national autonomy is sometimes considered a measure of security, a system verging on the autocratic is unthinkable today and interoperability with our allies remains essential, at the very least by intermediary technical bridges. Put simply, that means exchanging information and data between domains, each having its own codes, standards, logic, technology, procedures and restrictions in a joint or multinational operational context—which underlines the complexity of the challenge. It will also be necessary to ensure interoperability between different generations of materiel in order not to create a two-speed ASI. The building blocks already exist to ensure minimum capability yet the greater amount has yet to be developed in partnership with the university and industrial worlds. The declared openness of the Ministry for the armed forces—and in particular the special operations command and the Air Force— with regard to innovation is a great advantage in constructing arrangements optimised for ASI and for preparing for the future. Artificial intelligence, Big Data and enhanced reality are promising areas of technology. The development of mixed structures dedicated to ASI on the pattern of the operational laboratory for research into the air-ground interface (*Laboratoire opérationnel de recherche sur l'interface AIR-SOL*—

LORIAS) in Orléans,[15] which combines university, industrial and operational worlds, is a significant advance in specialised R&D, itself a measure of recognition of the need.

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Air Surface Integration is the result of feedback from experience and is perfectly adapted to current types of conflict. It enables enhancement of effects from the components of a force, optimising the overall manoeuvre. Its wider application calls for better appreciation now of its important role in the current operational environment, for above all it represents a major pillar of projects like SCORPION, FCAS and AFIA. With its experience in the third dimension, the Air Force has a major role to play as the integrator of effects. ◆

(15) A digital 'design house' that discovers promotes and guides creators of innovative companies.