



# Transforming Joint Air Power The Journal of the JAPCC



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# Joint Air & Space Power Conference



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**Joint Air Power  
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It is my great pleasure to present you the 21<sup>st</sup> Edition of the JAPCC Journal. The opening article of this edition is an interview with Lieutenant General Preziosa, Chief of the Italian Air Force, who gives us an insight into Italian contributions to overcome critical capability shortfalls in NATO, both through national projects and by leveraging multinational cooperation.

The Journal subsequently offers a selection of essays covering a variety of topics. The field of information dominance is addressed in two articles exploring the fields of Electronic Warfare and advanced network-centric platform communication. 'The Electromagnetic Spectrum: The Cross Domain' educates us on the principles of Electronic Warfare and the challenge of the competitive use of the extremely complex Electromagnetic Environment, while 'Joint Employment Zones (+)' elaborates on forms of tactical communication that will contribute to the organization and synchronization of complex warfare activities at platform level. Critical thought within NATO is inspired by the two exposés 'Is NATO's MPA Force prepared for resurgent Russian submarine patrols?' and 'Institutionalizing C-IED Lessons Learned from Afghanistan'. Another article, 'China's Aerospace Power 2015' informs about the modern anti-access area-denial (A2/AD) capabilities of the People's Liberation Army Air Force and implies a key takeaway for NATO. More threat analysis is provided in 'Small Drones: From Cheap Toys to Terrorist Tools' by illustrating the potentially nefarious use of commercial small drones as well as describing associated detection and disruption issues. Further articles deal with new challenges faced by Italian Naval Air Power, address the consequence of the persistent lack of a NATO Space Policy, and promote the importance of Information Knowledge Management (IKM) as a mission essential asset.

This journal furthermore directs our reader's attention to a very relevant issue, 'Strategic Communications'. Today's global communication capabilities greatly amplify the impact and speed with which one can change foreign and domestic public opinion and thereby eventually influence the Alliance and the way it conducts operations. Disinformation campaigns carried out against NATO and coalition forces in recent operations in Afghanistan and Libya specifically characterize Air Power as an inhumane and indiscriminate means of war. Disinformation and misinformation about Air Power also steer political debate. A very prominent example is the discussion about the legitimacy and legality of using weaponized 'drones'. This edition, therefore, provides particular emphasis on the subject of 'NATO Air Power and the Strategic Communications Challenge', with an article of the same title that introduces us to a JAPCC study currently being conducted in partnership with academic researchers.

I congratulate the authors on their contributions to this 21<sup>st</sup> JAPCC Journal and I strongly encourage our readers to consider their efforts as you go forth and advocate for Air Power. The JAPCC team greatly appreciates your feedback and thoughts. Please visit our website at [www.japcc.org](http://www.japcc.org), where you will find contact information and additional Air & Space Power content.



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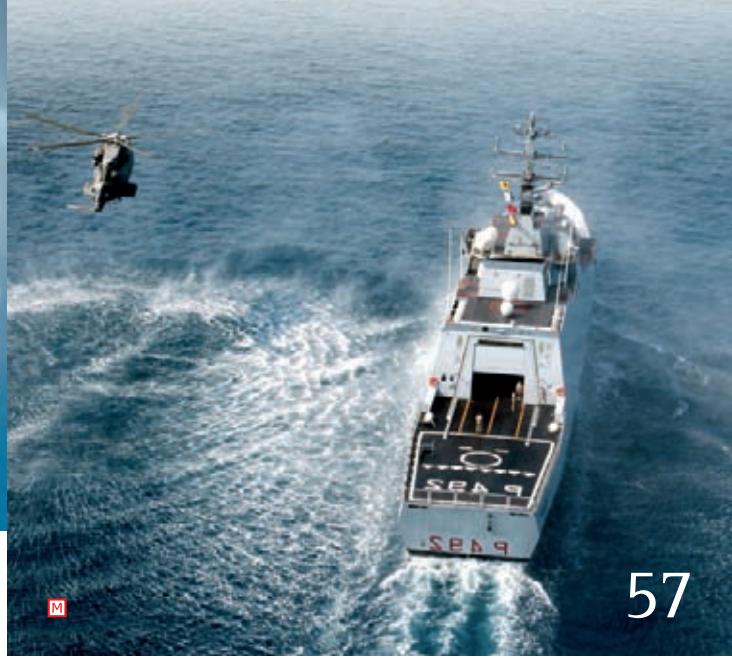
We encourage comments on the articles in order to promote discussion concerning Air and Space Power.

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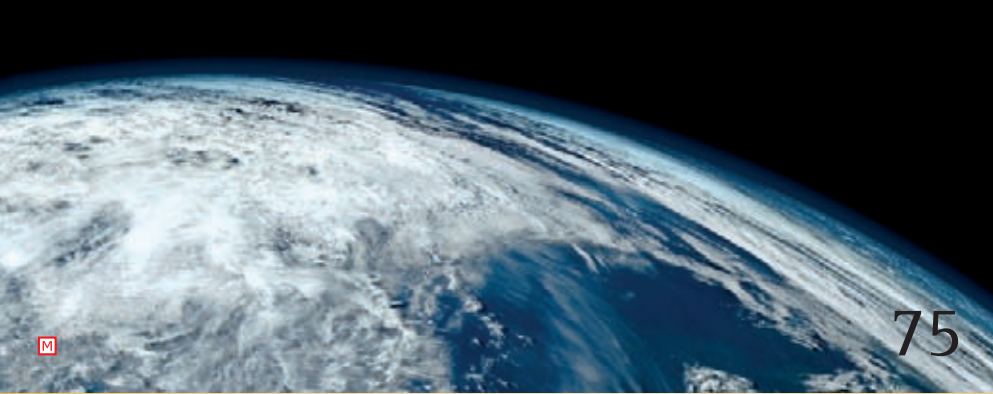
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# Daily Ready to Serve Italy and NATO

## *Interview with Lieutenant General Pasquale Preziosa, Chief of the Italian Air Force*

*During the Wales NATO Summit of 2014, out of the 16 identified main shortfalls of the Alliance during recent operations, the shortage of ISR dedicated RPAS and lack of a developed multinational information sharing process has been highlighted. What does the Air Force intend to do to increase information availability across NATO?*

The Italian Air Force has been carrying out airborne ISR operations with our RPAS for ten years, with a large operational experience accumulated both in various out-of-area operations and in support of other governmental agencies in Italy. These activities place the Air Force as one of the most relevant actors in this field in Europe and we are constantly working to capitalize on the experiences gained so far, as well as to further increase our capabilities.

Clearly, we acknowledge and realize that the modern crises entail a rising need for information and operations need to be more and more Intel-driven in order

to attain success in most of the current scenarios. Hence, ISR assets have a very valuable role to play. In this regard, the Italian Air Force is currently working on different strands that include ensuring continuity and possibly an enhancement of our RPAS fleet and also focus on making sure that the data produced by each sensor is properly exploited in order to maximize its informational value.



As far as RPAS collection platforms are concerned, we are pursuing a set of Surveillance and Reconnaissance sensors improvements for our current frontline of MQ-9s. Moreover, the Air Force is significantly engaged in two main ISR programs (i.e. P1-HH Hammerhead and European MALE 2025) that, although different in terms of current development stages and capabilities, are both intended to eventually contribute to the overall availability of data. I do highlight this latter term, data, as independent of the automatic processing capability that might be associated with the collection phase. We recognize that the biggest challenge for developing our ISR capabilities lies in realizing a system where collection assets and sensors are integrated into a managed cycle and the appropriate level of resources are allocated to the Processing, Exploitation and Dissemination functions, with the ultimate goal to satisfy the informational requirements in support of the conduct of operations. The degree of success is to be measured against the satisfaction of those information requirements and that requires a high degree of specialization

across all professional figures that contribute to this cycle, from ISR planners to RPAS and exploitation crews.

The complexity of the task at hand is self-explanatory. The Italian Air Force is applying a construct that is quite similar to what NATO has been relying on through its JISR initiative. The three pillars of Training and Education, Doctrine and Networking describe at best the main efforts that need to be exercised constantly in order to support JISR as an enduring capability. In fact, as we are striving to fulfil the goals I mentioned above, we are fully integrated in NATO's ef-

fort to achieve JISR Initial Operational Capability, which should coincide with the ITA JFAC period of standby in support of NRF-16.

Moreover, Italy is deeply involved in the NATO AGS program that will soon begin operations from one of our Air Force Bases, Sigonella. Being the Host Nation for this very challenging and demanding program is not only a demonstration of the capability that Italy has achieved in managing complex RPA Systems, but also of the firm commitment and clear intent that we have in increasing the information sharing among the Alliance. Not only do NATO processes and procedures need to be improved, but also the Nations' overall understanding of the value that a better and more tailored information sharing could bring to the Alliance decision-making process.

However, from a policymaking perspective, probably the biggest challenge lies in the modalities for sharing information and in particular for sharing Intelligence information, in an alliance, multinational or coalition environment, in which each Nation is constrained by different national legal obligations. The Air Force certainly recognizes the value of information sharing and will continue to be a driving force inside the Italian MOD to promote all those policies and frameworks that can help increase information availability through multilateral or bilateral agreements.

*Continuing with NATO identified 'Short Falls', both the limited European 'Tanker' availability and the scarce number of 'Cat3' type AAR Clearances have to be addressed. What measures do you foresee that will facilitate the processes of certification and release?*

The Italian Air Force has worked for several years in EU/NATO/COE fora (i.e. NATO AARWG, EDA, ARSAG, etc.) to find reasonable solutions for this NATO capability gap.

Since we all know that Air to Air Refuelling is a critical enabler for air power projection, our Subject Matter Experts worked closely with JAPCC, custodian of the STANAG ATP 3.3.4.2 'Air to Air Refuelling', to find reasonable solutions to overcome the status quo.

Italy was the first country in the western world, alongside the Japan Air Self-Defence Force, to operate a new generation tanker, the KC-767A, beginning in Operation Unified Protection in Libya through today's missions in support of Operation Inherent Resolve.

Doing so, we were the first Air Force to face the problem associated with the high number of certifications required when you have new tankers as well as new receivers.

To solve the problem, we initially tried, within EDA, to explore the possibility of collective clearances with some positive results but we switched soon to a bilateral approach that proved, at the end, the best option.

Italy has gained a lot of experience in this field that we wanted to share at the highest level. This was done at the last EURAC conference, held in Milan, where our aim was to engage European Air Chiefs on sustainable as well as cost-effective air power projection by AAR in present and future NATO/EU/COW operations. Since AAR is a typical pooling and sharing capability, with present budgets and human resources' constraints, only few Air Forces, especially in Europe, can afford not to cooperate. With this situation in mind and thanks to a comprehensive approach in the STANAG application, we were recently able to certify France's E3-F and NATO's E3-A AWACS on KC-767A, opening future possibilities for other Air Forces and/or organization.

Concerning industrial policies regarding new tankers (i.e. A330 and KC46 family) we have already seen, especially in the EDA forum, that the lessons identified/lessons learned from the ITAF were taken in account by new tanker customers, requiring industry to provide the airplane ready with some specific AAR clearances before the delivery to the Air Force.

With decreasing defence budgets and an increased number of operations requiring AAR, the future calls for an evolution of the current version of the NATO STANAG, especially from the European side, to permit safe AAR operations while decreasing the human/operational/financial effort required today to achieve a full CAT. 3 AAR clearance. Nowadays, that drives many operators to request cheaper CAT. 1 'urgent clearances'

when the operational needs arise. In this respect, assertive leadership from the US to facilitate the process of certification of other Alliance Nations tanker and receivers would be extremely useful due to the overwhelming magnitude of its AAR capability.

*The new Italian Defence Strategy, the 'White Book for International Security and Defence', was recently published and defines Armed Forces human capital as a strategic element that is vital to effectively contribute to the achievement of national and international goals being pursued in upcoming years. In general, do you feel the 'White Book 2015' requires radical changes for the Italian Air Force?*

The Italian Air Force is ready to achieve the medium/long term the goals outlined by the 'White Paper 2015'. However, the highly specialized components that characterize the service make it necessary to develop an organisation that does not disperse the valuable professional skills already existing. These highly specialized professionals will be entrusted with the delicate task of channelling expertise to the younger generation. In turn, the new Air Force staff will be recruited according to specific criteria, geared to finding the best human resources made available by our nation.

A deep assessment of the macro-level trends affecting our Air Force is underway in order to promote the reorganization of structures and procedures. The goal is that of avoiding unnecessary duplications and redundancy as well as to improve our operational capability and our aptitude in order to be interoperable.

It is an effort to be implemented without changing the structure of the Air Force and without calling for additional resources from the country, in addition to providing special attention to the legitimate aspirations of staff and ensuring the continuity of the operations in progress. 'Reorganize while working': this always was and remains our path to improvement!

*In a time of economic constraints, multinational co-operation has grown to be a high priority both within NATO and European Union; concepts such as 'smart defence' and 'pooling and sharing' are more and more encouraged. Nevertheless, with the exception*



*of ENJJPT, almost every Nation has both a national pilot training Centre and bilateral agreements for training. Do you think that the creation of a multinational flight training syllabus, both basic and advanced, for fighter crews, conventional fixed wing transport aircraft and helicopters, is a pursuable path or do you suspect the benefits derived from resource pooling would be in turn spent on increased management costs of this type of pooling concept?*

Budget reviews in all our countries require a suitable policy that matches economic context and security requirements. Nowadays, finding out and exploring new synergies and opportunities of cooperation is becoming more crucial than ever. The creation of a multinational flight training syllabus is undoubtedly a way not only to reduce costs of training but also to share experiences with partners in order to comply with the statement 'fight together, train together, educate together', which I do believe is always valid.

The issue of common defence and security is as imperative to all NATO and European countries as it is to Italy. These countries, and their armed forces, taken individually, are unlikely to achieve results that are

able to meet the new challenges of a changing world. To win we must be a Team! To be a Team we must share. Share to win is the key for success!

At the EURAC 2015 conference, Brigadier General Kraak, RNLAF, in view of developing the European Air Crew Training Center (EACTC), mentioned the 61° Wing in Lecce and the new T-346 as a possible solution to fill in the European aircrew training gaps. He envisages the solution of a common EACTC in Lecce with the aim of reducing costs and maximizing and downloading operational training so as to have more combat aircraft available for ops. With that in mind, Lecce Airbase's capabilities fulfil the RNLAF commitments for pilot training, as recently formalized in a T.A. with ITAF. The 61° Wing is a mature reality where flying instructors and trainees of eight nations already train together.

Today, the T-346 is the most advanced lead-in fighter trainer and it is representative of 4<sup>th</sup> and 5<sup>th</sup> generation fighters. The T-346 is part of an Italian-built Integrated Training System optimized for the different phases of the training syllabus, which also includes Academic Training System, Flight Training Devices and Full Mission Simulators. With this Integrated Training System, which is capable of further optimizing training time, increasing security and improving overall pilots' skills,



the Italian Air Force will enhance the quality and the quantity of its training potential in order to offer it to a major number of foreign customers/partners and continue its long tradition of training pilots from other countries.

*Do you feel NATO should review the process of scheduling and executing its Air Exercises in a Joint and Combined manner in an effort to make them more attuned to the real world and if so, how?*

Exercises are the main tools through which NATO tests and validates its concepts, procedures, systems and tactics. Furthermore, they enable militaries and civilian organizations deployed in theatres of operation to practice working together. In that sense, the NATO Connected Force Initiative allows the Alliance to move from a 'campaign-oriented' to a 'preparedness-oriented' posture, increasing collective training through exercises. In order to provide Joint and Combined events enabling forces capable to fight present and future threats, the planning and programming system needs to permit the execution of short-notice exercises. That is the way to increase NATO's visible assurance. Specifically, the Readiness Action Plan implementation will be a crucial step for the Air Component to affirm to the world NATO's determination in assuring the Allies training of the standby NRF elements. Of course, it will be vital to extend common funding coverage to include the strategic lift for supporting the deployment of the forces in exercises. It will show a credible and evident resolution in NATO actions.

*As a Senior Airman, with vast experience ranging from the full-fledged Cold War to a period of diverse crises, what advice do you have for contemporary NATO Airmen?*

Contemporary NATO Airman, today more than ever, are operating in a much broader, complex and ever changing asymmetric scenario worldwide. Despite the economic constraints and budget reviews that are affecting all our countries, the strength of the organisation has always been the willingness and the ability to operate and cooperate together. Hence, if the pooling and sharing has recently become one of NATO's most important capabilities, the human resource has always been at the core of its joint air power capabilities.

My advice to contemporary NATO Airmen is to continue to share experiences, educating, training and fighting together in order to pursue the issue of common defence and security for each country and for all the NATO. The achievement and results of a well-performing team are likely to be much more successful than the work of the single individual. Continuing to look for new synergies is the key for success, not only to reducing the costs of training and military expenses, but, most importantly, to exploiting each capability with the awareness of being part of a great and professional joint team, in which the Air component is a relevant and important tile of the entire framework.

*Sir, thank you for your time and your comments. ●*

#### **Lieutenant General Pasquale Preziosa**

was born on 21 March 1953. He joined the Air Academy in 1971 where he qualified as combat pilot. Amongst his assignments:

- Commander, 36<sup>th</sup> fighter Wing, Gioia del Colle AFB;
- Defense Attaché and Defense Cooperation Attaché, Washington, DC (USA);
- Commander, Air Education and Training Command, Bari;
- Chief, Cabinet of the Minister of Defense, Rome;
- since February 2013, Chief of Air Force, Rome.

He spent more than 2,300 flight hours as pilot of several different aircraft and helicopters (P148, MB326, G91T, F104, G222, TORNADO, NH500, P180, FALCON 900). General Preziosa holds Postgraduate degrees in Aeronautic Sciences and International and Diplomatic Sciences.





# The Electromagnetic Spectrum: The Cross Domain

By Major Garrett K. Hogan, USA AF, CAOC Udem

**'Electronic Warfare (EW) is military action that exploits electromagnetic (EM) energy to provide situational awareness and achieve offensive and defensive effects. EW, the conduct of Electromagnetic Operations (EMO), is Warfare in the Electromagnetic Environment (EME).'**<sup>1</sup>

This simple yet broad definition from the highest level of NATO effectively covers all domains and a multitude of activities. Due to this broad scope, a deep understanding of EMO is limited to only a small community of EW experts in the NATO Command Structure, and broader military community. As the conflict in Afghanistan wanes, NATO is reminded that not only have technology and capability advanced during that decade-long struggle, but the world has become increasingly smaller due to communications networking and the

exploitation of the entire electromagnetic spectrum. Contemporary military operations are executed in an environment complicated by increasingly dense and complex demands on the EME. An environment once the purview of a very small and specially trained group of EW operators is now of utmost importance at the operational and strategic levels. NATO doctrine was therefore rewritten 'to significantly improve NATO's understanding and employment of EW capabilities in response to both the growing availability of modern weapon and information systems, and the increasing exploitation of the EME by adversaries.'<sup>2</sup>

While all warfighting domains are in some way reliant on the EME, the most heavily dependent are the 'Information Age' domains of Air, Space and Cyber. This is why airmen require a solid understanding of NATO

EW doctrine and its operational relevance. In support of this understanding, this article highlights EW as an important aspect of conducting joint operations in a contested environment.

## Electromagnetic Operations in the Electromagnetic Environment

On today's battlefield there are many operational capabilities which depend on using or exploiting a portion of the Electromagnetic Spectrum (EMS). These capabilities largely exist in separate disciplines. Examples include communications and data links, sensors (imagery, surveillance, reconnaissance, and radar) and many forms of intelligence collection, EW, navigation and navigation warfare (NAVWAR), targeting and weaponry.

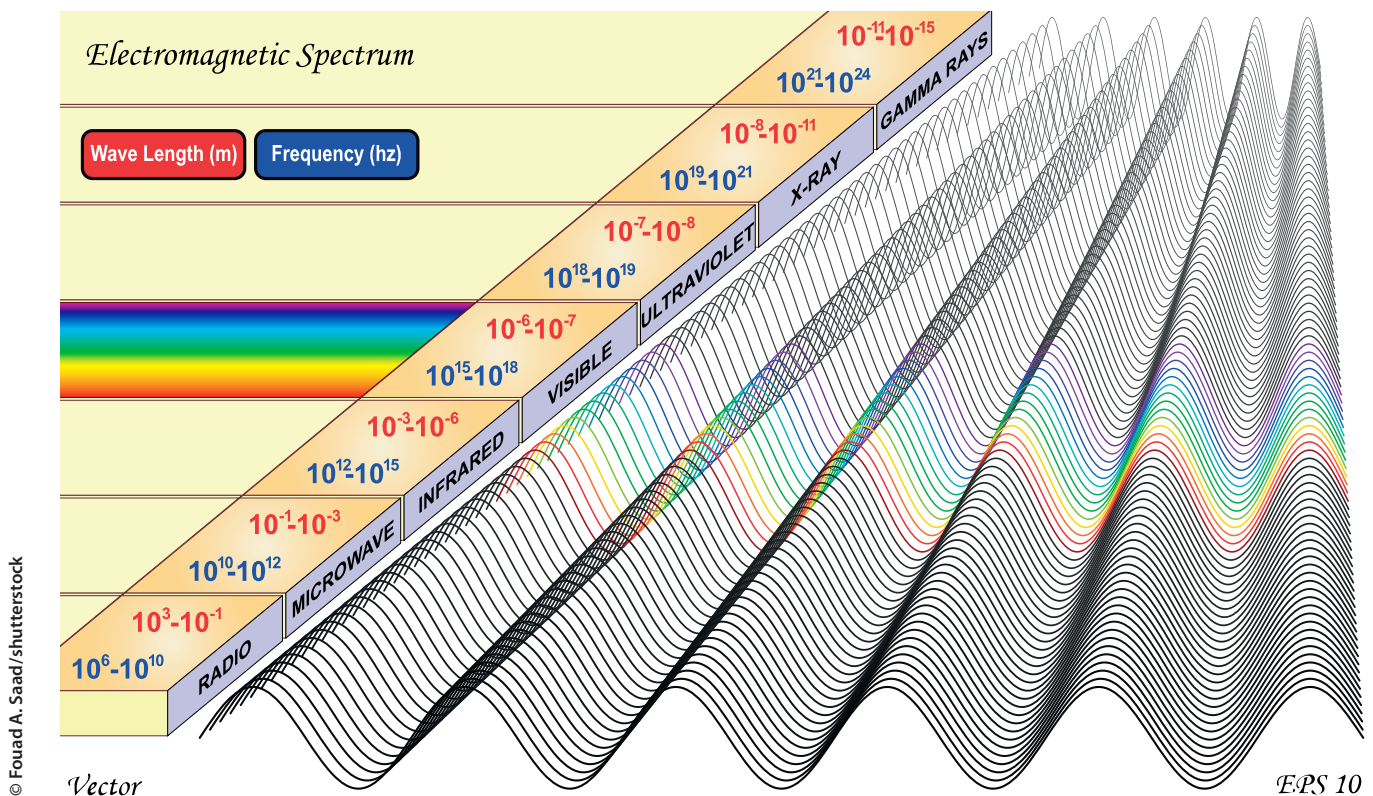
NATO has recognized the EME as a manoeuvre space and defines it as, 'The totality of electromagnetic phenomena existing at a given location.'<sup>3</sup> It is a local operational environment which serves to connect all other physical and informational domains. These

connections take place simultaneously and use different but potentially overlapping parts of the EME. Put simply, the EME enables activities and effects across all domains.

Potential adversaries operate within the EME as well and may seek to exploit or interfere with Alliance use of it. In addition, non-combatants make use of the EME as an everyday capability, for such purposes as emergency services, personal or business communications, navigation and entertainment.<sup>4</sup> The increasingly dense utilization of the EME drives the important requirement to actively avoid undesired conflicts across the domain. This need for deconfliction between friend, adversary, and neutral use is a concern for operation planners at all levels, land, sea, air, and joint.

## EW Actions and Measures

It is beyond the scope of this article to define all EW Measures and Actions. Here, it is more important to understand how they interact in the operational and tactical sense to support the delivery of Electronic





Warfare to create operational and tactical effects, as is shown in the diagram below. The diagram also provides a basic understanding of the various EW actions and measures.

The Electromagnetic Spectrum (EMS) can be thought of as a warfighting domain similar to the Air, Space, Cyber, Land, and Sea domains, but it is unique in the fact that it will always interact with all other domains. An action taken in the EMS by the Land Component in the Land Domain may have an impact on other components operating in other domains. For example, take into account Counter Improvised Explosive Device efforts in Afghanistan and Iraq. Efforts there by the Land Component to defeat the radio controlled improvised explosive device (RCIED) required an EW Action, Electronic Attack. This operational action was, in turn, applied at the tactical level as Electronic Counter Measures (an EW Measure) in the form of Counter RCIED Electronic Warfare (CREW) systems such as Symphony and Guardian. These systems, while effective at denying the RCIED threat, had cross domain impacts on Air and Space Domain personnel who were attempting to access the same portion of the EMS for communications and intelligence. It was because of this level of interdependency that the EMS extended beyond just simple joint interaction and

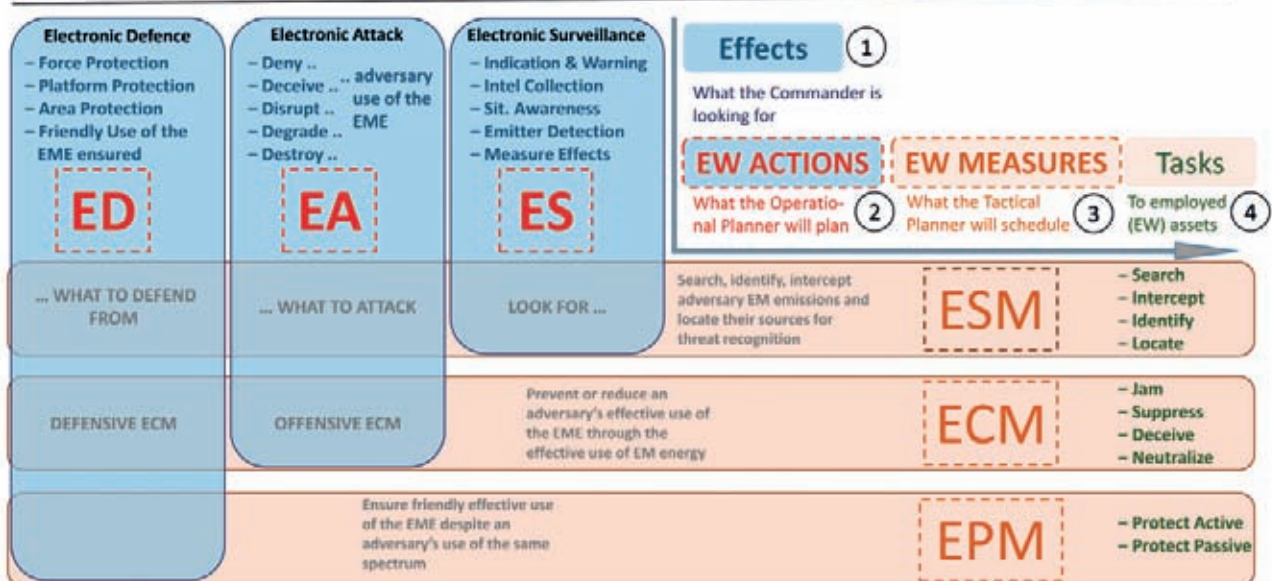
required a cross domain focus, meaning that all domains must be considered for every EW operation. The next few paragraphs lay out more examples of interdependency for each domain. The diagram below will serve as a reference for those discussions.

## Air Interdependence

In the Air Domain, communication, navigation, survivability and superiority are all dependent on the EME. Modern navigation and all-weather weapons delivery is reliant on satellite navigation (SATNAV), i.e. the Global Positioning System (GPS). Survivability involves EA and ED. Air superiority, targeting and munitions employment are based on the use of Radio frequency and electro-optical systems to find, fix, track, target and engage adversary capabilities. All of these functions require access to the EME. Stripped of the EME, air forces would not operate effectively. The operational situation would worsen if the adversary were to maintain access to the EME.

With regard to communications, airpower is heavily dependent on the EME because the coordination of air activities, the deconfliction of aircraft tracks as well as the transmission of mission essential data or intelligence would be virtually impossible without radio

## EW Actions vs EW Measures - From Effects to Tasks



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communication or data links. Communications in the air domain are primarily in the 30 MHz–3 GHz portion of the spectrum, which makes them very susceptible to either unintended or deliberate EM Interference (EMI). Examples include, but are not limited to, EM jamming of Early Warning/Acquisition radars and communications jamming. One method of mitigating EMI is the use of frequency hopping or spread spectrum techniques; however, these techniques require extensive input by the operator. One missed or incorrectly executed step in this EPM will deny the use of a frequency as effectively as the EMI you wanted to evade. Another particular vulnerability is the risk of hostile communications interception as well as position tracking combined with the provision of critical information such as system type and purpose.

Modern all-weather navigation and precision guided munitions (PGM) delivery is reliant on GPS. If an aircraft is unaware of its location in space and time, that aircraft is incapable of accomplishing its mission and is most likely a danger to other aircraft in the surrounding airspace. Internal Navigation Systems (INSs) are capable of providing rudimentary navigation information to air crews, but INS drift rates will sooner or later degrade navigation accuracy to a point that

precludes any precise employment of weapons. GPS is a low power signal that is easily overcome by jamming and is likely to be denied or degraded in future conflicts. This is a weakness requiring mitigation at all levels of planning.

Aircraft survivability is likely the most significant air-power matter with regard to EME dependency. Modern Anti-Access/Area Denial capabilities present a significant challenge to air operations. Air superiority in these areas requires first attaining EME dominance. In the air domain, this requires Suppression of Enemy Air Defences (SEAD).<sup>5</sup> Air operations in denied airspace require friendly forces to deny enemy air defence systems (in particular radars) the information they need to engage friendly forces. The heart of any SEAD package is the EM Jamming platform. EA/ECM typically requires the employment of extremely high energy to jam the applicable radio frequencies. While most modern fighter aircraft have a sort of built-in offensive and defensive ECM capability, a SEAD strike package requires the employment of special purpose aircraft such as the US EA-6B Prowlers or EA-18G Growlers and EC-130H Compass Call. However, the high power these stand-off jammers employ can have unintended second-order consequences across the

EME at ranges well outside their intended target area, including the risk of Radio Frequency fratricide.

Due to the boundless nature of the air domain, EMO in the air have a large footprint. Denying the adversary the use of a specific band of the spectrum may also make it impossible for friendly forces to make use of that same band. Therefore all EMO (EW Actions and EW Measures) must be coordinated by the responsible staff not only with regard to forces, time, and space, but also with regard to frequency bands and spectra involved.

### Space Interdependence

Space is a supporting domain. Space assets have become indispensable, providing advanced early warning, surveillance, precision navigation and timing, and over-the-horizon global communication links. When stripped of EME access, space support to theatre operations is heavily degraded.

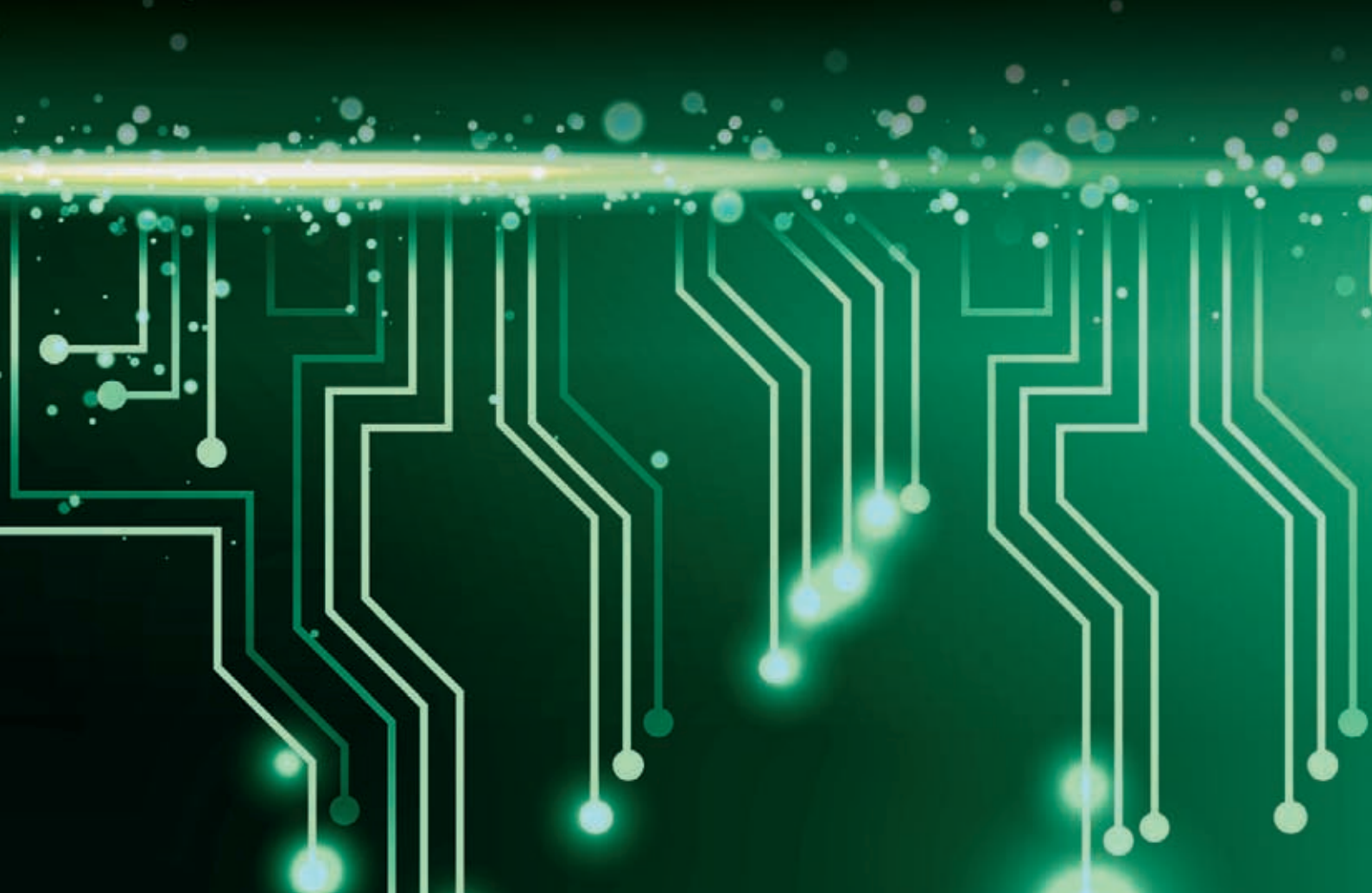
Downlinks are a critical vulnerability; however, space jamming effects are likely to be local in nature, as the negation of space communication or control in one region does not necessarily mean that it is negated

globally. As such, space can continue to provide capabilities despite being rendered ineffective in a region if adequate contingency measures are in place.

### Cyberspace Interdependence

While there is no commonly agreed definition, the US Department of Defence defines Cyberspace as 'a global domain within the information environment consisting of the interdependent networks of information technology infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers.'<sup>6</sup>

Cyberspace is the only domain that has been physically and virtually created by humans. A single computer, connected to the network, is nothing but an input/output device to access cyberspace. Cyberspace does not exist without access to the EME, being completely dependent on mostly-commercial digital lines of communication. These lines of communication travel through copper wires, fibre optic cables, and microwave and satellite relays, all of which are applications of the EME. Therefore Cyber and Electronic Warfare share more common ground than not.



The definition and explanation above implies an obvious vulnerability of cyberspace assets; it is possible for an adversary to attack the infrastructure of digital communication lines and computer systems by other than kinetic means. In terms of EMO/EA, the application of Direct Energy Weapons (DEW, e.g. lasers or high-power microwaves) could achieve the same effect. On the other hand cyberspace assets are vulnerable to 'logical' cyber-attacks which aim not to destroy the system but use the system for the benefit of the attacker.

Richard Clark describes a perfect example of the effective exploitation of airspace and cyberspace interdependency.<sup>7</sup> He points out that the September 2007 Israeli strike on a North Korean-sponsored nuclear weapons facility in Syria succeeded using 'highly observable' (as opposed to low observable or 'stealth') F-15s and F-16s despite a Russian-designed, modern, long range SAM-based air defence system. He postulates that a cyber-attack delivered by an Israeli EA asset allowed Israeli forces to virtually take control of the Syrian Integrated Air Defence System (IADS), so that the Israeli air strike package could breach Syrian airspace without any risk.

## Conclusion

Competition for accessing and using the extremely complex EME will increase in the future. Since the EME has no single owner, there is no way to prevent an adversary's access to it. Any sort of localized control is

only possible through sound application of EW. While airmen must pay particular attention to the EME, EW is inherently joint. That is why all commanders and staff involved in NATO operations must consider the EME, recognizing and supporting their EW staff as critical advisors. Dominance in the EME is critical to 'information dominance', which is widely seen as central to modern warfare. The Chinese maxim, 'a superior force that loses information dominance will be beaten, while an inferior one that seizes information dominance will win'<sup>8</sup> puts this dependency into sharp focus.

There will always be a weak point in the EME. Every emitter/receiver is a possible point of attack and every exposed junction a critical vulnerability. Every piece of information is vulnerable to spin, denial, and deception. If our conventional capability is our strongly-united and impenetrable front (as demonstrated in recent conflicts), our EME reliance is our undefended flank. Deconfliction, synchronization, prioritization and protection of the EME are therefore keys to the success of NATO operations. ●

1. NATO Military Committee, 'MC 0064/10 NATO Electronic Warfare (EW) Policy', 27 Mar. 2009, par. 6.
2. NATO, 'Allied Joint Doctrine for Electronic Warfare, AJP 3.6(B)', Jul. 2012, par. 0104.
3. NATO 'Glossary of terms and Definitions, AAP-6', Edition 2014, p. 2-E-2.
4. NATO 'Allied Joint Doctrine for Electronic Warfare, AJP 3.6 (B)', par. 0301.
5. NATO 'Suppression of Enemy Air Defences, MC 0485/1', 26 Feb. 2014, p. 3–12.
6. NATO Cooperative Cyber Defence Centre of Excellence, 'Cyber Definitions Glossary', available at <https://ccdcoc.org/cyber-definitions.html>, accessed 20 Aug. 2015.
7. Richard A. Clarke and Robert K. Knake, 'Cyber War: The next threat to National Security and What to do About it', (Harper Collins Press, New York, NY, 2010), p. 1–8.
8. *Ibid*, p. 49–50.

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## Small Drones

### *From Cheap Toys to Terrorist Tools – Detection and Disruption Challenges*

By Knut Torbjørn Moe, NOR, Squarehead Technology AS

The commercial drone industry has been in operation since the mid-1990s with expensive, highly advanced systems. The year 2013 saw the release of the DJI Phantom, a commercially available drone for aerial photography, and, suddenly, high tech was available to anyone for less than 1,000 EUR. With hundreds of thousands of commercial drones being sold every month, should we believe that none of them will end up in the hands of would-be terrorists or criminals? Security professionals must obviously take related threat scenarios into account, and solutions are possibly required to mitigate the risk.

#### The Evolution of Small Drones

In recent years, military personnel have become increasingly familiar with the use of drones for anything from practice targets to air strikes. Military drones show huge promise and will certainly play an important role in the decades to come. With the de-encryption of the GPS system in 1999, there was suddenly an opening for civilian manufacturers to build self-flying systems. From this event, among others, the civilian drone market was created. By 2005, professional systems such as the MD4-200 from Microdrones GmbH, with its ability to provide

an aerial photography and mapping platform, grew to be a mainstay of the market. Since then, hundreds of manufacturers have built their models and sold some tens of thousands of systems in the high-end market.

#### Payload and Range

Putting us in the post-professional civilian drone era, DJI disrupted the market with the launch of the rotary-wing DJI Phantom in early 2013. DJI places the capabilities of larger systems into a hobby package, which can be purchased for less than 1,000 EUR. Its operation can be mastered by nearly everyone.

The DJI Phantom's payload is listed at 200 grams, but unofficial tests confirm a capability of up to 1,000 grams. On 6 April 2014, a drone operator flew a standard DJI Phantom mounted with a camera for 16.4 kilometres while following it by car. Alternatively, the flight could have been conducted in a pre-programmed mode. Added payload weight would, of course, have altered this result. However, in general, it can be assumed that modern civilian drones can deliver 1 kilogram at a range of 5 kilometres through programmed flight.

Common professional drones such as the Aerialtronics Altura Zenith can carry up to 4 kilograms for as far as 15 kilometres. The Dronera X12U has a payload of 100 kg and battery endurance for 35 flight minutes. The technical specifications of the DJI Phantom features look minor in comparison; however, one can imagine that its small payload combined with its long range offers possibilities for many useful applications. Numerous manufacturers are offering small drones with similar features as the DJI Phantom to the civilian market, which presents a huge potential for commercial use.

## Potential Malicious Applications

The increased capabilities of commercially available drones provide multiple areas of concern for security professionals:

**1. Imaging.** By autonomously flying over restricted areas and collecting thousands of low altitude, high-resolution images, an ultra-high resolution aerial picture could be created. These images, including detailed topographical information, allow an opponent to covertly create maps of areas that are off-limits to them. The operator could see details down to 1 cm<sup>2</sup> and calculate the topology with astounding precision. Furthermore, in order to enhance intelligence collection, sensors such as thermal cameras or multispectral payloads might be used to create maps of heat sources, tap wireless networks or provide other types of sensor information. In short, drone-assisted mapping gives forces without satellite capacity the capability to collect high end imagery intelligence.

**2. Observation.** Obviously, small drones can transmit or stream their video signal back to their operator. Such awareness would allow an opponent to plan entry into a compound and stay hidden from protective forces. Previously, strong video transmitters were required for this purpose, but technology has evolved and transmitters with low signal strength and even encryption are available now. Finally, modern mobile phone networks such as 3G/4G allow for direct streaming of High-Definition (HD) video with minimum latency to anywhere in the world with high-end encryption.

**3. Smuggling.** Smugglers on all continents have already discovered the possibilities that commercial drones provide. Drones allow for trafficking contraband such as drugs, weapons, information, and mobile phones into compounds such as prisons, but also across borders – all without the risk of capture. Additionally, drones might be used to smuggle information and even technology out of secured areas.

**4. Hacking.** Small routers specifically manufactured to scan for vulnerabilities in a wireless network are already commercially available. Drones may be equipped with such devices, remotely uncover these vulnerabilities in an organization's network infrastructure and allow an opponent to gain access to data not accredited to them.

**5. Tapping.** So called IMSI-catchers, which can exploit the International Mobile Subscriber Identity (IMSI) stored on the mobile phones' card as well as false cellular phone base stations are available from online stores. Drones would allow an opponent to covertly position such devices on rooftops and other locations to create optimum coverage. The devices would allow for intercepting communications (voice and data) conducted on the cell phone networks in range. In the past, fenced and guarded premises created enough stand-off to make such techniques useless. However, small drones could easily place such devices under the cover of darkness, allowing intelligence collection for as long as batteries will allow.

## From Kids Toys to Terrorist Weapons

Commercial-Off-The-Shelf (COTS) drone systems with the possible applications stated above provide the operator with an infinite amount of nefarious possibilities. It would be naïve to believe that criminals or terrorists will not make use of these opportunities. As far as criminals are concerned, it can be assumed to be standard that they grab whatever technology is available and use it for malicious intent.

Terrorist use of drones has been widely reported since 2014. Drones were not only employed for intelligence collection. Current reports mention drones fitted with explosives, guns, fluid and powder dispersion devices



for chemicals and more. In some areas, DJI Phantoms have been used for counter-sniper work, suicide bomber support and even direct attacks with explosives. Some news stories show militants attaching hand grenades and IED's to drones for pinpoint aerial delivery. Remembering the DJI Phantom payload of potentially 1,000 grams, terrorists could, for example, drop an equivalent of at least two M67 fragmentation grenades, which have a 5 m fatality range, via a pre-programmed autonomous drone flight with an accuracy of 1 m radius around the target.

Installations such as embassies, oil refineries, prisons, government offices, military bases and communication installations are terrorist targets of interest. In July 2015, both British and American intelligence services reported evidence that terrorist organizations are planning to use drones, or even swarms of drones, to carry out attacks against heavily populated installations such as football matches or festivals.

Given the enormous attention that improvised drone weaponization receives on the internet and the sheer number of systems available, it is highly probable that commercial drones will be fitted and used for attacks within the near future, both within and well outside of recognized warzones.

### Improving Security without Expenditures

The first step to solving a problem is admitting its existence. Risk exposure to low, slow and small drones should be a dedicated part in the risk analysis for any building, compound, border or unit. By introducing traditional thinking, one can plan for a number of precautions connected to drones, some of which are: guards should be on the lookout and have a specific alarm procedure; sensitive installations could be covered when not in use; and,

VIP visits should generate increased security with regard to drones.

Due to a lack of statistics, probability remains an unknown factor and is not a suitable parameter for establishing a complete risk analysis. One should instead weigh the costs of investment in drone security in relation to the value of the protected asset. What would the loss be should drones compromise the integrity of a base, compound or border after all defensive measures have been attempted?

### Available Technologies

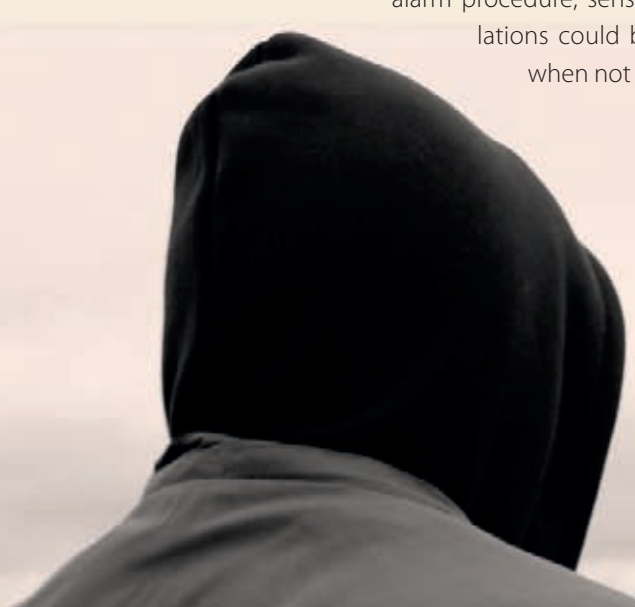
There is a growing business sector dealing with establishing drone-secure airspaces. As aviation authorities struggle to keep up with the advances of drone manufacturers and instead focus on creating regulations for legal drone businesses, control of the large number of drones for recreational use remains an open question. This leaves the responsibility for close proximity air space to the respective landowner.

There are two basic components of drone defence: Detection and Suppression.

Detection devices allow the operator to become aware of a current threat in the airspace, whereas suppression technology enables the operator to counter that threat.

There are currently numerous technologies, such as laser scanning, radar, acoustic, video, radio signal scanning, that can provide drone detection. Each of these technologies carries advantages and disadvantages.

Drone suppression technology is in the early developmental state. Counter-drones, lasers, GPS jamming and spoofing, as well as microwave cannons are being tested with increasing success. All these systems have in common that they may cause a flying object to lose control and crash into the ground. The kinetic energy from such a crash is likely to injure or even kill a person on the ground, opening up a large liability issue for the responsible user. One industry player has introduced the 'Proportional Drone Response' concept to the discussion. This concept requires organizations to assess the



cost benefit of shooting down drones versus allowing them to continue. For safety reasons, it is argued that landowners should, in most cases, forego aggressive suppression until it is absolutely mandated for security.

## Sound as Detection Parameter

For low-altitude, short range drones, research conducted has concluded that acoustic detection is quickly deployable with a low false positive rate. Furthermore, acoustic sensing is inherently safe, as neither radiation nor signals are emitted.

Any flying system produces specific sound patterns, and, as it turns out, that sound pattern is difficult to conceal. The sound patterns of drones are highly recognizable and are completely different from any other flying objects. To date, the problem has been that regular microphones would not provide sufficient range to be successful as triggers for effective countermeasures (typically, 100–150 metres of detection range). However, technological advances and multi-microphone arrays that will extend detection range to over 700 metres are being tested commercially.

## Conclusions

The 'Personal Drone' has emerged from the hobby builder's basement to a multi-billion dollar industry over the course of 3 years. In these years, technology has advanced from 'barely airworthy' to 'advanced autonomous operations and payload delivery'. With thousands of engineers working on hardware, software, user interfaces and innovations, there will be a sharp

increase in available capabilities and systems. These will be ever more powerful, cheaper and easier to use.

Expected developments in the coming years include:

- drones that can stay aloft indefinitely using solar power;
- inexpensive thermal cameras that allow for night-time operations;
- drones that can transport a person;
- homemade weaponized drones;
- intelligent understanding of surroundings, allowing drones a higher degree of autonomy;
- lower prices for basic functions, potentially providing a dispensable drone for single use.

The impending arrival of any of these capabilities will bring amazing opportunities to consumers and hobbyists. However, it also means that the isolated security breaches using commercial drones seen to date are mere precursors to the security challenges to come. As these capabilities become more readily available, drone-related security concerns will continue to grow. It is highly recommended that security analysts pay close attention to the commercial drone industry and that national assemblies and aviation authorities develop legislation governing the use of personal drone aircraft. ●

### References

- ISIS intending to use drones at mass events, <http://www.mirror.co.uk/news/world-news/isis-planning-use-toy-helicopters-6119888>.
- 100 kilo payload helicopter, <http://www.dronera.no/product/dronera-x12u/>.
- DJI Phantom with 900 grams payload, <http://fpvlab.com/forums/showthread.php?31833-Pushing-the-DJI-Phantom-to-the-limit>.
- DJI Phantom 10 mile trial run, <https://www.youtube.com/watch?v=gBj3ntfzCqg>.
- Aerialtronics Altura Zenith – 4 kilos/20 minutes flight time, <http://www.aerialtronics.com/altura-zenith-engels/payload-performance/>.
- CBS News on DHS intelligence bulletin, <http://www.cbsnews.com/news/homeland-security-warns-drones-could-be-used-in-attacks/>.



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# China's Aerospace Power 2015

## *Reconnaissance-Strike Capabilities for an Anti-Access/Area-Denial Strategy*

By Lieutenant Colonel Martin Menzel, DEU A, JAPCC

***This article is an abbreviated version of a longer essay written in September 2014. The full version can be provided on request.***

### Introduction

Since the early 1990s, the People's Republic of China (PRC) has undertaken an ambitious programme of modernizing the People's Liberation Army (PLA), one that continues vigorously today. Significant economic growth within the last 30 years has allowed the Chinese government to invest **enormously in military development**. In 2014, China spent an estimated 216 billion USD on the military, which makes up for 12% of worldwide expenditure and is ranked second behind

the USA. Indigenous military Research & Development competency has also significantly matured and decreased China's former reliance on foreign (especially Russian) technology purchases or copies.

### Quest for Improved Aerospace Power

China's quest for improved aerospace power is based on the Chinese Communist Party's (CCP) evolving strategic needs. The CCP's claim to legitimacy has traditionally been based on the championship of national pride and the delivery of economic success. Challenges to these claims appear to have driven the CCP to resort to the exploitation of territorial sovereignty claims in the East China Sea and South China Sea. This is indicated



by China's recent increasing presence and assertiveness in its near seas (see map at Figure 1), which leads to regional tensions and potential confrontations with the US and its allies (in particular Japan).

The PLA has been prepared for a range of missions beyond China's immediate periphery for more than two decades. The current modernization plan is designed to improve the PLA's capacity to fight and win short, highly-intense regional contingencies, with a focus on deterring or defeating third-party intervention. It includes the development of capabilities to attack, at very long ranges, adversary forces that might deploy or operate within the Western Pacific in the air, maritime, space, electromagnetic, and information domains. To this purpose, China has been constantly increasing military spending with an emphasis on developing key Anti-Access/Area Denial (A2/AD) capabilities in the Asia-Pacific region, for which modern aerospace power and an 'informationized military' (see paragraph on Information Warfare) play a decisive role.

Although the PRC has never publicly acknowledged an A2/AD strategy, it is widely regarded as obvious that China is developing A2/AD in response to US dominance of the air and sea in the Pacific. China is, therefore, significantly upgrading its naval and naval aviation capabilities (notably, the first Chinese aircraft carrier 'Liaoning' was put into service in 2012). However, the primary modernization focus has been to update the People's Liberation Army Air Force (PLAAF) along with the long-range strike and missile defence capabilities of the Second Artillery Forces.

### Advanced Combat Aircraft

China began to acquire the Russian 4<sup>th</sup> generation Su-27 Flanker-family fighters in the 1990s and later produced its own variants. Meanwhile, China has gone beyond cloning Russian aircraft and is now designing and building modified or new military aircraft and systems with limited or no foreign assistance, including their own 4<sup>th</sup> generation designs.

The PLAAF currently possesses more than 2,800 (manned) aircraft in total. Approximately 2,100 of these are combat aircraft, 600 of which are modern.

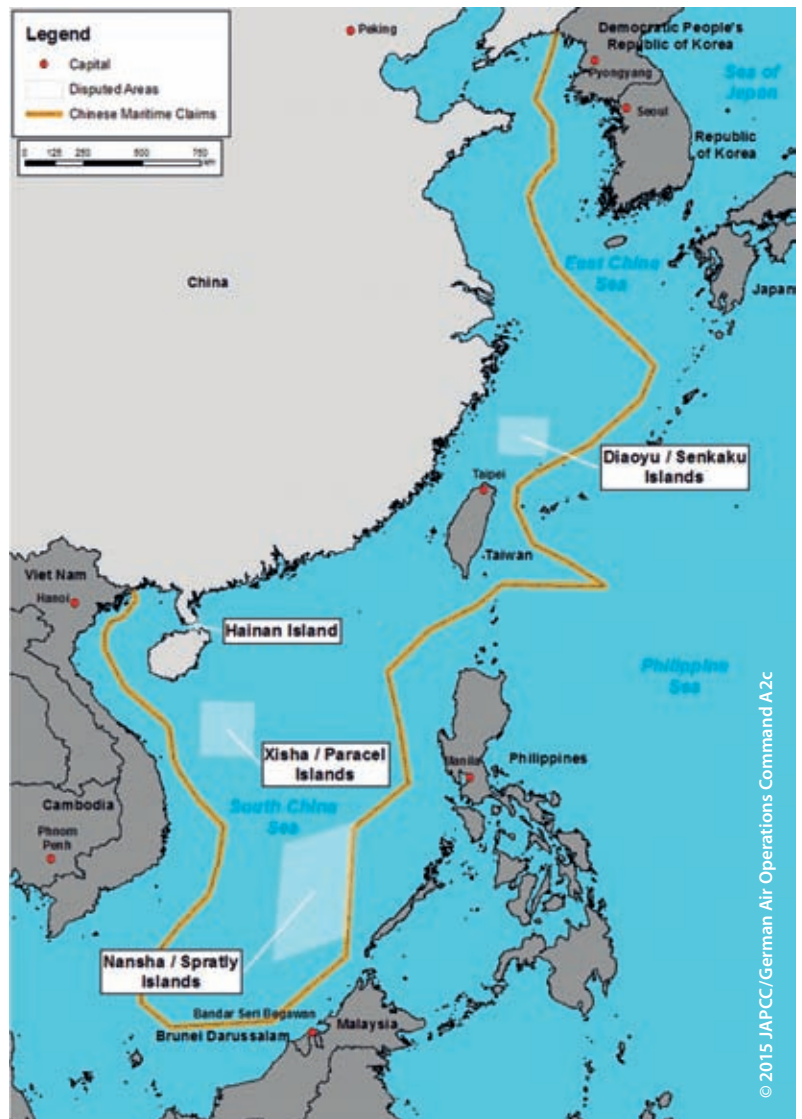


Figure 1: Chinese Maritime Territorial and Surveillance Claims.

The PLAAF's 4<sup>th</sup> generation aircraft include the FLANKER family with the J-11, J-15 (designed for carrier operations), and J-16, as well as at least three versions of the J-10 FIREBIRD family, which is frequently compared to the F-16. More than 50% of the fighter inventory is expected to be 4<sup>th</sup> generation by end of 2016.

Furthermore, China is continuing to design, upgrade and produce the JH-7 and JH-7B FLOUNDER fighter-bomber, the JF-17/FC-1 light fighter, and the L-15 advanced trainer. An upgraded version of the H-6 bomber aircraft (Chinese version of Tu-16 Badger) will have the ability to launch the CJ-10 cruise missile.

Indigenous 5<sup>th</sup> generation fighter/bomber aircraft development is underway, with stealth capabilities, super-cruise capable turbofan engines, modern phased array radar technology, and internal weapons carriage. The J-20 will probably become operational in

2017–18. A second stealth fighter, the J-31, is also being tested. Finally, China is conceivably working on a new bomber concept, a large delta wing bomber with stealthy bomb bays.

The current and projected status of the PLAAF's combat aircraft modernization is shown at Figure 2.

### Aircraft Weaponry

The PLAAF has a considerable number of tactical air-to-surface missiles (ASMs) as well as precision-guided munitions (PGMs), including all-weather, satellite-guided bombs, anti-radiation missiles and laser-guided bombs. China is developing smaller-sized ASMs such as the AR-1, KD-2, HJ-10 (anti-tank) and Blue Arrow 7 (laser-guided) in conjunction with its increasing development of Remotely Piloted Aerial Systems (RPAS). China is also adapting PGMs similar to the US Joint Direct Attack Munitions (JDAM) such as the FT-5 and LS-6 for RPAS.

### Integrated Air and Missile Defence and Air C2

Within 300 nm of its coast, China has credible Integrated Air and Missile Defence (IADS) that relies on robust early warning, fighter aircraft, and a variety of SAM systems designed to counter adversary long-range airborne strike platforms. China is the main buyer of advanced Russian long-range SAMs SA-20 (S-300) and the SA-21 (S-400) 'Triumpf'. It is also scaling up the production of at least four indigenous advanced medium-range SAMs: HQ-9 (Chinese-built SA-10), HHQ-9 (naval version of the HQ-9), HQ-15 (upgraded SA-10), and HQ-18 (Chinese-built SA-12).

China has developed and fielded advanced modern passive radar systems and active, phased array, over-the-horizon (OTH) radars. Other indigenous radars,



The Shenyang J-31 at the Zhuhai Airshow 2014.

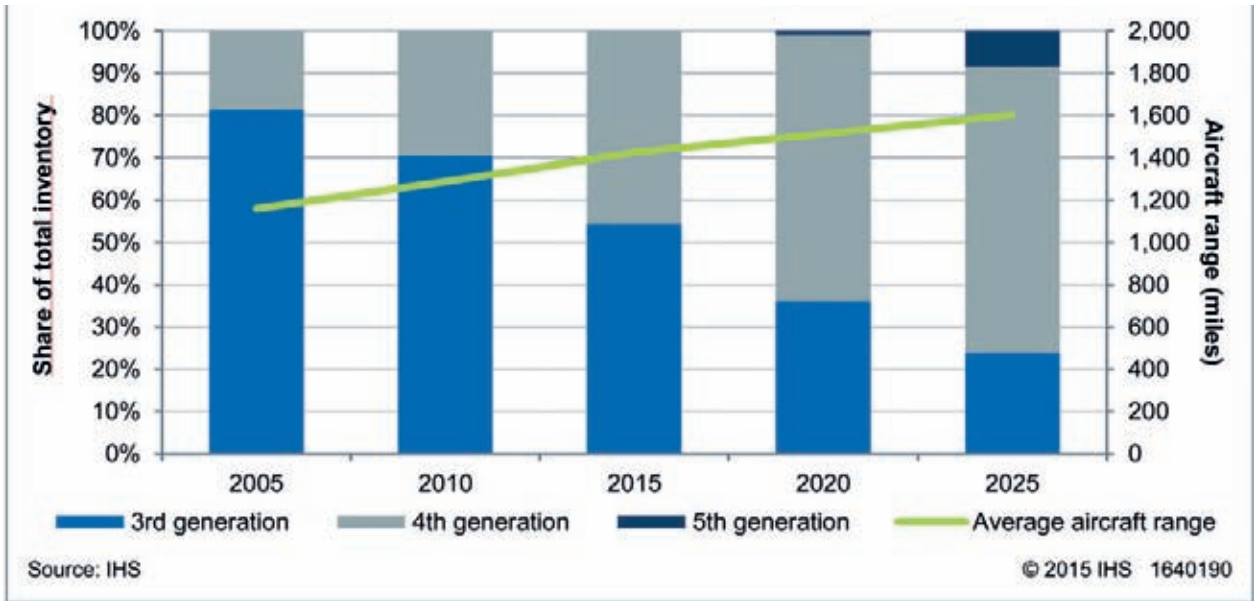


Figure 2: PLA and PLAAF combat aircraft inventory modernization.

the JL-1A and the JY-27A, provide the basis for a considerable Ballistic Missile Defence (BMD) capability, supported by the development of an intercept capability at exo-atmospheric altitudes (kinetic energy) as well as within the upper atmosphere. Finally, two indigenous Airborne Warning and Control System (AWACS) programmes, known as KJ-2000 and KJ-500, improve detection ranges well beyond China's borders. After initial testing and operating in several larger aircraft such as the IL-76 (Figure 3), Y-8W, as well as the Israeli type Beriev A-50, the development of the Y-20 multirole transport aircraft will likely solve China's problems regarding the appropriate air frame for their AWACS.

### Long Range Precision Strike

The development of China's conventionally armed missile capability has been extraordinarily rapid. Improved accuracy has made China more capable against adversary air bases, ports and ships, logistic facilities, communications and other critical infrastructure. China's 'Second Artillery' Force fields a large array of conventionally armed ballistic missiles (currently at least 1,200). Ground- and air-launched Land-Attack Cruise Missiles (LACM), as well as ground-, air-, ship- and submarine-launched Anti-Ship Cruise

Missiles (ASCM), can hold targets at risk throughout the Asia-Pacific region. US and allied bases in Japan are in range of a growing number of Medium Range Ballistic Missiles (MRBM) as well as a variety of LACMs. The US territory of Guam could be targeted by air-launched LACMs as well as by a new Intermediate Range Ballistic Missiles (IRBM) whose development is reaching close to maturity. Anti-ship variants of those IRBM, in combination with seaborne detection radars and precision guidance, might be used for engaging adversary naval assets in distances up to 900 nm from the Chinese coast. See Figure 4 for more details.

### Remotely Piloted Aerial Systems

In order to increase the ability to conduct long-range reconnaissance and strike operations, China is pursuing a major RPAS development and employment effort with impressive technological awareness and financial resources involved. The main High Altitude Long-Endurance (HALE) RPAS is the Xianglong, which can be compared with the US RQ-4 'Global Hawk'. The most important Medium Altitude Long Endurance (MALE) RPAS are the Yilong (Figure 5), Sky Saber, and the stealthy Lijian, all of which are designed to carry precision-strike weapons.





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Figure 3: KJ-2000 AWACS in an IL-76 aircraft at the Zhuhai Airshow 2014.



Figure 4: Chinese Conventional Strike Capabilities.



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Figure 5: GJ-1 'Yilong' MALE RPAS at the Zhuhai Airshow 2014.

## Space and Counterspace Capabilities

China boasts the most dynamic space programme in the world today, supported by a robust capacity for space lift. Over the last five years, China has launched 15–20 Space Lift Vehicles (SLV) and placed 17–25 satellites annually. For military purposes, China increased the number of on-orbit assets including intelligence surveillance reconnaissance (ISR), meteorological, communications, and navigation satellite constellations, which are capable of supporting targeting and theatre missile operations. These include electro-optical/infrared (EO/IR) or synthetic aperture radar (SAR) imagery satellites and electronic intelligence (ELINT) satellites. China is also improving the current constellation of Beidou navigation satellites (NAVSATs), including the production of ground receivers. A global NAVSAT constellation is expected to be completed by 2020. This would provide the Chinese with a proprietary national satellite navigation capability independent of the US-governed Global Positioning System (GPS).

The PRC has successfully produced SLVs, called the 'Long March (LM)', in different payload classes (heavy, medium, and light). These LM SLVs are usually based on ballistic missile platforms and designed to launch small satellites into a low-Earth orbit with little effort and at low cost. In September 2015, China successfully launched the LM-6, its first liquid-fuelled SLV, which is intended to provide new flexibility for civil and military space missions. The LM-6 reportedly has a seven-day launch cycle which allows the PLA to rapidly replace satellite capabilities lost in the event of attack.

In terms of counterspace capabilities, the PLA is acquiring a range of technologies such as directed energy weapons and satellite jammers. In January 2007, China demonstrated a direct-ascent kinetic kill capability against satellites in low Earth orbit by destroying one of its own defunct weather satellites.

## Information Warfare

China has established imperatives for the PLA's modernization in a way that allows an 'informationized' force to win an 'informationized' war. The concept

of 'informationization' permeates the PLA's doctrine, which emphasizes the holistic integration of digitally linked information, sensors, weapons, and an automated command and control system operating via common networks. PLAAF military writings furthermore describe informationized warfare as an asymmetric means to defeat a technologically superior, information-dependent adversary through dominating the battlefield's information space, weakening its ability to acquire, transmit, process, and use information, and thereby forcing the adversary to capitulate perhaps even before the onset of conflict. The PLA therefore conducts military exercises simulating operations in complex electromagnetic environment, viewing Electronic Warfare (EW) and cyber operations as a means of information dominance.

## Outlook

The PRC appears to have undertaken a comprehensive development programme of aerospace capabilities and is clearly pursuing methodical and rapid modernization of its offensive air, air defence, missile defence, space, counterspace, ISR, EW and cyber capabilities. Given its will and resources, the PRC is likely to continue its military advancement programmes with increasing speed and ambitions. The material and technological disadvantages which the PLA has historically faced are therefore likely to decrease rapidly. Conversely, NATO and its allies cannot single-mindedly rely on superior technology. The PRC's parallel advancements in ground and naval capabilities reveal that the PLA has significantly matured in all

three pillars of a successful A2/AD strategy: modern technology, dominance of the maritime, air and space domains, as well as information superiority.

As General Frank Gorenc, Director of the JAPCC, stated in a September 2014 interview, NATO needs to come to the realization that it does not have complete air dominance. It might have to either suppress or destroy enemy air defences. 'We tend to take some things for granted, like air superiority', Gorenc asserted. 'But in an A2/AD environment – the kind of layered long-range defense being built by Russia, China, and to a lesser extent Iran – we would have to earn air superiority.' In other words, NATO would have to fight for it.

Readers who are employed in the current series of NATO exercises should therefore not be surprised: the 'SOROTAN' scenario confronts them with an enemy air order of battle that is designed to challenge NATO operators with a realistic A2/AD scenario. ●

### References

- Breaking Defense. (22 Sep. 2014). What the US, NATO must do to counter Russia.
- Easton, I. (Feb. 2014). China's Evolving Reconnaissance-Strike Capabilities (The Japan Institute of International Affairs).
- Flaherty, P. M. (2011, 1st Quarter). Red Wings Ascendant – The Chinese Air Force Contribution to Anti-Access. Joint Force Quarterly, p. 95–101.
- Gunter's Space Page. <http://www.skyrocket.de/>
- IHS Jane's. (28 Jul. 2015). World Air Forces – China.
- IHS Jane's Defence Weekly. (5 Aug. 2015, Vol. 32, Issue 31). China's Space Programme – Catching Up.
- McCabe, R. T. (2013). China's Air and Space Revolutions. Mitchell Institute for Airpower Studies.
- Stockholm International Peace Research Institute (2015). SIPRI Fact Sheet Apr. 2015: Trends in World Military Expenditures, 2014.
- US Department of Defence. (2014). Annual Report to Congress – Military and Security Developments Involving the People's Republic of China 2014.
- US Department of Defence (2015). Annual Report to Congress – Military and Security Developments Involving the People's Republic of China 2015.



### Lieutenant Colonel Martin Menzel, MBA

began his military career in 1985, spending several years in the German Army Engineer branch including positions as company commander and Chief Instructor at the Army NCO School. In 1999, he stepped over into the military intelligence branch, where he since worked in a broad range of intelligence functions at Headquarters 1<sup>st</sup> German/Netherlands Corps as well as Headquarters Joint Force Command Brunssum. With deployments to SFOR and ISAF included, he became a highly experienced staff officer with regard to the conduct of operational military intelligence in multinational staff environments of NATO. Since May 2014, Lieutenant Colonel Menzel has been serving as the JAPCC Subject Matter Expert for Research, Analysis and Intelligence Support.

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# Is NATO's MPA Force Prepared for Resurgent Russian Submarine Patrols?

By Commander William A. Perkins, USA N, JAPCC

*This article is an abbreviated version of a longer essay written in June 2015. The full version can be provided on request.*

**As Russia shows signs of returning to Blue Water operations and resuming Power Projection away from the Coast, Naval strategists must learn the lessons from Crimea – Russia is unpredictable and misreading Russian capability, intent and action is dangerous – while devising future Anti-Submarine Warfare (ASW) aircraft force structure.**

In the waning decades of the 20<sup>th</sup> century, due to a noted reduction in Russian submarine deployments into the North Atlantic and economic globalization in the post-glasnost era, a commonly accepted theory

that naval conflicts between states had become less likely in today's world began to emerge. Similarly, feeding off successes in the 2011 air campaign over Libya, conflict paradigm in the air domain had shifted away from state-to-state conflicts toward hybrid warfare with non-state actors. From this, a vision began to develop postulating that future conflicts involving the Alliance would manifest in the form of a superior NATO force encountering an adversary operating on a drastically inferior technical and military level. However, trends that cast doubt on both lines of reasoning are emerging. Assumptions that land-based conflict within the European theatre would be unlikely in part resulted in NATO's failure in predicting Russian incursions into Ukraine and Crimea.



Acknowledging this failure, NATO Secretary General Jens Stoltenberg reminded the Alliance to both re-examine assumptions and look to the future when he recently announced in a speech at the Centre for Strategic and International Studies (CSIS) that 'NATO cannot be caught off guard by unanticipated Russian military action as they were with the recent annexation of Crimea.'<sup>1</sup> Further to looking to the future and providing insight into Russia's future naval

### *'NATO should be wary of discounting the open-ocean capability of these new and hard-to-detect submarine classes.'*

intentions, the Russian news agency TASS proclaimed in 2013 that submarine patrols in the southern seas would resume to further realize Putin's vision of a strong and agile military.<sup>2</sup> With the Russian Navy continuing to rebuild its open-ocean nuclear submarine force and notably increasing its power projection away from the coast into NATO's backyard (bombers, fighter and submarine patrols have all increased in recent years), Alliance Nations should be wary of continuing the current reduction in Maritime Patrol Aircraft (MPA) ASW capability while countering a potentially unpredictable nation. The NATO MPA force structure today has been reduced to a shell of its Cold War self. Even with the pooling of existing MPA assets, NATO may find itself challenged in the face of increasing Russian submarine patrols. As the Russian nuclear submarine force is beginning to emerge from hibernation, NATO cannot afford to continue to ignore the once dominant role of MPA in the ASW realm.

### **MPA's Mission Expansion into ISR since the Cold War**

At the end of the 20<sup>th</sup> century, as Russian submarine deployments were reduced due to economic downturn and other challenges, Orions of various models evolved to serve in an increasing Intelligence, Surveillance and Reconnaissance (ISR) role in nearly every global theatre of operations, especially over land in

Kosovo, B-H, Iraq and Afghanistan. In the US, in the 1990s, with the retirement of the S-3 Viking from service aboard aircraft carriers, the P-3 was the only remaining long-endurance aircraft capable of tracking submarines. However, its growing ISR mission was consuming larger and larger portions of the Orion's portfolio. Although ASW remained a core competency of all P-3 crews, ASW experience across the force began to suffer as its actual submarine on-top time fell to near zero.

The US was not alone in adapting their MPA to an ISR role. Across the Alliance, with a decrease in actual ASW requirements, the MPA platform adapted to fill an expanded role in an effort to achieve the Alliance's crisis response objectives both within and outside the European theatre of operations. Additionally, as one of the primary mission roles (ASW) was no longer executed at prior tempo levels, dramatic reductions in each nation's MPA inventory began to manifest across the Alliance.

Although MPA crewmembers and submariners pride themselves on excelling at tracking adversary submarines, the stark reality is that over a decade of force reduction, expansion of mission sets into the ISR domain, growth of overland deployments to the – Middle East, and lack of submarine tracking opportunities across the globe have all resulted in dwindling ASW experience. Capt. Charlie Williams, deputy for weapons & sensors, Navy Surface Warfare Directorate (as cited by Wilson, 2015) noted that 'with the collapse of the Soviet Union, the submarine threat diminished and the surface warfare community shifted focus from ASW to support other emerging mission areas ... Our ASW proficiency suffered, as our ASW experience-based knowledge dwindled to the point where the Navy would have been challenged against a modern-day subsurface threat.'<sup>3</sup>

### **Further Reduction in MPA Forces in the 2000's**

The common perception that the deep-water submarine threat had all but disappeared coloured both defence spending and MPA employment across NATO.

As MPA of almost every NATO nation had undergone mission pull into the ISR domain, the requirement for a continuous anti-submarine presence and persistent ASW capability had nearly vanished. In 2003, Germany acquired the fleet of Dutch P-3C to replace their aging Atlantiques; the Netherlands have elected not to replace their MPA capability following this sale<sup>4</sup>. On 8 September 2006, NAS Keflavik deactivated, the deployed P-3s returned to home stations in the US and the Task Group charged with overseeing Anti-Submarine Warfare (ASW) Operations in the region was disestablished. The full US P-3 squadron deployment to the Mediterranean no longer exists; rather, a small capability for periodic maintenance and limited operational missions (mostly maritime surveillance) remains in Sigonella, Italy, while the significant portion of the squadron's aircraft are further deployed to Djibouti or other bases in the Middle East. The US P-3 permanent presence in NATO has decreased from

more than 2 complete squadrons stationed in Iceland and Sigonella in the 1990s to fewer than 5 aircraft today. With the continuing ISR mission in the Middle East and the new US National Defence Strategy outlining a strategic pivot to the Pacific region, NATO's current allocation of US P-3s is unlikely to change in the near future. In 2014, with their CP-140 Aurora fleet aging, fiscal restraints have caused Canada to detour from an aircraft replacement plan (originally to be fielded by 2020) and instead have programmed a modernization initiative to 14 current CP-140 airframes to extend their utility to 2030.<sup>5</sup> The UK, meanwhile, has yet to produce a plan to reinstate its once world-class airborne ASW capability, which disappeared when the Nimrod MRA2 and its intended successor the MRA4, were found not to comply with airworthiness standards resulting in the cancellation of the entire Nimrod replacement program.<sup>6</sup> Across the Alliance, the inventory of current MPA is a fraction of its prior strength.



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## Trend Reversal in Submarine Deployments ... It's Not Just the Littorals Any More

Although the late 90s and early 2000s witnessed a dramatic reduction in Soviet submarine deployments, recent trends forecast a changing future. In the closing years of the 20<sup>th</sup> century, the ASW community began to witness a sea change away from deep-ocean nuclear-powered submarines to less costly, stealthy, diesel-powered submarines operating closer to land as technology improved the capability and endurance of these submarines classes. The littoral diesel submarine threat will remain and continue to challenge future operational planners in the maritime and amphibious domain. However, Soviet deep-ocean submarine building has been reinvigorated. The planned 10 Borei SSBN class (of SSGN) will replace the Typhoon and Delta classes and rebuild Russia's ballistic missile capability.<sup>7</sup> The new Yasen class SSGN

(8 projected) is intended to replace the Akula SSN and Oscar-II SSGN and will be fielded by 2016.<sup>8</sup> The return of deep-ocean, long-duration patrols is already a reality. Russian Navy Commander Admiral Viktor Chirkov noted that, from January 2014 to March 2015, the intensity of patrols by submarines had risen by almost 50 percent over the previous year.<sup>9</sup> Additionally, as many nations utilize submarines to enhance their strategic naval and regional influence, President Putin also views submarines as a critical means in regenerating Russian strategic influence.<sup>10</sup>

## Has NATO Cut its MPA ASW Capability Too Far Already?

In 2012, a Russian submarine was detected within 275nm of the US east coast, presumably observing a Carrier Strike Group training exercise.<sup>11</sup> Although the US official statement asserted that the detection process worked 'the way it was supposed to' in locating



this submarine,<sup>12</sup> the US accepted risk by allowing it to approach so close without the customary tracking procedures and multinational cooperative submarine prosecution that were de rigueur in the late 20<sup>th</sup> century.

In Nov 2014, Sweden reported detection of non-NATO submarines operating in or near its territorial waters.<sup>13</sup> The next month, Britain found itself seeking NATO assistance to search for a submarine reportedly operating in Scottish waters. The recent UK incident highlights the 'asset pooling concept' common throughout NATO's MPA history and fits well within NATO's Smart Defence Concept.<sup>14</sup> However, as fallout of this incident, the British MoD has begun internal discussions about re-establishing an organic MPA ASW capability, as this incursion served notice of a significant risk to the UK's organic strategic deterrent force. Additionally, the incident highlighted that pooling assets for a single sustained ASW prosecution will remain a logistic and operational challenge due to both the numbers

of NATO MPA deployed out of the European theatre supporting ISR missions across the globe and the significantly smaller MPA force retained today by each Alliance nation. These issues are exacerbated if the ASW scenario involves multiple submarines deployed over an extensive geographical region.

## The NATO MPA Future Force: It's Not All Bleak

Looking to the near-term future of NATO MPA, many NATO Nations are exploring methods to extend the service life of their existing Orion fleet. Additionally,



the US P-3 replacement aircraft, the P-8 Poseidon Multi-Mission Aircraft (MMA), recently completed the first operational deployment to the Pacific and has already participated in a small number of NATO maritime exercises. Other nations, both within the Alliance and Partner Nations, are exploring the Poseidon to replace

### *'NATO cannot afford to continue to ignore the once dominant role of MPA in the ASW realm.'*

their ASW aircraft. Although P-8s have participated at varying levels in recent NATO ASW (and ISR) exercises, the Poseidon is not projected to make a full squadron deployment to Italy until 2018 and will likely face similar mission pull out of the European theatre as the Sigonella P-3 squadron has.

### Conclusion

Although the Bear is not expected to return to its level of submarine activity during the height of the Cold War, NATO should be wary of discounting the open-ocean capability of these new and hard-to-detect submarine classes. With recent bomber patrols off NATO Nations increasing, coupled with observations of increasing Russian military activity across all spectrums, it is logical to project that the Russian Navy will continue to increase submarine deployments in an effort to reassert its global standing and capability to project naval power. Looking globally,

India has purchased a deep-water nuclear-powered Akula to improve their ability to project naval presence. China has embarked on a long-term strategy of deploying its submarine force further from the mainland and for longer durations in a similar manner. Future ASW, therefore, will not be relegated solely to counter diesel submarines operating in the littorals. The Alliance must continue to explore cost effective ways to mitigate the recent reduction in MPA ASW capability in order to better respond to future expansions of deep-water submarine patrols. ●

1. NATO Secretary General Jens Stoltenberg, 27 May 2015. Speech to CSIS. NATO Press Release. Online at: <http://www.nato.int/cps/en/natolive/index>.
2. 'Russia to send nuclear submarines to southern seas', Anishchuk, Reuters. 1 Jun. 2013. Online at <http://www.reuters.com/article/2013/06/01/us-russia-submarines-patrol-idUSBRE95007V20130601>.
3. 'Sonar technology comes to grips with a dangerous new era', Wilson, J. R., Military and Aerospace Electronics, 6 Jan. 2015.
4. 'Germany's new sub-hunter', Air International. Online at: <http://www.p3orion.nl/gn-2.pdf>.
5. 'Canada To Seek Less Expensive Maritime Patrol Plane, Upgrade More Auroras', David Pugliese, Defense News, 30 Mar. 2014. Online at: <http://archive.defensenews.com/article/20140330/DEFREG02/303300009/Canada-Seek-Less-Expensive-Maritime-Patrol-Plane-Upgrade-More-Auroras>.
6. 'Delays and Cost Challenges Beset Airborne ASW', Sweetman, Fabey, Mackenzie & Svitak, Aviation Week. Online at: [http://web.archive.org/web/20140420073903/http://www.aviationweek.com/Article.aspx?id=/article-xml/AW\\_04\\_21\\_2014\\_p02-677128.xml&p=3](http://web.archive.org/web/20140420073903/http://www.aviationweek.com/Article.aspx?id=/article-xml/AW_04_21_2014_p02-677128.xml&p=3).
7. 'Putin's "Red October": Russia's Deadliest New Submarine', Franz-Stephan Gady, The Diplomat. 4 Mar. 2015. Online at: <http://thediplomat.com/2015/03/putins-red-october-russias-deadliest-new-submarine/>.
8. 'Improved Russian Nuclear Attack Submarine Kazan to Deliver in 2016', Majumdar USNI News. 29 Oct, 2014. Online at: <http://news.usni.org/2014/10/29/improved-russian-nuclear-attack-submarine-kazan-deliver-2016>.
9. 'Submarine patrols up 50 percent over last year', Nilson, Barents Observer. 14 Apr. 2015. Online at: <http://barentsobserver.com/en/security/2015/04/submarine-patrols-50-percent-over-last-year-14-04>.
10. 'Mind the Gap: Strategic Risk in the UK's Anti-Submarine Warfare Capability', Willitt, Lee. 4 Feb. 2011. Royal United Services Institute.
11. 'Navy detects Russian Sub off US East Coast', Mount. 6 Nov. 2014 Online at: <http://security.blogs.cnn.com/2012/11/06/navy-detects-russian-sub-off-u-s-east-coast/>.
12. 'Navy detects Russian Sub off US East Coast', Mount. 6 Nov. 2014 Online at: <http://security.blogs.cnn.com/2012/11/06/navy-detects-russian-sub-off-u-s-east-coast/>.
13. 'Swedes Find Definitive Evidence of Submarines' Online at: <http://foreignpolicy.com/2014/11/15/swedes-find-definitive-evidence-of-submarine-russians-call-them-unmanly/>.
14. 'Smart Defense', NATO topic. Online at: [http://www.nato.int/cps/en/natohq/topics\\_84268.htm?](http://www.nato.int/cps/en/natohq/topics_84268.htm?)

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graduated in 1994 from Maine Maritime Academy with an Unlimited 3<sup>rd</sup> Mate's License followed by completion of the Navy's flight training syllabus. Commander Perkins holds a Master's Degree in Strategic Foresight from Regent University and is a graduate of the Joint Forces Staff College. He is designated as P-3 Orion Weapons & Tactics Instructor (WTI) and on his 7 deployments he has flown combat missions in every operational theatre in which the P-3C operates. In 2012, Commander Perkins completed a successful aviation squadron command tour as Commanding Officer of Tactical Air Control Squadron ELEVEN. He recently served as Navigator of the USS George Washington aircraft carrier, homeported in Yokosuka, Japan. He is currently serving as the Maritime Air (FW) including Carrier Operations SME at the Joint Air Power Competence Centre.





# Institutionalizing Counter-Improvised Explosive Device Lessons Learned from Afghanistan

## *An Overview – Part 1*

By Wing Commander Jez Parkinson, GBR AF, JAPCC

### Introduction

**Background.** In January 2014, the JAPCC, together with the Joint Allied Lessons Learned Centre (JALLC), was asked by NATO HQ Emerging Security Challenges Division (ESCD), on behalf of NATO's Counter-Improvised Explosive Device (C-IED) Task Force, to analyse what C-IED lessons could be identified from Afghanistan and consider how these lessons could not only be learned but 'institutionalized'<sup>1</sup>. This 2-part article will provide an overview of the issues that were identified in the paper submitted in response to the ESCD's request for support.

**Methodology.** The contents of these articles represent the distillation of many hundreds of hours of work. A number of 'fact finding' visits were made to ISAF over a period of years and C-IED capability development workshops were supported at a variety of headquarters. Additionally, the JAPCC used engagements with both the C-IED Task Force and the C-IED COE as vehicles to gather information. The primary method of obtaining data was through discussion with specialists across the spectrum of ranks who were either directly involved in or supported the C-IED fight. Military and civilian, national and Alliance perspectives were recorded and both industry and academia were consulted. All information gathered was non-attributable.





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IEDs in the future will be found in all domains.

**Purpose.** The purpose of the original work was two-fold. Firstly, it sought to expose to appropriate audiences and decision-makers the key findings of JAPCC work in support of NATO C-IED efforts in order to promote debate that would eventually lead to further development of C-IED capability. Secondly, to contribute to the C-IED 'Lessons' process so that an 'Action Plan' can be developed to ensure that the hard-won lessons from Afghanistan will be taken forward.

### Bottom Line Up-Front (BLUF)

C-IED lessons identified must be learned and institutionalized. However, this activity should not be at the expense of being prepared for the next threat(s). At the core of the IED problem is the concept of the 'IED Network'. It has been demonstrated repeatedly by, amongst others, Intelligence and Law Enforcement communities, that IED networks rarely operate just to facilitate IED attacks but that often a variety of other 'nefarious'<sup>2</sup> activities are being conducted in conjunction with IED facilitation.<sup>3</sup> It is likely that the IED networks of today, their subsequent evolutions or their replacements will be at the heart of the next set of challenges. Therefore, institutionalizing a 'Counter-Nefarious Network' capability should be the ultimate objective. To do this we need to think in a combined, joint and comprehensive fashion in

order to build an Alliance network (or network of networks) in order to successfully counter the nefarious networks we are likely to face in the future (including IED networks).

### Future Threat Overview

Entire books have been written about future threats<sup>4</sup> and the topic of so-called 'Hybrid Threats'<sup>5</sup> is currently popular. In terms of the likelihood of conflict, the question is not whether war will arise, but in what form and where. However, irrespective of the time, complexity and geographic location of the next NATO operation, it is highly likely that an IED threat will either be present at the outset or will develop as the operation progresses. The IED is not a new weapon. At the time ISAF was expanding, there was already significant use of IEDs by insurgents in Iraq<sup>6</sup> and, of course, there is the much analysed use of IEDs during the so called 'Troubles' in Northern Ireland. Irrespective of where you look, the history of IEDs can be traced back to at least the 1500s, when ships loaded with explosives were used as weapons. Therefore, the IED will undoubtedly remain a weapon of choice for future adversaries. A quick search of the internet will provide an insight into the number of IED incidents taking place in Ukraine. However, we must ensure that we balance the development of 'pure' C-IED capability



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with the development of our ability to deal with whatever our enemies may choose to replace and/or complement IEDs with in the future.

## Courting Controversy

**Terminology.** At the heart of any adversary's IED capability is his facilitation network and the likely nature of future threats is such that 'nefarious' networks will be a factor to some degree. It is suggested, therefore, that it is necessary to develop a NATO 'Counter-Network' capability. However, the use of the word 'Counter' is proving controversial. Current accepted terminology is 'Network Identification Engagement (NIE)', with a focus on Network Identification, not actions against a network. But what is the good of knowing about something if you can do nothing about it?

## First Ten Lessons

**1. Transnational Challenge.** At the heart of the IED challenge is the network. Importantly, such networks are not constrained by international borders; they are truly transnational. It is accepted that the Alliance is ultimately a political entity and its military activities will be bound by politics, law, conventions and morals. However, on numerous occasions when discussing C-IED and specifically 'Attack the Network (AtN)', the

issue of the 'political limiting' of the Joint Operational Area (JOA) arose. If our adversaries as well as their supporters have safe havens from which they can operate with impunity, it will be difficult if not impossible to defeat them. Political limits may, in some cases prove detrimental to mission accomplishment and should be carefully weighed by authorities before being imposed.

**2. The Joint Approach.** The Afghan experience was set in a land-locked country, whereas future operations may be set in the maritime, littoral or riverine environments. Despite this, whilst carrying out research, it became clear that many were already discussing C-IED as a Joint activity. Equally, it is worthy of note the Taliban did use IEDs to target helicopters and experimented with using IEDs to target low-flying fixed-wing aircraft. NATO's Maritime Component is currently exploring how the IED might be employed in their environment and how it may subsequently be countered. The lesson is clear – C-IED must be a Joint endeavour.

**3. The Combined & Comprehensive Approach.** Few nations can now operate at anything above 'small scale' on their own. Initiatives such as NATO's 'Smart Defence' and 'Connected Forces Initiative', together with the European Defence Agency (EDA) 'Pooling



and Sharing' concept, are a reality in the modern defence environment. Afghanistan demonstrated the huge cost of countering the IED threat. If we in NATO are to continue to maintain a robust C-IED capability, the approach must be coherent with existing NATO initiatives. Furthermore, the future operating environment will involve a plethora of Other Government Departments (OGDs) and Non-Governmental Organisations (NGOs) operating in the same space as the military. Military deployments will likely be part of a wider attempt at conflict resolution with the full spectrum of Diplomatic, Industrial, Military and Economic (DIME) elements in play. It is likely that these other actors will be as concerned as the military about the threat and many already have well-developed strategies for operating in high IED-threat environments. If we have to work alongside these other 'actors', then we should develop our C-IED capability in concert with them, including integrated training. Academia brings a particular approach to the solving of complex problems as well as a perspective on history; this 'alternative' but equally valid approach can contribute to the C-IED fight. By engaging with industry, the military

gains an understanding of what is deliverable in terms of technology and industry gains an understanding of the requirement. In summary, engagement with OGDs, NGOs, academia, and industry is essential to an effective approach to C-IED.

**4. Build a Network to Break a Network.** What was clear from the outset was that by broad, independent and unbiased engagement regarding C-IED, the JAPCC was able to gather information from multiple sources. It soon became apparent that, whilst there were themes running throughout, there was no single approach to C-IED. Similarly, no one location had what the JAPCC or the location itself considered an ideal solution. Rather, by having described to them multiple approaches, the JAPCC team was able to extract in the vast majority of cases at least one, often more, novel or innovative concepts that provided a location with an edge. By visiting multiple locations, the JAPCC was able to act as a conduit for the sharing of these concepts and in doing so was adding to the overall capability base. This concept of building 'friendly' networks in order to defeat threat networks is perhaps



one of the major findings. In future conflicts, it will be important that C-IED professionals network throughout their AOR in order to realize these benefits.

**5. Skewing of Perspectives.** Outside of the C-IED Community, other 'capability areas' have raised concerns over the disproportionate amount of attention and resources being invested in C-IED, which may be driven by political imperatives or media pressure. The perception is that an entire 'industry' has developed around countering the IED threat and that there are now 'vested interests' to perpetuate C-IED as a specialist capability area.<sup>7</sup> It is understood and accepted that the Alliance developed the C-IED approach because of the imperative at that time. However, as we strive to 'institutionalize' the capability, part of the process should also take the lessons from a single capability area and spread them across many where appropriate. Institutionalizing C-IED capability is absolutely essential, but it must not be at the expense of ignoring other threats.<sup>8</sup>

**6. Developing Added Value at the Operational Level.** The JAPCC has supported a number of Capability Development events. It has also supported the development and provision of the C-IED COE's C-IED Staff Officers' Awareness Course (SOAC) in an effort to mitigate one commonly observed challenge. The challenge is how to create a Joint Staff Officer who can think at the operational level and add value to the C-IED fight. Many staff officers had considerable experience at the tactical level but came straight from the point of delivery of effect into the staff environment. This has historically resulted in a cadre of personnel who struggled to do anything other than approach the challenge at the tactical or sub-tactical level and ultimately, output became focused on 'Defeat the Device'.

**7. Beyond 'Defeat the Device'.** In discussing AtN with those responsible for forensic exploitation of IEDs, three interrelated failures at the tactical level formed a substantial part of the discourse. Firstly, material from devices was either simply not being collected or was being handled in a manner that rendered it forensically useless. The second was a prevalent view that, all too often, the simplest course of action of destroying

the IED in situ ('Blowing in Place') was the preferred course of action, again limiting the supply of resources to support AtN forensic activity. Finally, often, material that was being moved for further exploitation was not moved at a pace that allowed the force to detain suspects. Exploitation processes have to support the force both in terms of its ability to further degrade nefarious networks but, also support compliance with the Judicial Process and the Rule of Law.

**8. Biometrics.** Biometrics is an essential tool in the fight against 'nefarious' actors that, when used correctly, will at least limit their freedom of movement and at best bring about their prosecution and subsequent removal from circulation.<sup>9</sup> The Alliance should continue to pursue the development of a robust strategy for the effective use of Biometrics as a key tool in neutralizing nefarious networks through the identification and subsequent targeting of the members of such networks. JAPCC's work indicated that there was a general lack of understanding of the use of 'Biometrics'. This lack of understanding, leading to an unwillingness to embrace 'Biometrics', applies equally to any future technology that has proven capability but the fielding of which is viewed as controversial by some nations.

**9. Bigger Vehicles Bigger Bombs.** The bigger, more heavily armoured our vehicles are, the bigger the IED our adversary will build. Armour will always, eventually, be overmatched. A bigger device does not necessarily become easier to detect, especially if forces are enclosed in large armoured vehicles with little awareness of their surroundings. A balance needs to be struck between protection, adequate situational awareness and, if appropriate, an ability to engage with the civilian population. Caveats that force personnel to operate in armoured vehicles that alienate them from the population and cause damage to property run counter to an effective C-IED strategy. A similar argument applies to the provision of Personal Protective Equipment (PPE) or 'Body Armour'<sup>10</sup> as well as other equipment personnel carry when on foot. Avoiding encumbering personnel with a weight of equipment that causes them to lose focus on their surroundings and miss obvious combat indicators that point to the presence of an IED is a vital part of a sound C-IED strategy.





**10. Last But Not Least.** It is inevitable that IEDs will continue to cause casualties. Any attempt to ‘institutionalize’ a C-IED capability must have realistic aspirations. Underpinning this effort has to be the acceptance that any military operation is inherently dangerous and there will be occasions where our adversary will be successful. This needs to be accepted as part of what we do by senior leadership, politicians and the media.

## Summary

The author has tried to capture challenges, not necessarily in the manner in which they were initially discussed but in a manner that describes them as something that can be acted upon in order to achieve the stated purpose. It is clear that whilst there are numerous individual challenges, many, if not all, are inter-linked and, so any attempt to ‘institutionalize’ the C-IED lessons from Afghanistan will need a truly comprehensive approach. Furthermore, whilst it could be argued

that most lessons could be institutionalized as part of the concept of ‘Train the Force’, this is an over-simplistic approach. Many of the solutions to the challenges presented above span multiple lines of development and affect, in many cases, multiple levels of command across the Joint environment. The next instalment of this article will explore further challenges and explore a coherent way forward for the Alliance. ●

1. Institutionalisation refers to the process of embedding something (for example a concept, a particular value or mode of behavior) within an organization.
2. Typically of an action or activity wicked or criminal.
3. Human Trafficking, Drug Smuggling and Money Laundering are but three, simple examples.
4. As an example, see JAPCC publication: Present Paradox – Future Challenge, JAPCC 2014.
5. The journalist Frank G. Hoffman defines a hybrid warfare as ‘Any adversary that simultaneous and adaptively employs a fused mix of conventional weapons, irregular tactics, terrorism and criminal behavior (sic) in the battlespace to obtain desired political objectives’. Hoffman, Frank G. ‘Perspectives on the Future Security Environment’, Before the Subcommittee on Intelligence and Emerging Threats and Capabilities, House Armed Services Committee, US House of Representatives, 13 Feb. 2012.
6. 1,683 IED incidents in Iraq in Oct. 2005. Cordesman, Anthony H. (with assistance from Moller, Sara Bjerg). ‘Iraq’s Evolving Insurgency’ (Working Draft). The Centre for Strategic and International Studies, 9 Dec. 2005.
7. It is not unreasonable to assert that other ‘capability areas’ view C-IED with an element of envy.
8. The proliferation and availability of Man-Portable Air Defence Systems (MANPADS) could be used as one of several examples.
9. Either in the context of the due process of law or as a military target.
10. To include helmets, eye protection, etc.

### Wing Commander Jez Parkinson

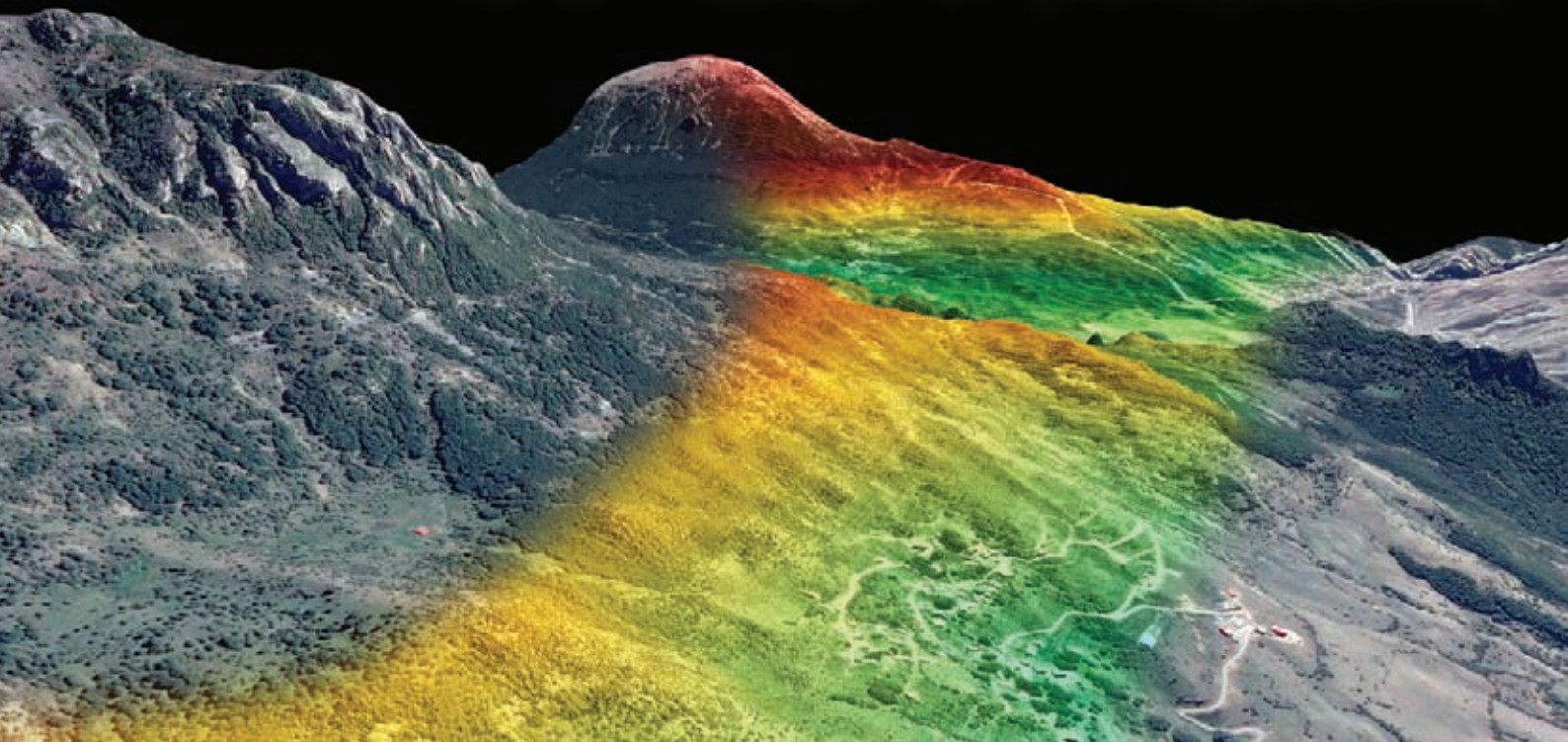
joined the RAF in 1986 as a RAF Regiment Officer. He is currently serving at the Joint Air Power Competence Centre (JAPCC) at Kalkar in Germany in his third NATO appointment where he is employed as a Special Advisor to the Directorate. He has a broad background in Force Protection (FP) and has completed operational tours in the Middle East, the Balkans and Northern Ireland being awarded the NATO Meritorious Service Medal for his last deployment as the Deputy Commander of Kandahar Airfield responsible for FP. Amongst his many projects and responsibilities related to FP, he is the Officer with Principle Responsibility for the NATO FP Course, the author of both NATO FP Policy and NATO Doctrine for the Force Protection of Air Operations.





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# NATO Airpower and the Strategic Communications Challenge

## *About the JAPCC's Airpower and Disinformation Study*

By James S. Corum PhD, Lieutenant Colonel (ret.), US Army Reserve

**NATO airpower provides a huge asymmetric advantage in conflicts today. It is, arguably, the opponents' top target for disinformation campaigns designed to influence Western media and public opinion. The aim is to push Western powers to limit and even compel them to renounce the use of airpower in campaigns against terrorists or aggressor states, thereby nullifying one of NATO's most vital military advantages. NATO needs to recognize its serious shortfalls in Strategic Communication, specifically when it comes to justifying the use of airpower to the public. The JAPCC is sponsoring a study in order to further analyse this problem set and develop doctrine, policy and training recommendations for improving NATO's Strategic Communications.**

Even though the enemies that NATO and Western coalitions have faced in the last two decades are significantly inferior to NATO in terms of military capability, both non-state and state enemies still have strategies to neutralize NATO advantages. Indeed, looking to undermine the will of our populations appears to be the best means to counter NATO action. Just as airpower is NATO's major asymmetric advantage, it is also the primary target for disinformation campaigns designed to undermine support for NATO operations. If the adversary cannot defeat NATO in the air, they do what they can do by conducting information campaigns that characterize the use of airpower as an inhumane means of waging conflict, making it politically impossible for democracies to use it. Thus, information campaigns



that use disinformation and misinformation have been a central element in any adversary's strategy when fighting NATO. While NATO must play by strict rules, the enemy may violate laws and international norms with impunity to further their cause. Spreading false information and fighting in a way as to deliberately endanger civilians and ensure maximum civilian casualties works very effectively to undermine international public opinion. Such strategies have been commonly used in the past and are expected to play a key part in any major conflict that NATO will fight in the future.

## Concept and Aim of the Study

The Airpower and Disinformation Study was commissioned by the JAPCC in 2014. It is being conducted by a team of professional academics, all of whom are employed outside NATO structures.

How do disinformation campaigns and misinformation about air operations affect public and opinion? How, in turn, do these perceptions affect policies concerning NATO's use of airpower?

In order to answer these questions, the Study is looking at trends and historical lessons on how airpower is presented and perceived by the public and the themes used by NATO enemies to discredit NATO air operations. One part of the study seeks to identify how airpower is broadly understood in the Western nations. Studies of five specific NATO Nations are included: Germany, France, Italy, the United Kingdom (UK) and the United States (US).

Furthermore, the study will address the vulnerabilities of NATO airpower to disinformation and develop doctrinal recommendations to best counter the expected enemy media campaigns against NATO airpower as well as specific recommendations for Strategic Communications. Finally, the team of authors intends to develop education and training, i.e. short training courses, for air staff officers and MOD officials, to teach them how to handle airpower disinformation in future operations.

## Disinformation versus Misinformation

Disinformation is the deliberate distortion of events and creation of false narratives disseminated by state or non-state actors with the intent of putting their enemy in a bad light, undermining the morale of the enemy and bolstering the morale of one's own public. Disinformation has been part of information operations in conflict for centuries. Today, dictatorships and radical movements use disinformation as a major part of their broader information campaign. Disinformation can be used as part of a long term strategy to undermine the public's confidence in their government and key institutions. Disinformation can also be used tactically, in the short term, to discredit a particular act or operation.

By contrast, misinformation consists of exaggerated stories that normally have some elements of truth but have become, mostly through error or poor media practices, broadly distorted and often barely reflect the original factual events. Publication of misinformation is often based in the desire to publish information that is sensational and has great media appeal but ends up being basically wrong. Misinformation is closely related to disinformation in its effects but is much more common. Rather than being deliberate, misinformation is commonly caused by the poor use of sources, by overreliance on highly biased informants or material, or by the publication of unverified and poorly understood information. Misinformation can occur because the reporting agency, perhaps the media or an NGO, has a minimal understanding of military operations or conditions. In other cases, even reputable and experienced members of the media will publish poorly researched and unverified (but sensational) material due to the around-the-clock pressure to get news stories and commentary out faster than competing news outlets. Over the long term, misinformation can have effects even greater than disinformation.

## The Media Challenge

Apart from occasionally poor media practices causing the spread of misinformation, deliberate media bias resulting in disinformation is a highly significant challenge







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forces and are only allowed to film images and events that will support the irregular groups' political agenda and propaganda message.

Enemy groups also construct false narratives to imply that NATO and Western forces are deliberately insulting the people's religion and culture or have an agenda to forcibly convert the local populations. Such false stories are meant to appeal to the base fears, prejudices and ignorance of the local population, demonizing foreign forces in order to win popular support for the own forces as defenders of the people and the faith.

The themes of disinformation are only limited by the imagination of the adversary. No matter how improbable such stories are or how little real proof for them exists, some of the very wildest and implausible stories about Westerners are commonly believed in highly isolated and tribal societies with a low education level. In other cases, against a better educated and more developed population, disinformation tends towards conspiracy theories and somewhat more probable stories.

## The Disinformation and Airpower Challenge in Afghanistan

The conflict in Afghanistan has been NATO's longest active war and has featured large-scale airpower use

across many mission areas. Although the International Security Assistance Force (ISAF) operated under careful rules of engagement and paid compensation to families of civilians killed or wounded in the course of military operations, a constant Taliban disinformation campaign was quite successful in creating public discontent against ISAF forces. Afghan President Karzai's routine condemnations of ISAF actions did little to help this situation. By 2008, it was clear to ISAF's leaders that the Taliban was exploiting airpower issues very effectively. A poll of Afghans in 2009 showed that 77% of Afghans believed that air operations caused excessive casualties. As to the blame, 41% of Afghans thought poor NATO targeting was the main cause of civilian casualties and only 28% of Afghans put most of the blame on the Taliban for operating too close to civilians.<sup>1</sup> The common belief that airpower was causing the heavy civilian casualties was likely not true<sup>2</sup> and based on a preference to blame the Westerners for Afghanistan's problems. However, in counterinsurgency operations, it is public perception that matters in the long term and airpower was arguably causing some very negative public perceptions.

Aware of the views held by the Afghan public, in 2008 General McKiernan, Commander ISAF, issued rules that limited the use of airpower and tightened the rules of engagement. Upon taking command in 2009, General Stanley McChrystal restricted the use of air and ground firepower even further in order to



improve public support. This strategy involved greater risk to NATO forces, but McChrystal was very interested in taking away one of the Taliban’s major propaganda leverages.<sup>3</sup> This was a tough call to make, but, in the context of the war and the need to keep the support of the Afghani people, it was the right policy.

Afghanistan provided many valuable lessons for NATO in terms of Strategic Communication. ISAF leaders learned the importance of the rapid de-classification of strike imagery and the immediate

*‘Speed is essential in the news world and a traditional bureaucracy, which waits cautiously for full details, does not help to counter exaggerated or confusing reports.’*

release of video and photo imagery to the media to counter Taliban claims of attacking civilians. Another important lesson learned by NATO public affairs officers was the importance of communicating with local populations through well-placed information. Speed is essential in the news world and a traditional bureaucracy, which waits cautiously for full details, does not help to counter exaggerated or confusing reports. While NATO thoroughly investigated claims

of civilian casualties and collateral damage, the normal procedure of releasing information had to be sped up to counter poor reporting and outright disinformation.

### The Influence of Non-Governmental Organizations

Numerous Non-Governmental Organisation (NGOs) and other organizations in Western nations concern themselves with political and security issues, maintaining websites and publishing reports on NATO operations, including extensive coverage of Western air operations, e.g. in Afghanistan, Libya and currently against the ISIS. Often connected to political groups and political parties, these groups have some influence on sectors of public opinion. Although most NGOs are well-intentioned, they often lack a sense of objectivity. A number of NGOs tend to portray Western armed forces negatively, having a strong bias against the use of any force in general and NATO’s use of force in particular. Some groups present well-researched reports and balanced assessments of events; however, others have a blatant bias and present corrupted data that is useless to support serious analysis. In particular, when it comes to civilian casualties caused by Western military operations, the figures can vary widely.





# misinformation

## Lawfare – Criminalizing Unmanned Aerial System Operations

Many NGOs also engage in the debates on the legality of war and of weapons and doctrines. Currently one of the main issues in this debate is the use of Unmanned Aerial Systems (UASs), widely recognized as ‘drones’ in the media and public, in particular when they are weaponized. An extensive poll, conducted by the Pew Research Center in July 2014, showed that there are only three nations – the US, Israel and Kenya – where a majority of people interviewed favour the use of drones against terrorists. This was not the case in any NATO nation other than the US. Only in Poland, the UK and Germany, did support for drones crack the 30% approval rate.<sup>4</sup>

The level of public understanding about the use and capabilities of UASs, and airpower in general, is extremely low. Although UASs are little understood, they are generally disliked, as the public sees them as some kind of unfair or immoral weapon. For several years, various NGOs and groups aligned with the UN have made the argument that the use of armed drones against terrorist groups is illegal under international law. The US has contested this in legal arguments, but the US is at a disadvantage due in part to the media coverage of drones in counter terrorism operations.

UN-aligned and international groups are today arguing that any use of drones in the strike mode is wrong and this is reflected in major media stories.<sup>5</sup>

## Conclusion

It is essential to recognize that the main issues used by both state and non-state NATO adversaries, namely human rights and civilian casualties, actually play to NATO’s strengths. NATO’s adversaries essentially have no regard for human rights or the lives of civilians and the key focus of NATO Strategic Communications must be to emphasize the care that NATO takes to protect civilians and follow the laws of war. In contrast, NATO must take care to document and publicize the human rights violations of its adversaries.

NATO needs to place considerably more effort into Strategic Communication regarding military power in general and towards airpower in particular. While the Airpower and Disinformation Study is still in progress, it has developed some tentative recommendations for NATO covering the following issues:

- Better anticipate the expected media issues in operational planning and include measures to deal with the major themes of human rights and civilian casualties. NATO needs to deploy expert media teams to document adversary war crimes and to respond

immediately with true data and information to any charges of civilian casualties or collateral damage allegedly caused by NATO operations.

- Where possible, loosen declassification rules to ensure that strike imagery is quickly made available to the public in order to counter disinformation, implementing this as Standard Operating Procedures for NATO and NATO Nations.
- Be ready to embrace the social media. NATO and NATO Nations should allow their soldiers and units to maintain blog sites. These are not only good for troop morale, but are also an excellent means to connect to the general public (as well as family and friends). The military needs to avoid the organizational tendency to censor and control the message, and only apply a few common sense rules to serviceman blogs, such as no obscenities, no photos of dead soldiers, no inflammatory anti-Islam messages, etc., as well as considering operational security with regards to locations, plans and other factors.
- Use embedded journalists as key enablers to educate the public about applied airpower. In the last decade, NATO nations that allowed embedded journalists to spend time with combat units have experienced remarkable success in connecting the public, with these media members showing the military deployed to field operations and even in combat. Excellent documentaries have been produced in the US, UK, Denmark and Lithuania that were shown on major television networks and reached a wide public audience. Such documentaries provided citizens with tangible impressions of the soldiers serving as both professionals and citizens, giving the public a

positive (and accurate) account of the realities of modern warfare and refuting the enemy disinformation meant to portray the Western forces as callous or brutal.

- NATO needs to use a general approach of allowing cleared journalists easier access and giving the media the opportunity to cover active air operations. While specific intelligence or operational details must not be compromised, the public could, however, be given some account of the careful teamwork invested in the planning and execution of air operations. This is specifically true with regard to the use of UAS, which need to be better explained and demystified for the public in order to mitigate the negative effects of commonplace dis- and misinformation, thus increasing the chances of reinforcing positive public opinion.
- Finally, NATO officers and officials need much more training in Strategic Communications, including both how to conduct effective information operations and understanding the nature of adversary disinformation campaigns to devise ways to counter them. ●

1. See Anthony Cordesman, *Afghan Public Opinion and the Afghan War* (Washington: CSIS Report, 2009), p. 5, the polling was carried out by ABC News.
2. The latest annual UNAMA on the Protection of Civilians in Afghanistan, in 2014, states that out of 6,849 civilian casualties 2% are to be attributed to Pro-Government Forces (PGF) air operations, 34% to PGF ground operations, 11% to targeted kill. The rest is attributed to Improvised Explosive Devices, Unexploded Ordnance, and attacks by Anti-Government Elements, or other means.
3. The issue of airpower and firepower in Afghanistan and McChrystal's decision to reduce air operations is discussed in General McChrystal's memoirs. See Stanley McChrystal, *My Share of the Task: A Memoir* (New York: Penguin Books, 2013).
4. Pew Research Center, *Global Opposition to US surveillance and Drones, but limited harm to America's Image*, 14 Jul. 2014, p. 5.
5. See 'Drone Strikes by US may violate international law, says UN', *Guardian*, 18 Oct. 2013. See also 'RAF's crew's role in US drone unit revealed', *Guardian*, 23 Jul. 2015.

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holds a MA from Brown University and a PhD in History (Queen's University, Canada). He is an internationally recognized academic in military history, airpower and counter-insurgency. He has authored eleven books and more than 70 major journal articles and book chapters on strategic studies, airpower and military history. Dr. Corum has had a career in higher military education, serving as a professor at the USAF School of Advanced Air and Spacepower Studies (1991–2005), professor at the US Army Command and General Staff College (2005–2008), and dean of the Baltic Defence College (2009–2014). He currently is Programme Leader of the MA Programme in Terrorism and Security Studies at Salford University, UK. Dr. Corum is a retired US Army Lieutenant Colonel with 28 years service. He served in Iraq as a strategic planner in 2004.





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# Capability in Practice and Tactical Superiority

## *Theoretical Reflections about Air Power and Deterrence from a Small Nation's Perspective*

By Major Patrik Stensson, PhD, Swedish Air Warfare Development Department

### Introduction

Deterrence is the act of making someone decide not to do something, it is about preventing a particular act or behaviour from happening. Deterrence is a strategic effect.<sup>1</sup> In political terms, deterrence means: 'developing ... military power so that other countries will not attack your country.'<sup>2</sup> The principal question then becomes what comprises sufficient military power to

deter a potential aggressor? In classical military theory, a generally accepted rule-of-thumb states that a numerical superiority ratio of three-to-one is required for winning an offensive with acceptable probability and level of risk. Consequently, a certain ratio might be necessary for maintaining reassuring deterrence. However, it is possible to consider such classical theory both classical, as in possibly obsolete, and merely theory, as in not necessarily relevant in practice. In other words,



there might be more to air power, deterrence, and capability, than relative numbers from a theoretical perspective. Therefore it seems relevant to ask, is the classical theory relevant when discussing deterrence?

Such philosophical reflections about theory and practice are necessary as deterrence and capability are abstract concepts requiring theory for discussing their composition, from any perspective. Furthermore, the theoretical perspective may be more relevant from a relative position of strength than from a small nation's perspective, as large power allows enforcing practice to align with theory. From the perspective of a relatively small military power, the distinction between theory and practice is therefore particularly interesting.

The Swedish Air Force Chief of Staff highlights three criteria for success in employing air power: numerical,

tactical, and technical superiority; he recognizes that numerical superiority cannot be the Swedish norm, and concludes that focus has to be on tactical and technical superiority.<sup>3</sup> Arguably, 'tactical superiority' denotes the ability 'in practice' to make relevant use of 'technical superiority', while 'numerical superiority' aligns with the theoretical perspective of being superior in a statistical sense. Regardless of this argument's validity, **the assumption that 'tactical superiority' is mainly an effect 'in practice' is fundamental to the present reasoning, which thereby concerns the difference between a theoretical and a practical perspective on military capability more than deterrence specifically.** Nevertheless, the classical theory is a good starting point for discussion.







## Quantity vs Quality, is a Numerical Rule-of-Thumb Relevant?

The theoretical comparison of entity counts assumes implicitly a one-to-one relationship between capability qualities. With modern technologies, this is not necessarily the case. One entity might be capable of evading several others solely based on different/superior performance characteristics. However, in the times of classical warfare, the supposed origin of the rule-of-thumb, differences between entities and varying situational conditions were practically irrelevant because with large numbers, on average, individual performances tend to balance. Conversely, comparison of forces with fewer entities increases the significance of specific individual capabilities as well as the operational impact of local conditions. Today, numbers are usually small, thereby making every entity and situation count. Hence, as statistically significant relations do not account for specific cases, the theory of numerical superiority may be irrelevant in practice today.

Furthermore, modern capabilities, particularly air power capabilities, tend to build upon advanced technologies and system of systems designs. Such designs render the otherwise straightforward counting of entities difficult to collect because system integration at various levels of abstraction blurs component boundaries and intertwines capabilities. Some entities contribute non-crucial aspects to a range of capabilities, while others individual entities provide complete capabilities. Simply put, system components count differently depending on purpose and viewpoint. Hence, the theory of numerical superiority is obsolete when considering the relative quality of involved entities.

However, it is undeniable that quantity is a quality in itself, although with a complex relation well captured by the assertion: 'quality is better than quantity, especially if deployed in large numbers!'<sup>4</sup> The problem becomes identifying what matters more in a specific situation, quantity or quality. It is a judgment that requires comparing two substantially different phenomena. Quantity is a measure, ideally objective and context independent, representing a real world aspect,



predominantly some kind of physical property. Quality, on the other hand, is essentially a subjective value, context dependent, a psychological and socially situated phenomenon. Obviously, both aspects are significant, in some sense representing theory and practice respectively. Therefore, the question remains: What is more important, theory or practice?

## Disowning Practice, Undesired Consequences from Focusing on Predictions and Theory

Concrete measurements of physical aspects are easy to interpret as objective facts, especially when represented by 'the pure language of science, mathematics'.<sup>5</sup> Consequently, statistically significant predictions are easy to interpret as objective facts as well. However, the problem of collecting relevant entity counts shows that even straightforward measurements may be ambiguous. In fact, all measurements and mathematical calculations are associated with subjective assumptions about their meaning, which means that they also require contextual interpretations. Moreover, statistical predictions require theoretical models, but 'all models are wrong'.<sup>6,7</sup> Oversimplification by assuming that entity capabilities are equal on average may prove a model irrelevant. Models are, in fact, always simplified and limited descriptions of reality, capable only of depicting general relations in principle. Consequently, models can only predict principle effects in general, if assumed conditions return repeatedly. Models say virtually nothing about what actually will happen in any specific real world case, only what will happen in theory.

From the perspective of the individual, the actual result is always more important than any general principle regardless of its statistical validity. Quality in general, is relevant only in advance, as grounds for decisions, or afterwards, as data for analysis. In practice, actual quality is what matters. Subjective phenomena, such as quality, are fundamentally unpredictable precisely because they are subjective and therefore both local and specific. They depend on interpretations and judgments not yet made, which in turn depend on contexts and conditions not yet existing because they are

the result of future actions and decisions. Furthermore, people tend to understand better what they also know practically than what they only know theoretically, and for people to know things practically they must be practically involved. For relevant judgments of subjective phenomena, people require the kind of understanding of options and consequences that comes from personal involvement. This makes subjective phenomena have a self-generating character that implies circular dependencies perhaps impossible to capture in mathematical models with sufficient relevance.<sup>8</sup> The theoretical perspective simply is qualitatively different from the practical perspective. Ironically, theory is nonetheless required for also understanding the practical perspective.

*'Practical capability is in this environment much about understanding meanings and values comprehensible only by sufficiently involved human beings, ...'*

Unfortunately, theories and models are also treacherous. They are powerful tools for understanding and thus powerful tools for persuasion and self-deception as well. Statistical predictions, for example, inherently disown practice because they predict general future effects from principles, thereby disregarding the impact of deliberate actions in specific cases. Furthermore, our apparent preoccupation with modelled aspects implies a theoretical focus in which the practically oriented human nature often becomes a problem. This shows, for example, in the contemporary tendency to consider automated systems categorically safer than manual ones, which arguably comes from mistaking predictability for safety.<sup>9</sup> While, in fact, enforced predictability of system behaviour among unforeseen hazards may cause accidents.<sup>10</sup> However, with an understanding limited to theoretical aspects, the mistake is indistinguishable. In the stereotypical world of theoretical principles, predictable behaviour is perfectly safe and logically relevant, and the success of automation a self-fulfilling prophecy. That is, if we believe that models depict and predict the truth, then there is no room for human agency and creativity, and no need for responsible decisions.

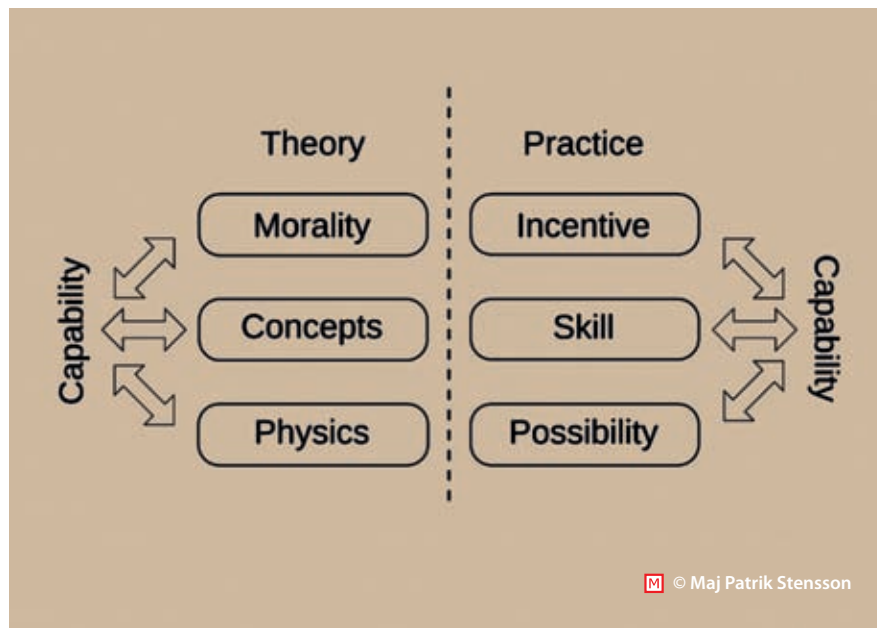


Figure 1: A Conceptual Framework for Theoretical and Practical Capability.

## Tactical Superiority Requires Capability in Practice

For the military, enforced predictability and stereotypical behaviour is clearly undesirable, unless you are the opponent. That is, exaggerated focus on theoretical aspects of capability and a disowning of practice implies reduced relevance of 'tactical superiority', which by the Swedish Air Force Chief of Staff was recognized as essential for air power and deterrence from a small nation's perspective.<sup>11</sup> Tactical superiority was then argued to require the capability in practice to make relevant use of technology, but relevance is a socially situated and unpredictable phenomenon. The ability to assess relevance of effects requires therefore the ability to interpret local contexts, which is a human-oriented activity in practice.

The Swedish military pilot education system is renowned for producing creative and responsible officers, which presumably is the result of a general focus on screening and coaching instead of large intakes and extensive dismissals. Coaching allows for a supporting atmosphere in which people are encouraged to strive for insight and comprehensive understanding, thereby facilitating self-governing and implicitly a non-stereotypical behaviour. The competitive environment

that follows from a dismissal approach, on the other hand, puts focus on formal aspects, thereby fostering a model compliant behaviour. The different perspectives are distinguishable in different education approaches and the Swedish system appears to have the former, practical perspective, in mind.

However, in the contemporary era of computerization, automation, and formal evaluation according to modelled parameters, the theoretical perspective appears continuously gaining ground, also within the Swedish system. While some aspects of this development might be beneficial, the consequences of a lost practical perspective may be a hindrance. New knowledge and theory that makes the practical perspective and its implications comprehensible is therefore required. The following conceptual framework is a candidate theory that includes the practical perspective.

## Practical Capability, a Conceptual Framework Honouring Practice

The Swedish Military Strategic Doctrine<sup>12</sup> defines capability in terms of three pillars: physics, concepts, and morality (Figure 1, left side). The definition distinguishes between what 'can be done' and what 'will be done'



because the three pillars extend the view of capability from being merely a calculable consequence of physical conditions to include psychological and social aspects. However, the definition is still rather theoretical, focusing on defining the capability. It fails to capture the practical perspective appropriately, and how that capability comes to be.

**Figure 1** illustrates a conceptual framework for capability explicitly honouring practice and human agency by complementing the theoretical pillars with a corresponding set of practical aspects. On the one hand, there are theoretical aspects describing and defining the capability. These aspects aim to be general and context independent principles, thus they are rather static. Practical aspects, on the other hand, describe effects deriving from potential capabilities. These aspects regard specifics and strive for context dependency, thus they are concerned with the dynamics of reality and human decision-making. The framework helps distinguishing between theoretical and practical aspects of capability.<sup>13</sup> Moreover, by depicting aspects in layers, the framework also supports distinguishing between levels of abstraction.

At the bottom level, concrete physical aspects make up hard conditions for capability, such as technical

systems, personnel, infrastructures, performance properties and availability. Physics is normally indisputable, thereby determining effectively what 'can be done'. Without physical means to fly, there is simply no flying capability. **Physics** translates into practical **possibilities**. With physical means to fly, there is a potential to use the flying capability so that flying occurs.

At the middle level, conceptual aspects make up abstract rules for 'what should be done' and 'how'. Rules govern how people *should* think and act, regulated by doctrines and policies. Without rules for using a capability, potential effects are essentially unknown. **Concepts** translate into practical **skills**. With skills governed by rules, for example through training, there is a potential to use the flying capability such that flying occurs in a structured manner.

At the top level, moral aspects make up reasons for 'why things should be done'. Morality governs how people *want* to think and act, affected by leadership, grounding values, ethics, motivation, etc. Without purposes for using the capability, potential effects will likely be irrelevant. **Morality** and purposes translate into practical **incentives**. With an incentive to use the flying capability, there is a potential to apply skills and use the flying capability to generate relevant effects.



## Summary

Having relevant military capability is undoubtedly a necessary condition for deterrence. The question is how to define what is relevant? Theoretical models help us understand the world, and we use models to predict principle effects in general and assess relevance. However, statistical predictions disregard effectively what happens in practice. An over-emphasis on theoretical aspects thereby disowns human agency,

*'From the perspective of a small nation unable to enforce predictability on operations, the practical perspective is particularly important.'*

which arguably is essential for tactical superiority. In fact, disregarding the practical perspective turns predictions into self-fulfilling prophecies because without knowledge about the practical aspect of values, predicted behaviour is successful by definition. However, predictability from stereotypical behaviour is clearly undesired from a military perspective, unless you are the opponent. Therefore it is crucially important to have a view of capability that honours the practical perspective, a view in which the importance of tactical superiority becomes comprehensible. For the prosperity of such a view, theory honouring the practical dimension is required.

From the perspective of a small nation unable to enforce predictability on operations, the practical perspective is particularly important. Capability in practice is distinctive for the Swedish Air Force's view on air

power. The presented framework is currently applied in analyses and development efforts aiming to improve the balance between technical possibilities, practical skills, and relevant incentives, in order to increase the practical capability further. Military power is fundamentally about people, and desired effects such as deterrence are mainly social phenomena. Air power operates essentially within systems of social systems that exhibit complex dynamics. Practical capability is in this environment much about understanding meanings and values comprehensible only by sufficiently involved human beings, crucial for the ability to affect an established social structure with relevant use of effective technological properties. If timely and skilfully applied in a dynamic situation, a stable structure might be knocked over with a feather. ●

1. Gray, Colin S. (1998), 'Explorations in Strategy', Westport, Conn.; London: Praeger, ch. 3.
2. <http://www.merriam-webster.com/dictionary/deterrence>.
3. Bydén, Micael (2014), in 'European Air Power: Challenges and Opportunities', Edited by John Andreas Olsen. Lincoln, NB: Potomac Books.
4. Prof. Dr. phil. Holger H. Mey, Swedish Defence University Air Power Seminar, Karlberg Castle, Stockholm, 24 Feb. 2015.
5. Allegedly, a statement of Galileo, 'the father of modern science' (Whitehouse, David (2009), 'Renaissance Genius: Galileo Galilei & His Legacy to Modern Science'). Combined with the view that science defines truth, the Galilean legacy implies 'what cannot be described mathematically cannot be true'. Arguably, there is a related tendency to believe also, 'what is described mathematically is true'.
6. Sterman, John D. (2002), 'All Models Are Wrong: Reflections on Becoming a Systems Scientist', *System Dynamics Review*, vol. 18, no. 4: pp. 501–31.
7. Box, George E. P. (1976), 'Science and Statistics', *Journal of the American Statistical Association*, vol. 71, no. 356 (Dec.): pp. 791–799.
8. Taleb, N. N. (2010), 'The Black Swan, The Impact of the Highly Improbable', Second Edition, New York: Random House.
9. Reason, James (2000), 'Safety Paradoxes and Safety Culture', *Injury Control & Safety Promotion* vol. 7, no. 1: pp. 3–14b.
10. Perrow, Charles (1999), 'Normal Accidents: Living with High-Risk Technologies', New Jersey, Princeton University Press.
11. *Ibid.* 3.
12. Forsvarsmakten (2012), 'Militärstrategisk doktrin (MSD 12)'; M7739-354023, 09 833:60820.
13. For an analogous distinction between theoretical (calculative) and practical (situated) aspects of usefulness, cf. Stensson (2014), 'The Quest for Edge Awareness, Lessons not Yet Learned – PhD thesis on Practical and Situated Usefulness of Advanced Technological Systems among Inescapable Uncertainties and Competing Interests in a World of Dynamic Changes', Uppsala University.

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joined the Swedish Air Force in 1988, becoming a fighter pilot flying the Viggen until it retired from service in 2004. In 1998 he acquired an MSc in engineering physics, specializing in computer systems, and began working with military research and development, focusing on human-systems integration. In 2014 he acquired a PhD in Human-Computer Interaction at Uppsala University. His interdisciplinary research concerns usefulness of advanced technological systems and focuses on the human role in achieving desired effects in real world situations. Major Stensson's current assignment is at the Swedish Air Warfare Development Department.





# Italian Naval Air Power

## *New Challenges and Capabilities*

By Commander Maurizio Modesto, ITA N, JAPCC

***This article is an abbreviated version of a longer essay written in June 2015. The full version can be provided on request.***

### Background and Introduction

Italian Naval Air Power plays a key role across the strategic concepts of Italian Maritime Power. The projection of capabilities and integrated maritime surveillance are two of the major pillars of Italian Naval Air Power. Italy, located in the middle of the Mediterranean Sea with more than 8,000 kilometres of coastline, has an economy that is heavily reliant on the free use of the sea, as merchant and fishing fleets contribute

significantly to the national GDP (Gross Domestic Product). One future challenge for the Italian Navy, and possibly other major Western Navies, is to increase capabilities that a Nation can project on the sea and from the sea, focusing on critical areas such as North Africa and the Middle East, in a budget-constrained environment. With the aftermath of the worldwide economic crisis of recent years still in place, military budget constraints may become ever tighter. The concept of 'Dual Use', which suggests that non-military activities can be supported when necessary using technologies, equipment and means available to the Armed Forces, could be the right path to build an efficient and valuable Italian Navy. While



exploring this concept, Italy is investing in a better and more efficient Naval Air Power instrument to meet the sizeable challenge of increasing in capability whilst decreasing in size. Retiring old vessels from service in order to make savings, whilst at the same time raising funds to build new, more efficient ships is another challenge shared by Italy and other Western navies. The Italian MoD's 'White Paper Defence Book' guidelines state that 'only a correct balance between acquisitions and operational development can transform investments into a net gain.' Investing in a modern and efficient navy, one which is enhanced by an associated growth of the air power instrument, could be the most appropriate method to achieve an affordable and reliable tool of foreign policy.

## Future Scenario

As the major world economies recover from global recession, the maritime environment for trade and communications will become even more important. This importance is likely to be bolstered by increased immigration from Africa to Europe and endangered by the continuing threat of maritime piracy and other forms of organized crime. All these will generate more pressure on navies to ensure the safety of sea

lines of communication. Due to its particular geographical characteristics, Italian territory will be particularly vulnerable and, therefore, maritime surveillance and protection will be paramount.<sup>1</sup> Recent NATO operations have emphasized the importance of persistence in the area of operations and the guaranteed presence of adequate military air power for a period suitable to ensure completion of the task. The Italian Navy must be prepared to play its role in increasing capability projection 'on the sea and from the sea' in order to have an influence throughout the Mediterranean Sea. As a nation, Italy must look more towards the south of Europe, North Africa and Asia as a source of both immigration and economic opportunities. At the same time, Europe as a whole should concentrate on North Africa and make a concerted effort to stabilize Libya, which is too often perceived as a distant problem.

A politically and economically stable Libya is necessary for a free Mediterranean. In the near future, therefore, the Italian Navy will be required to achieve increasingly complex and sophisticated goals, wherein threat deterrence and neutralization will be only part of the tasks required. The seas allow global reach and maritime freedom of movement as an advantage for





all: those conducting legal business, those engaged in illegal activities and those who are countering them. Therefore, the seas are the ideal domain for ‘forward projection’ of any action, either military or economic.

## New Challenges for Naval Air Power

Operating with a multi-dimensional approach, the Italian Navy will need to ensure the protection of Italy’s national interests, the development and support of local authorities as well as the promotion of growing levels of security and stability in crisis areas. To achieve this, Italian Navy doctrine purports the fusion of naval and air power – considering these two elements to be a solid, united and indivisible instrument. As confirmed in recent NATO operations, naval aviation is an essential force multiplier for the fleet since naval air power has the capability to project and operate on the sea and from the sea.

In fact, the Navy is a unique instrument characterized by organic aircraft, helicopters and unmanned vehicles that, with their dedicated crews and distinct capabilities, are considered ‘fully operational’ from sea platforms, with the advantage of being completely independent from land. This capability is considered a key

element for a modern Navy. Projection of capabilities is a key attribute.

However, naval air power does not always have a strictly military function. Humanitarian Assistance, disaster Relief and non-combatant Evacuation Operations are good examples of how power projection capabilities can effectively fulfil non-combat missions in support of the civilian population. In the past, military power was only partially involved in supporting humanitarian assistance or disaster relief. Today, one of the new challenges for the entire Italian Navy, in particular for the Fleet Air Arm, is to support and find synergy for the concept of ‘Dual Use’<sup>2</sup>. An example of dual use in the event of crisis was deployment of the Italian aircraft Carrier Cavour during operation ‘White Crane’ for the relief effort for Haiti following the 12<sup>th</sup> January 2010 earthquake. The Cavour’s embarked aircraft facilitated complex operations such as medical support, transportation of civilians and material, as well as humanitarian and logistic support.<sup>3</sup>

Navies should always be a key enabler of Italy’s maritime security and prosperity, constantly maintaining or regaining warfighting capabilities and, at the same time, ensuring a full capacity to intervene across the





spectrum of humanitarian assistance. Dual Use is now an inherent characteristic of all ships and units belonging to the Italian Navy and, for the above reasons, any newly commissioned Italian naval assets will be designed to meet the new requirements in services and technologies. Existing assets will be carefully managed during the period until the arrival of new ships and aircraft.

### Downsizing Whilst Enhancing Capabilities

The need for a modernized Armed Forces is one of the most important factors for the entire NATO Alliance. A deep revision of the military instrument is required in order to make it capable of responding to a wider variety of potential scenarios and to be able to overlay new tasks and capabilities.

In 2013, the Italian Armed Forces, under the supervision of the Minister of Defence, started an important process of renovation and reduction. In recent years, the Italian Navy has operated in many circumstances to safeguard national interests, either autonomously or jointly with other services or agencies and within NATO- and EU-led forces. During 2012, according to Italian Defence Ministry statistics, Italian warships had an operational tempo of about 65,000 hours, while naval aircraft logged more than 12,000 flight hours, a marked increase compared with previous years. A large part of this was due to the enduring contribution made to the NATO-led anti-terrorism maritime activities in the Mediterranean.

According to projections provided by the Italian Defence Ministry, by 2025, fifty of the ships that are in service today will be decommissioned. Between 2012 and 2018, the Italian Navy plans to retire 30 combatant air platforms and support vessels, including 7 frigates. Many of these warships have a remaining service life of about seven years but their retirement was the best

option to ensure that resources are available for the effective operation and maintenance of the newer vessels and aircraft.

Reduction in personnel, availability of ships and an increase in technical problems due to aging ships and aircraft meant that a swift response was necessary to avoid the loss of capabilities and capacity required to support national sea protection and interests. As the Chief of the Italian Navy, Admiral De Giorgi, reported in an audit carried out for the defence parliament committee the objective of the Italian Navy is to increase efficiency and effectiveness by replacing quantity with quality.

In order to fulfil the above objectives, in 2013 a new Italian Navy organization was designed in order to concentrate most resources into three major hubs: North, South and Islands, each of them including a naval base, a naval shipyard, and a naval air station.<sup>4</sup> The Italian Navy, taking into consideration the economic resources available in the near future, completed a re-organization process in 2014, though portions of the plan have yet to be implemented. Aware of the increasing importance of amphibious power projection, the Italian Navy has planned to boost its amphibious fleet so that it becomes a major component of the fleet. The navy's marine force, currently composed of three regiments, will be re-shaped for use as a single, agile, fully deployable unit, with the support of the new and more capable EH101 transport helicopter (replacement for the old 'Sea King').<sup>5</sup> For the same reason, synergy is being enhanced between the Italian Army and Navy, with a formal agreement reached in 2013. This agreement means that Army aviation has begun training its pilots to operate A-129 attack helicopters from the flight decks of Italian ships. This interoperability between the Navy and the Army is part of a defence project to optimize available resources and avoid duplication of effort in the Italian Armed Forces.



Other than the acquisition of the new EH101 multi-role helicopter, the most important current programme for the Italian Fleet Air Arm is the introduction of the SH90 multi-role helicopter as a replacement of the AB212 employed in Anti-Submarine Warfare (ASW), which will be withdrawn from service in few years. In addition, another key challenge for the Italian Navy is the integration of unmanned aircraft known as Unmanned Aerial Systems (UASs) on board ships. Such a capability is not intended to replace piloted aircraft but to supplement their capacity. UAS may be particularly useful for Intelligence, Surveillance and Reconnaissance (ISR) and can be used in risky missions without endangering any crew member. Experience with these systems so far supports the theory that such unmanned aircraft increase degrees of flexibility, versatility and persistence on board Italian Navy ships for missions such as counter-piracy and immigration control.

A further major challenge ahead for Italian Naval Air Power is the renewal of embarked fixed-wing aircraft with the gradual replacement of AV8B PLUS with the STOVL (Short Take Off and Vertical Landing) version of the F-35B. The F-35B is a revolutionary aircraft with extraordinary operational capabilities supported by a logistics system with global reach that will allow the Italian Navy to make a leap into 5<sup>th</sup> generation combat aircraft.

## Conclusions

The Italian Navy is undergoing an important restructuring process, which is necessary for facing new economic and political scenarios. In the last five years,

the situation in the Mediterranean has changed rapidly and a real sense of instability has spread throughout Europe. In addition, the Italian economy is heavily reliant on the free use of the sea and cooperation between NATO countries is key when facing these new challenges. This means that the Italian Navy, in combination with its Naval Air Power, must play an increased role in order to become a credible and effective instrument for both military and diplomatic purposes. Today, Italian Maritime Power is undergoing major transformation in order to ensure that it has the flexible and credible dual use capabilities necessary to perform both traditional warfare tasks and non-military ones, in support of national interests and humanitarian assistance. Investing to generate a better and more efficient Naval Air Power instrument is also a necessity. Rationalizing and merging personnel may be necessary in fields where technology effectively replaces the need for manpower, but a reduction in specialized technicians and aircrews is not acceptable if an appropriate level of professionalism is to be maintained. New aircraft acquisition for the future will empower the Italian Navy with a military power status in the world in terms of efficiency and capabilities. Investments in military capability are required in order to guarantee a secure and better life for our next generations. ●

1. [http://ec.europa.eu/enterprise/policies/security/files/doc/maritime\\_case\\_study\\_csas\\_en.pdf](http://ec.europa.eu/enterprise/policies/security/files/doc/maritime_case_study_csas_en.pdf) – Centre for Strategy & Evaluation Services 'Maritime Security and Surveillance – Case Study January 2011'.
2. <http://www.marina.difesa.it/cosa-facciamo/capacita-dual-use/Pagine/dual-use.aspx>. Dual Use (No military activities of the Italian Navy).
3. [http://www.marina.difesa.it/conosciamoci/editoria/notiziario/Documents/speciali/2013\\_04\\_WhiteCrane.pdf](http://www.marina.difesa.it/conosciamoci/editoria/notiziario/Documents/speciali/2013_04_WhiteCrane.pdf).
4. [http://www.senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=SommComm&leg=17&id=00813378&part=doc\\_dc-sedetit\\_pi-genbl\\_adcdsmdmadsdgdirae&parse=no](http://www.senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=SommComm&leg=17&id=00813378&part=doc_dc-sedetit_pi-genbl_adcdsmdmadsdgdirae&parse=no).
5. <http://btgsanmarco.it/organizzazione/il-san-marco-oggi/>.

### Commander Maurizio Modesto

joined the Italian Navy in 1988 and completed flight training with the US Navy in 1992. In his career he had flown 5,000 hours mostly in support of amphibious and special forces operations and he is been an instructor pilot for SH-3D and EH-101. He participated in all major operations including Somalia 2 and 3, Kosovo and Afghanistan. From 2000–2002 he was an exchange pilot with the Spanish Navy for the SIAF (Spanish Italian Amphibious Force). From 2011–2014 he served as staff officer at the Italian Naval Air Fleet Command in Rome. He is currently stationed at the JAPCC in Kalkar, Germany as Joint Personnel Recovery, Littoral and Special Operations Subject Matter Expert.







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# Information Knowledge Management

## *A Mission Essential Asset*

By Lieutenant Colonel Antimo Russo, ITA AF, JAPCC

Leveraging information is more important today than ever before in nearly every aspect of human activity. If used in the proper way, information can boost corporate profits, help companies gain new markets or even defeat an enemy, as recently depicted in a film (The Imitation Game) about Alan Turing, who helped win the Second World War in Europe by inventing a computer that could decipher communication encryption.

The top players within organizations or companies need information to make the right decision at the right time. The primary aim of Information Knowledge

Management (IKM), also referred to as Information Management (IM), is to precisely facilitate the flow of facts or ideas up and down the chain of command to improve business operations and mission success rates.

### Introduction

'Information is not knowledge,'<sup>1</sup> visionary scientist Albert Einstein once said. What did he mean by that? If someone who is not a doctor attempts to analyse blood test results, all he sees is a list of unintelligible





data because of his lack of required skills and experience. Albert Einstein claimed that *'Knowledge derives from experience'*. Knowledge, in Einstein's view, is the ability to understand information and turn it into something more functional. Information per se, therefore, is not itself knowledge, though it provides at least part of the basis for knowledge.

The difference between information and knowledge is not only a purely semantic one. Proof of this can be seen across the vast literature published in the 20<sup>th</sup> century on cognitive sciences and neuroscience. For example, scientist Ivan Pavlov provided a tangible example of how our brain transforms external inputs

into knowledge and adaptive behaviours ('Conditioned Reflexes'<sup>2</sup>) or, in other words, how the brain transforms information into knowledge. Knowledge therefore, may be viewed as a process.

This article will not focus on the scientific aspects of knowledge. It seeks to provide an overview of large organizations – primarily NATO – where Information Knowledge Management serves as the tool to organize information in a systemic way and facilitate the development of knowledge through an intelligent use of processes. Information Knowledge Management (IKM) implies that information is processed and used by managers and leaders in pursuing their goals.





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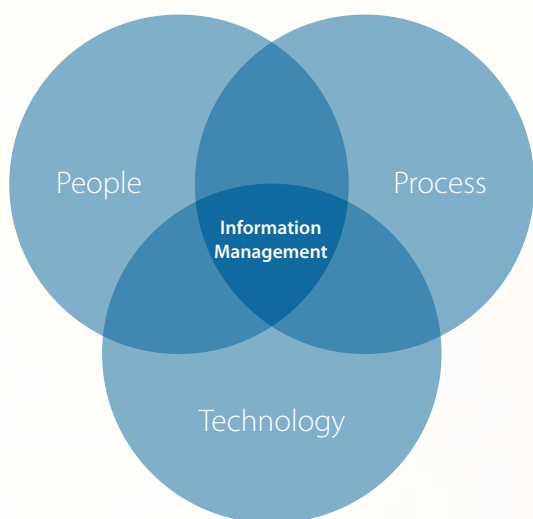
In this discipline, information ownership is never passed on to others. IKM stands on one main principle: information is a corporate asset that needs to be standardized, protected and ensured (especially in military environments).

In the 1990s, IKM became a non-transferable structural component of business strategies as well as a corporate asset, just like the Human Resources or the Legal departments. This trend is even clearer today as IKM principles are being applied to more areas/environments and have grown into a stronger empowerment tool – a well-defined enabling system, in other words.

According to Edward Waltz<sup>3</sup>, a Knowledge Management (KM) academic specializing in the intelligence domain, KM is an organizational discipline that processes,

acquires, creates, reveals and delivers knowledge through information technology (IT). As such, it allows companies to reach their mission goals.

Within international organizations like NATO, which is both a political and a military organization, IKM is a mission-essential asset, the aim of which is to contribute to the achievement of Information Supremacy<sup>4</sup>. It does so primarily by using tools such as a computer-based collaborative environment to facilitate the creation, storage, and sharing of documents, policies, guidance, assessments, reports, memoranda, briefing, etc. Used properly, these tools allow for instantaneous access to a real-time information stream and drastically improve the capability to collectively and collaboratively contribute to discussions and/or products, from almost anywhere in the world.



Information Management and the processes it generates revolve around people and technologies. These two components are essential when it comes to sharing information in a manner that is both timely and in compliance with NATO security policies and standards. Taking the 'need to know or need to share' principle as its starting point, IKM uses software as an IT background to facilitate the generation, storage and sharing of documents. From an organizational perspective, IKM and IT combined can be referred to as the weapon system of Information Management: a system that avails itself of the best available technologies for organizational purposes.

In essence, the primary aim of IKM is to facilitate decision-making processes and mission fulfilment. As stated on the NATO official website<sup>5</sup>: 'Each day, hundreds of civilians and military experts and officials come to NATO HQ to exchange information, share ideas and help prepare decisions ...'

## Information and Knowledge

### Management in NATO

#### Civil and Military Bodies

#### **IKM as Key Enabler for the Transformation and Assurance of Defence and Security**

The 28 nations that comprise NATO have a common goal, but are very different from one another. For this reason, the Alliance promotes information and knowledge standardization through a consistent harmonization effort. A solid example of this is the large number of doctrines and policies used to regulate different domains. In this respect, IKM is a key enabler in streamlining the harmonization process.

IKM is well-rooted at many levels of the NATO environment. At NATO HQ, an IKM Office supports the International Military Staff (IMS)<sup>6</sup> and the Military Committee (MC) in their mission. This Office provides support to the strategic military authorities of NATO member countries to develop strategic policies and concepts.

Of equal value and also at the top level is the NATO Information Management Authority (NIMA), a Working Group dealing with IM. NIMA is where information management strategies, policies and NATO-wide guidance are designed to meet mission requirements and ensure mission success.

Furthermore, it should not be forgotten that IKM has already contributed to several NATO Military Operations (Operation Unified Protector [OUP], from February–October 2011, is one example). No military operation would be successful without a smooth and effective flow of information. Based on the personal experiences of OUP IKM personnel, it is apparent that Information Knowledge Management was heavily used as an enabler of the planning process. IKM facilitated seamless

transmission of requirements from OUP leadership, who were in multiple locations, to the various support and planning agencies that built the required infrastructure to enable command and control of the Operation.

IKM initiatives are also essential to core activities at NATO Centres of Excellence. IKM principles, coupled with IT infrastructures and processes, allow the best possible use of the most valuable resource of all: intellectual capital. 'Centres of Excellence<sup>7</sup> train and educate leaders and specialists from NATO member and partner countries, contribute to doctrine development, identify lessons learned, improve interoperability and capabilities and test and validate concepts through experimentation. Their recognised expertise and skills are beneficial to the Alliance as they support the transformation of NATO while avoiding the duplication of NATO Command Structure assets, resources and capabilities.' By empowering defence and security, IKM becomes one of the main facilitators of Alliance transformation.

#### **IKM as a Human Capital Tool Contributing to Alliance Transformation**

The effective handling of information remains a top priority for organizations. In complex entities like NATO, where standardization, interoperability, common language, best practices and lessons learned all have their specific importance, information management takes on a major role in short, medium and long-term planning cycles, as well as in day-to-day operations.

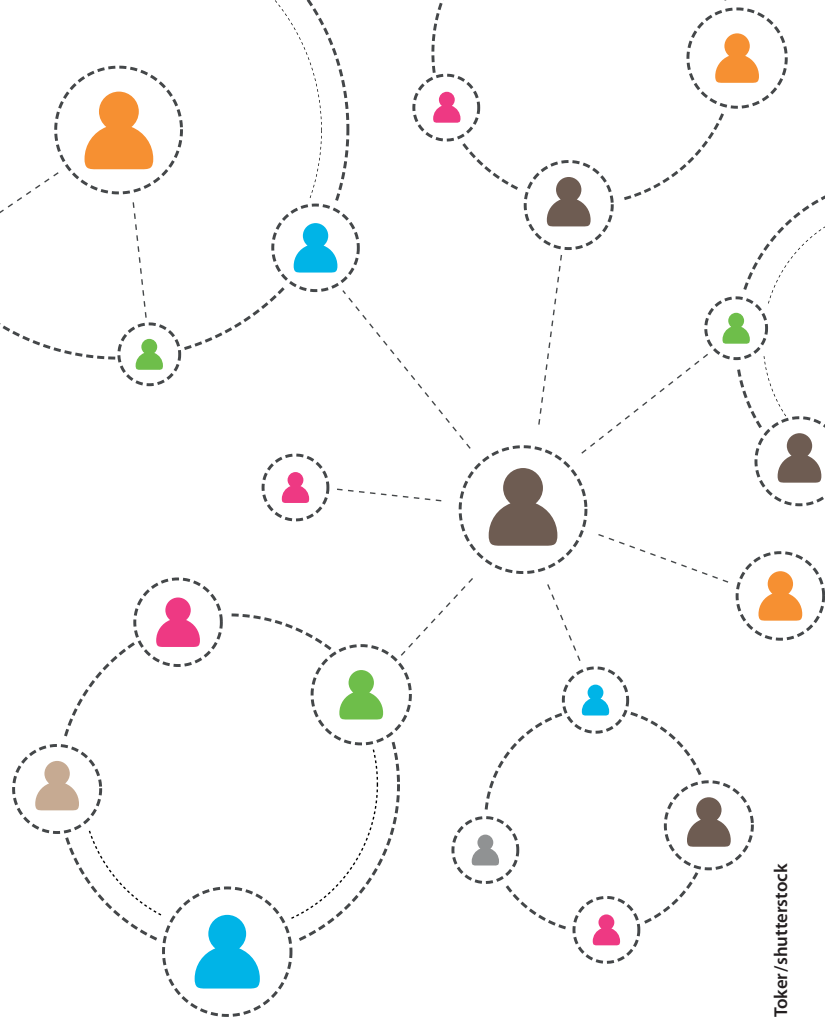
The importance of Information Management to NATO in recent years is evident in the major investments NATO has been making in its effort to adapt IM structure to new challenges. As set forth in article 19 of the Lisbon Summit resolution, '(NATO must) ... carry out the training, exercises, contingency planning and information sharing it takes to assure our defence against the full range of conventional and emergency security challenges, and provide appropriate visible assurance and reinforcement for all Allies'. Information sharing is seen as a fundamental principle of IKM as well as a contributing factor to defence reassurance and support and security.

## Information Management: Key Factors for Success

Properly managing information helps to ensure that the right information is available to the right people at the right time and in the right form, enabling decision-making processes.<sup>8</sup> During military exercises, accuracy and timeliness of information are considered to be mission-essential. Accuracy and timeliness are precisely what military commanders in charge of operations or exercises need to pursue in order to accomplish their mission. AS IKM supports these two mission-essential requirements, there are several factors that enable effective implementation of its principles.

**Training** is certainly a key factor of effective IKM. At the Chicago Summit in 2012, NATO leaders stressed the importance of expanding education and training. Training provided by NATO to its human capital comes in various forms. Examples are professional training in preparation for future operations (exercises) as well as individual and collective training or on-the-job training aimed at mitigating the loss of expertise as may occur upon staff reassignments. Nations, too, are aware of the importance of training and devote considerable resources to it. Italy, as an example, has recently stressed the importance of training in a high-level strategic defence document.<sup>9</sup>

When discussing training, there are some IKM-specific courses offered within NATO. One such course is taught at the NATO School in Oberammergau, Germany, and is aimed primarily at preparing students for their IKM planning and execution duties and services in a NATO environment. Using NATO IM policies as reference, students learn how to assess the compliance of their organizations with NATO's IM principles. They are provided examples of suboptimal practices and are trained to identify the NATO IM policy used in each case. The course is aimed at end-users from across the organization, such as heads of NATO Military Bodies, IM Senior Officials, Information Managers, IKM Heads, IKM Support Officers, Originators, Information Owners and Information Custodians. This further confirms that, as mentioned in the introduction to this paper, the IKM 'system' impacts everyone everywhere in the organization.



Along with training, IKM initiatives owe their success to other factors, too: leadership, culture, organizational set-up (structure, roles and responsibilities, governance) and information technologies (IT).

**Leadership** plays a key role in ensuring almost any initiative taken by an organization has a successful outcome. Its impact on IKM is especially evident because IKM is a relatively new discipline. Nothing has greater impact on an organization than leaders promoting a discipline among their staff and making them aware of its importance. One of the worst enemies of IKM is the lack of interest in it *among* the leadership or the stakeholders.

**Culture**, in this context, relates to two different aspects. The first aspect addresses the necessity of broad commitment to the rules and mechanisms that IKM provides, i.e. the ways how to share information. The second aspect is about the willingness to share the information, i.e. the question what to share, especially when it comes to security classification issues. A recent shift can be observed in NATO information management as well as security policies, which is softening the often too strict 'need-to-know' principle<sup>10</sup>



that basically leads to the hoarding of critical information. The new emphasis is on the 'responsibility to share'<sup>11</sup>, which involves avoiding over-classification as well as applying information release procedures to entities concerned. IKM provides a knowledge-sharing environment which puts both requirements in balance, where information shall be managed to facilitate access, optimize information sharing and re-use, and reduce duplication, all in accordance with security, legal and privacy obligations.<sup>12</sup>

**Organization set up.** In IKM-enabled organizations, roles, responsibilities and governance are clearly identified and provide fertile ground for performance improvement.

**IT** is the heart of IKM: there can be no benefits without IT/CIS. CIS and IKM combined are a weapon system and inadequate investments in IT may well jeopardize the IKM mission, which can subsequently cause overall mission failure.

The right combination of these components is the precondition for IKM success. *The cost of doing it is nothing compared to the pain of not doing it!*<sup>13</sup>

## Conclusions

NATO offers a favourable environment for the development of IKM strategies. Since its establishment sixty-six years ago in the early days of the Cold War, NATO has needed to keep at pace with the changing world

and be prepared for future challenges. There is no doubt NATO has been keen to introduce and develop IKM strategies in its recent history. Emphasizing transformation as a tool for tackling future challenges, NATO is increasingly acknowledging that more structural, conscious and proactive information management can bring significant benefits to organizations, especially when this means turning individual knowledge into collective knowledge. IKM is a unique vehicle to convert bright ideas into spendable capital. Making initial investments in the right resources leads to significant savings, facilitates decision-making and enhances the sharing of accurate information. To conclude, information creates knowledge, knowledge creates education, and education and training prepare and empower NATO allies and forces. ●

1. Paolo Coelho. 10 Lessons from Einstein. 16 Mar. 2012. [Online]. Available: <http://paulocoelho.blogspot.com/2012/03/16/10-lessons-from-einstein/> [Accessed 16 Sep 2015.]
2. I. P. Pavlov and G. P. Anrep. Conditioned Reflexes, Nov. 1984.
3. E. Waltz. Knowledge Management in the Intelligence Enterprise, London, 2003.
4. NATO Primary Directive on Information Management (C-M(2008) 0113), Nov. 2008.
5. NATO official website. What is NATO? Available: <http://www.nato.int/nato-welcome/> [Accessed 16 Sep 2015.]
6. NATO official website. International Military Staff. Available: [http://www.nato.int/cps/en/natohq/topics\\_64557.htm](http://www.nato.int/cps/en/natohq/topics_64557.htm) [Accessed 16 Sep 2015.]
7. NATO official website. Centres of Excellence. Available: [http://www.nato.int/cps/en/natolive/topics\\_68372.htm](http://www.nato.int/cps/en/natolive/topics_68372.htm) [Accessed 16 Sep 2015.]
8. NATO Consultation, Command and Control Board (NC3B). Guidance for Developing Information Management Plans. AC/322-D 2009-0045 Rev. 1 Mar. 2010.
9. Italian Ministry of Defence. LIBRO BIANCO per la sicurezza internazionale e la Difesa, Apr. 2015.
10. Need-to-know is 'the principle according to which a positive determination is made that a prospective recipient has a requirement for access to, knowledge of, or possession of information in order to perform his official tasks or services'. NATO Information Management Policy, C-M(2007)0018.
11. Responsibility-to-Share is 'the individual and collective obligation to make information available, discoverable and accessible for those entities that require the information to perform their official duties and tasks', *ibid.*
12. *Ibid.*
13. NATO Information Management Authority. Informative Leaflet on Information Management, Nov. 2009.

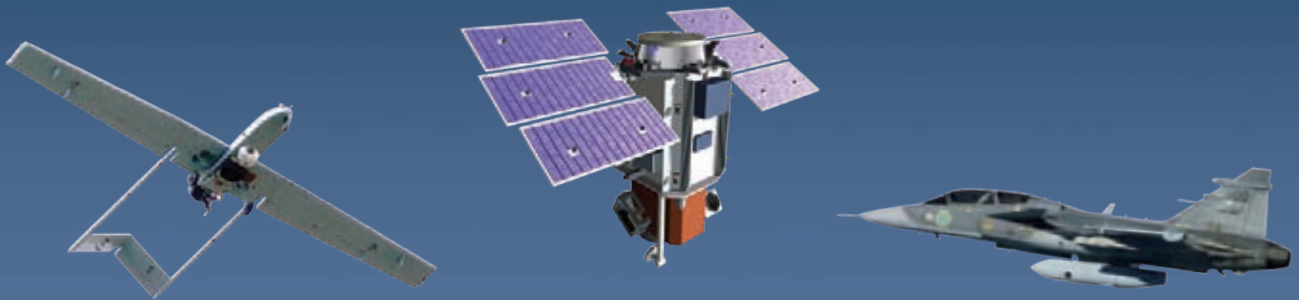


### Lieutenant Colonel Antimo Russo

is a CIS officer with more than 25 years of experience in the Italian Air Force. Currently, he serves as a JAPCC Information Knowledge Management Staff Officer within the Planning and Control Section. He holds a degree in a branch of political science. His officer career includes experience at the tactical, operational, and strategic levels either in national or in international environment. Worth mentioning are his assignments to the 3<sup>rd</sup> Wing in Verona Villafranca (Italy) as a CIS Section Head; Albania as a liaison officer during the operation Albit; 4<sup>th</sup> Department Logistics of General Staff of Italian Air Force as a staff Officer and the former NCSA Sector Naples as a Branch Head and Squadron Commander. He participated in the NATO OUP mission as a Networks Support Group Commander of the NCIA Sector Naples.

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# Joint Employment Zones (JEZ+)

## *A Step Beyond in Joint Air Power*

By Lieutenant Colonel Carlos Presa, Ph.D., ESP AF, JAPCC

**BUZZ:** 'Halt! Who goes there?!'

*The other toys are peeking over the edge of the bed.*

**REX:** 'Don't shoot! It's okay! Friends!'

**BUZZ (to Woody):** 'Do you know these life forms?'

**WOODY:** 'Yes. They're Andy's toys.'

**BUZZ:** 'Alright, everyone. You're clear to come up.'

*Buzz Light-year, Sheriff Woody and Dinosaur Rex.  
Toy Story (1995), Walt Disney Pictures/Pixar*

*A set of dissimilar toys sharing common battlespaces can successfully accomplish a task by selecting, for each given tactical situation, the best cluster of players. But only if they can talk.*

There is a doctrinal pre-condition for cooperative success. This is well illustrated in the Old Testament story of the tower of Babel: any coalition has to share both a communication code and the means to exchange it, in order to avoid the tower's mission failure.

Time and space variables, often presented as constraints and restraints in military planning, are now a key transformation factor in Air and Space Power. The existence of solid new communications protocols linking a vast collection of platforms federated through their mission computers is a key enabler for further NATO success.

Communication is ultimately important. Through communication, we agree and disagree. Strategically, communication helps us resolve conflicts and synchronize in time, space and action with our allies. This paper, however, is not about STRATCOM. Instead, it addresses forms of tactical communication that will contribute to the organization and synchronization of complex warfare activities at platform level through future automated correlation which is controlled or supervised by a battle manager.

### Communication, Air Power Activities and Spatial Structure

As distances can be the main constraint for an operation involving linked Air and Space assets, this article will reflect the importance of local interaction among platforms sharing a specific network ('net'), that is to say, with certain degree of proximity. This will allow us to build a concept based on 'bottom-up' interaction, using the Core Air and Space Power activities as a constant, as almost any Command and Control (C2) structure will grow from their orchestrated execution within certain spatial area.



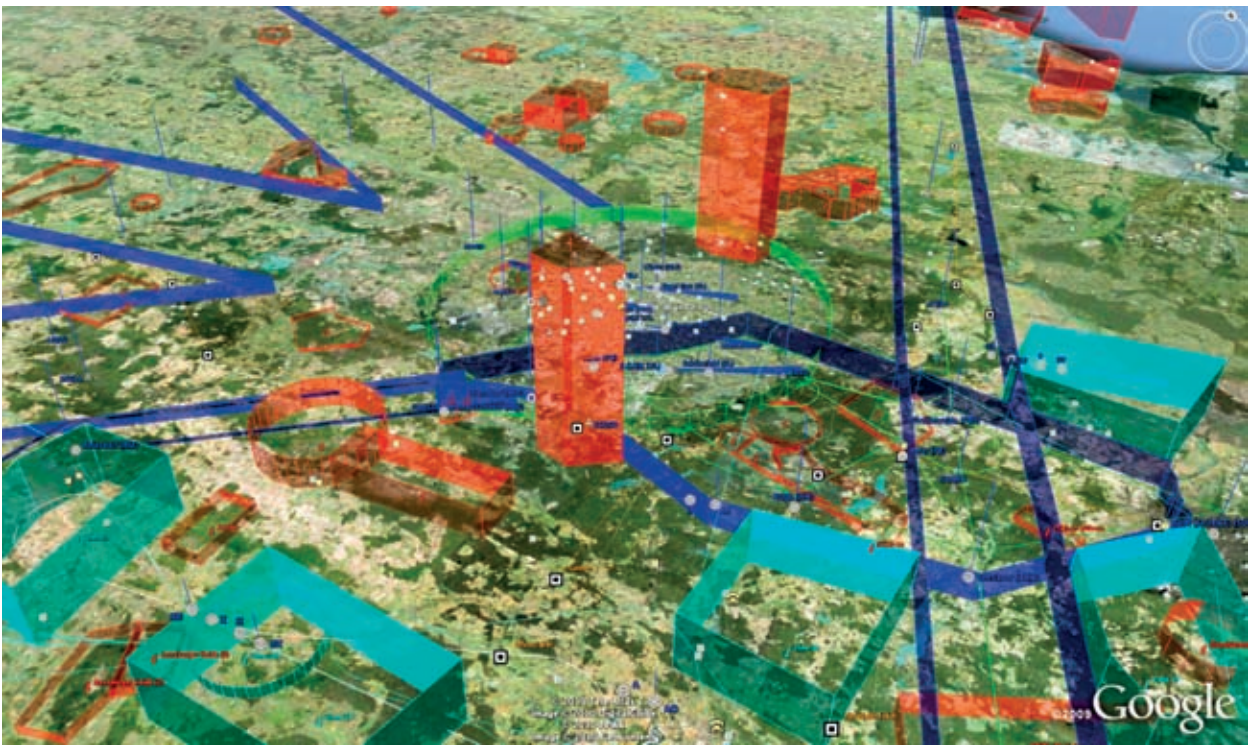


Figure 1: Berlin's Airspace segregation in the 1980s.

Regarding the structural approach to communication in a networked environment and Air and Space operations, AJP 3.3<sup>1</sup> (A) (NU) is the scaffolding which categorizes the aforementioned Core Air and Space Power Activities. There is a certain correspondence between these Activities and the air and space, ground, maritime and cyber domains, where cooperative patterns of interaction may be formed through future options of data exchange.

Moving one doctrinal step down from the Joint to the Tactical level: the concrete morphology of Air Power actions can be found in the Bi-Air Command Regional Manual 80-06 (NR). This manual describes the various contexts of Air and Space Power Activities by establishing common ground for the tactical employment of Air Power in terms of standards, coordination, and now communication.

Manual 80-06 (NR) includes about 20 structure-related definitions related to the 'zone' concept, structures that integrate and define what Matthew Flintham poetically calls 'martial heavens'. The most common ones are the Fighter Area of Responsibility (FAOR), the Fighter or Missile Engagement Zones (FEZ-MEZ), the Desired Engagement Zone (DEZ) and the Restricted Operations Zone (ROZ). It also includes detailed descriptions of ground position reference systems,

which correlate entities executing Air Power Contribution to Surface Operations (one of the five Core Air Power Activities comprised in AJP 3.3) with ground-based entities.

In addition to the aforementioned standard zones, a variety of back-up spaces, such as sanctuaries or safety corridors, will apply when certain systems degrade. Some zones will be system dependent, related to weapons or sensors employment. Other zones will be defined by the C2 in a specific Airspace Control Order (ACO) for transit, de-confliction, coordination, backup or weapons status. Other zones will be conceived regarding the opponent's systems and targets taxonomy. All those zones and the activities within their borders need to be known and exploited at the maximum level of synergy by the C2 structure without limits for the different occupants of each space and for their managers in the C2 operations centre. That may be done through a solid data exchange protocol.

### Composite Air Operations (COMAO)

COMAO missions are the classic approach to space and time compression in modern Air Power activities. The COMAO consists of a number of dissimilar aircraft (a subset of Air Power elements or a cluster of platforms/sensors/weapons) fulfilling a common task by

means of complementing each other's tactical role while executing cooperative tactical management functions, which include C2 as well as certain decision and delegation schemas.

Traditionally, COMAO components shared a limited and de-conflicted airspace and a detailed (and pre-planned) supporting – supported tactical structure throughout a single mission. However, communications (voice and basic data) were limited to a basic architecture and platforms sensors were not federated for threat detection and reaction. Spaces (areas or zones) were tied to a specific voice-communication pattern and information exchanges (and, thus, potential tactical support) among the various portions of airspace were few or none, as the assets could neither see their neighbour's radar tracks nor monitor their frequencies from their visual bubbles, boxes, corridors and cylinders.

## MIDS Killed the Radio Star

From classic schemas of COMAO execution to highly dynamic operations like Time Sensitive Targeting (TST), the introduction of the Multifunctional Information Distribution System (MIDS) in some platforms federated certain sensors among some of the users of each net. Information about targets, threats and task changes began to flow to and from on-board displays, reducing action and reaction times in the tactical environment.

These features marked the beginning of the end of an Air Power era that relied on hand signals and radio calls. As a consequence of this data exchange, based mainly in symbols and icons for better situational awareness, the TACOM<sup>2</sup>, the executive brain in the C2 system, has increased agility (through his battle managers) and can solve the main aspects of the Babel challenge through an agreement called LINK, which is a specific military tactical data exchange network.

## The Joint Employment Zone (JEZ+) Concept

JEZ stands for 'Joint Employment Zone', however, 'employment' is only one management function.

Therefore the broader term of 'Employment' and the acronym JEZ+ will be proposed as shown in the title of this article.

According to US Joint Publication 3-52, JEZ (Joint Employment Zones) Operations involve 'multiple Air Defence weapons systems of one or more Service components simultaneously and in concert, engaging enemy Air Power in the same airspace.'<sup>3</sup> Further, this publication warns against the limitations extracted from the lack of maturity (in accordance with Alberts et al. [2010]<sup>4</sup> about C2 Maturity) of the C2 system, especially regarding lack of awareness in terms of the players' identity: 'However, successful JEZ OPS depend on correctly identifying friendly, neutral and enemy aircraft (...) and without effective C2, is extremely difficult to implement.'<sup>5</sup>

In the past, the concept of Clear Avenue of Fire (CAF) together with interrogation and labelling of unknown or ambiguous tracks have been the main obstacles for a safe 'Collaborative C2' schema of engagement, requiring a de-conflicted C2 solution. Traditionally, these solutions were space and time based, and Non-Cooperative Target Recognition Systems (NCTR) (Identification Friend and Foe/Selective Identification Feature (IFF/SIF) and Electro-optical systems) were not robust enough to provide the JEZ option at an acceptable level of safety. Until now, controllers, pilots, tactical planners and GBAD operators have lived with spatial boundaries (coordination lines, BENO [do not be there] lines or segregated areas) within their private engagement zones, where the topology of MEZ, ROZ and FAOR did not coincide.

JEZ+ becomes possible when the position, ID and future intention messages flow among the blue forces across the battlefield in seconds or less once a track has been positively identified, labelled and declared according to decision rights allocation within the Management Functions distribution in that particular C2 context. Current platforms are equipped with MIDS/LINK, interrogators and Electro-Optical Identification (EOID) pods, among other capabilities. Connectivity through MIDS or an equivalent system (even portable) will be a must for all future operations, not only for those in JEZ+ environments.



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## The Future: Pros and Cons

Swarm technologies currently aim for the design of mathematical models that provide the necessary algorithm for an efficient cooperative profile of entities evolving in the same airspace. Hardware and software solutions may move from improving the Traffic Collision Avoidance System (TCAS) towards a future confliction avoidance C2-integrated net or towards the design of autonomous entities equipped with proximity sensors<sup>6</sup> to avoid collision and interference with other robots within the model of choice: swarm, flock or even school.<sup>7</sup>

All these associative forms of life or technology need a continuous space, like the sea for the fish or the air for the bees, where individuals generate the space they need for their different states or functions through local interactions while maintaining common goals with their colony. Civilian air traffic de-confliction is beginning to be based in 'quickly reactive for change (...) floating airspace baselines'<sup>8</sup>

mainly through a tri-dimensional iterative process based in mathematical models, simulations, software development and operations.

In the military environment, however, these concepts may bring new software applications to current platforms for increased force/system/weapon effectiveness as well as for traffic or tactical flow de-confliction.

Situational awareness (SA) displays may incorporate new features based on a dynamic airspace model which would generate graphics consisting of danger-close bubbles defined by certain trajectory and fuze values sent by the shooter to other nearby platforms.

These dynamic features would generate a de-conflicted 3D battlefield updated in real time. SA could be maintained through simple software upgrades, including the associated blast and debris diagrams around the air or ground targets for awareness. Friendly aircraft, manned or not, would adapt their tactical patterns to



that immediate and dynamic spatial segregation through steering indications on their Head-Up Displays (HUD) or even through auto-pilot commands to the Flight Control Computers given by the Blue Force Tracker brain to de-conflict weapons launches.

5<sup>th</sup> Generation aircraft or ground stations will relay/filter/prioritize/declutter and/or convert the format of these LINK signals and pass them to the different players of the cluster initially through user-friendly apps in compatible systems, either fixed or portable. Once full integration is accomplished, LINK data may be directly passed to their different Mission Computers for geo-location based situational awareness displays as well as for spatial de-confliction and effective weapons management. As the kill chain is compressed, the battle can be accelerated and won.

Whatever the process, the resultant force delivering air power within the spatial limits of a JEZ+ should approach the demands of the last degree in maturity that Alberts et al. (2010) propose: the 'Edge' level, where self-synchronization would reflect the immediate confluence of mission and circumstances. This would resolve time gaps in decision making and solve CAF conflicts among entities. It would also help to suppress double-targeting or untargeted adversaries in the way that a swarm adapts the formation and the manoeuvre as a derivative of the tactical situation within its JEZ+ space. Nevertheless, a strong backup option (today's primary) must always be emphasized in training.

JEZ+ training would measure how efficient the task becomes under such connected environment. Compatible software developments and criteria would

also be necessary. But the most challenging part is the grasping of this new battlefield concept, which is similar to the Marines' practices in amphibious operations in which all systems play together. From an aviator's point of view, it may be difficult to accept a Patriot missile as a wingman, a Reaper as a Sandy in a Combat Search and Rescue (CSAR) mission or a frigate as a Sweeper in Air Sea battles. However, time and technology will see the development of the best axioms for a joint force in shared airspace.

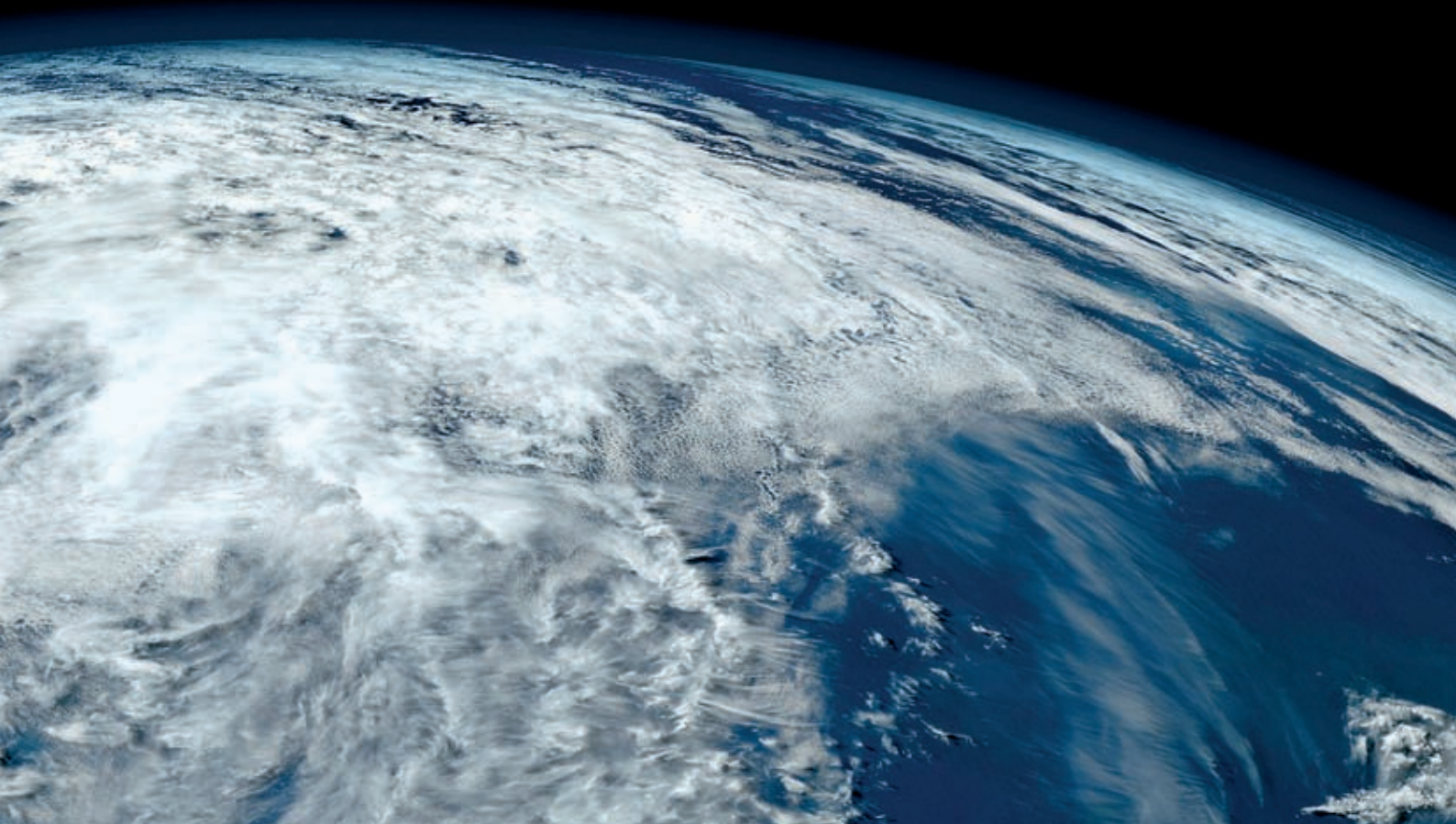
The core activities of air power, current technologies and tactical doctrine options may all need to be revisited in the search for patterns of combination among entities (multi-labelled in capabilities, systems, platforms, and weapons) in order to achieve maximum efficiency. Training JEZ+ with dissimilar platforms and compatible software modelling may enhance tactical options in new challenging scenarios. Exercise designs should include new C2 features which test the advantages and backup options that fighting JEZ+ brings to the Operational and Tactical arenas ... where the talking toys play. ●

1. 'Allied Joint Doctrine for Air and Space Operations AJP 3.3 (A)'. Nov. 2009. Promulgated by the NATO Standardization Agency.
2. Tactical Commander, who has certain decision rights allocated to him/her.
3. Joint Publication 3-52. Doctrine for Joint Airspace Control in the Combat Zone. US Armed Forces Joint Staff, 1995 [e-version] p. III-6 [http://www.bits.de/NRANEU/others/jp-doctrine/jp3\\_52\(95\).pdf](http://www.bits.de/NRANEU/others/jp-doctrine/jp3_52(95).pdf).
4. Alberts et al. (2010) NATO NEC Maturity Model. Produced by the Centre for Advanced Concept and Technology (ACT) [e-version] [http://www.dodccrp.org/files/N2C2M2\\_web\\_optimized.pdf](http://www.dodccrp.org/files/N2C2M2_web_optimized.pdf).
5. Ibid.
6. Arvin et al. (2014) 'Colias: An Autonomous Micro Robot for Swarm Robotic Applications'. International Journal of Advanced Robotic Systems. [electronic bulletin] <http://eprints.lincoln.ac.uk/14585/1/Arvin-IJARS-2014.pdf>.
7. Like the Nissan EPORO robot car, with collision avoidance features mimicking fish behaviour.
8. Ehrmantraut & McMillan. 'Airspace Design Process for Dynamic Sectorisation' Dissertation. 26th DASC. [http://www.eurocontrol.int/eec/gallery/content/public/documents/conferences/2007\\_DASC\\_Dallas/Airspace-Design-Process-for-Dynamic-Sectorisation-V2.0.pdf](http://www.eurocontrol.int/eec/gallery/content/public/documents/conferences/2007_DASC_Dallas/Airspace-Design-Process-for-Dynamic-Sectorisation-V2.0.pdf).

### Lieutenant Colonel Carlos Presa, Ph.D.

was commissioned through the Spanish Air Force Academy as an Officer in 1992. Following operational and instructional postings in several Units, flying mainly the F-18 Hornet, he completed his Command Tour as the 462 SQN Commander in the Canary Islands. After graduating from the Joint Staff College in Madrid, he was posted as an Air-to-Air instructor at the Tactical Leadership Programme. Among other missions, he joined ISAF as the acting Air Liaison Officer, TACP Commander and Airfield Coordinator for the Spanish Battalion. He returned to the Staff College as an Instructor in 2012 and is currently the Manned Air Defence Subject Matter Expert at JAPCC. Lieutenant Colonel Presa holds a Ph.D. in Linguistics.





# The Final Frontier

## *Or the Long Journey to a NATO Space Policy?*

By Lieutenant Colonel Stephen Neumann, DEU AF,  
German Space Situational Awareness Centre

**The Space domain is increasingly congested, contested and competitive and NATO is now, more than ever, dependent on Space. When discussing the Space domain, NATO is focusing on protecting access to Space as one of the global commons and on Space support to NATO Operations.** In 2008, the Joint Air Power Competence Centre (JAPCC) published a study entitled – ‘NATO Space Operations Assessment’ (NSOA). This study identified 19 Space-related gaps and provided 23 recommendations to NATO. Among a few others, NATO’s lack of Space-related guidance is a recurring

theme throughout the document. In 2012, ‘Schriever Wargame 2012 International’ emulated a notional NATO operation with reliance on space-based capabilities provided by nine NATO nations and Australia. The results provided a meaningful example of Space-related threats and challenges for NATO-led operations in the Twenty-first century. The Supreme Allied Commander Transformation (SACT) report on NATO’s participation highlighted once again the fact of missing political guidance. Unfortunately, two years later, NATO still lacks formal political guidance.

## The Crossroad

In 2011, SACT founded the NATO Space Integrated Project Team (IPT), which started to work on some of the issues addressed in the NSOA and lessons learned during International Security Assistance Force (ISAF) operations. Even in the early stages of work, the group was advised not to work on a Space Policy due to political/national sensitivities, e.g. national sovereignty, or the need to safeguard strategic economic and industrial interests. Based on NATO's participation at the 'Schriever Wargame 2012 International' and the shortfalls identified during that exercise, a NATO Bi-Strategic Space Working Group (NBiSCSWG) succeeded the IPT and was tasked by the NATO Military Committee (MC) to investigate specific Space-related questions. And again, a Space Policy was explicitly excluded from the programme of work.

Within the last two years, the NBiSCSWG has made some significant steps towards improving Space support to NATO operations. Nevertheless, by trying to answer some of the questions addressed by the Military Committee (MC), and by looking over the horizon, the group has encountered boundaries due to the political and national sensitivities. At the moment, the NBiSCSWG is standing at a crossroads, unable to determine the correct heading for Space in NATO. In fact, the group is currently not able to fully answer the questions posed by the MC due in part to a lack of political guidance about Space in NATO.

## Why a Policy on Space

An elaborate answer to the 'why' question was developed in the JAPCC publication 'Filling the Vacuum – A Framework for a NATO Space Policy', which strongly underlined the need for a NATO Space Policy. Examining NATO's policy on Cyber Defence may provide a framework which can be adapted for the Space domain.

***A new NATO Policy on 'Defending Access to Space' provides a solid foundation from which Allies can take work forward on 'Space Support to NATO Operations'. The document would clarify both NATO's priorities and NATO's efforts in 'Space Support to***

***NATO Operations' – including how to protect the Space capabilities that are used and the way this can be achieved.***

## A Blueprint for a Space Policy – the Cyber Defence Policy

In 2002, at the NATO Prague Summit, Cyber was addressed at the Heads of State-level for the first time, though no direct guidance on a policy was at that time given. Due to the increased Cyber threat, which was highlighted by Cyber events in 2007/08, Heads of State later tasked the North Atlantic Council (NAC) to revise NATO's cyber defence policy (Lisbon Summit 2010) to cope with the increasing threat. As a result, NATO's revised policy on Cyber – 'Defending the networks – The NATO Policy on Cyber Defence' – was released in 2011. This agreed policy states the focus, objectives, principles and response to emerging security challenges. Furthermore, it includes an action plan to counter the threat and to further prepare NATO against future cyber threats. Importantly, it accomplishes these things while completely respecting national priorities and rights with regards to Cyber. This agreed Cyber Defence Policy also answers the questions:

- ***WHY*** a NATO Cyber Policy?
- ***WHAT*** is NATO's Role in cyber defence?
- ***HOW*** will NATO respond in the event of a cyber-attack on NATO or the Allies?

In awareness of NATO's identified Space shortfalls and from a generic perspective, NATO's Cyber Defence Policy is an example of a document that proves political sensitivities can be overcome and solutions to complex multinational challenges are possible. It also provides an example structure that could be adapted.

## A Possible Path to a Space Policy

NATO did not discuss Space issues at the latest summit in Wales. Based on the identified Space dependencies, shortfalls and gaps, including the most recent studies by the NBiSCSWG, NATO has sufficient evidence available to start working on all the existing recommendations and to assign higher priority to the Space domain.





As a first step, NATO nations need to formulate their vision and strategy on how NATO should proceed to cope with those threats that are associated with the increased Space dependency.

*How could NATO respond in the event of an attack on NATO or the Allies Space capabilities? Any collective defence response by NATO will be subject to political decisions of the North Atlantic Council. NATO does not pre-plan any response option and therefore maintains flexibility in deciding a course of action.*

## *'The content and roadmap of the existing NATO Policy on Cyber Defence could be used as a blueprint to draft NATO's policy on Space.'*

At the same time, the Space topic needs to be raised to the NAC so it can be discussed at the political level. At the next NATO Summit, the Space question should be included and, like Cyber was, delegated to the NAC to develop a NATO vision, strategy and policy on Space. This should also include an action plan that allows NATO to develop and establish the right mechanisms to cope with the challenges that are associated with NATO's dependency on the Space domain.

Secondly, NATO should allow its NBiSCSWG to continue its work beyond 2015. But this requires the NBiSCSWG to look outside the limited scope of the mandate and to discuss all aspects of Space Operations. These conditions need to be provided by the NATO MC and would pave the way towards the development of a Space Policy for NATO.

### Conclusion

The implementation of the NATO Cyber Defence Policy in no way abrogated the national rights of any nation. It demonstrates a method to handle very sensitive topics within NATO and could offer a valid approach for the Space community. Current work within NATO's Space community underlines the fact that NATO requires space-related political guidance, which should include:

- NATO's Vision on 'Defending Access to Space';
- a Policy that defines the framework and boundaries for Space Operations in NATO; and,
- a Strategy for how NATO will achieve the Vision within the Policy framework.

### Recommendation

In order to improve NATO's ability to exploit the Space domain, the NAC should set the conditions by promulgating political guidance for the development of a NATO Space vision, policy, and strategy. The content and roadmap of the existing NATO Policy on Cyber Defence could be used as a blueprint to draft NATO's policy on Space. Such a policy would provide essential guidance to NATO operators while preserving national priorities and equities.

***The main focus of a NATO Space Policy should be 'Defending Access to Space', i.e. on the protection of NATO – used Space capabilities and on Space Support to NATO Operations related to national support that NATO relies upon to carry out its core tasks: Collective Defence, Crisis Management and Cooperative Security. ●***

#### References

- Multi National Experiment 7 – Protecting Access to Space, available from <https://www.gov.uk/government/publications/protecting-access-to-space>.
- The JAPCC – NATO Space Operations Assessment, Revised Jan. 2009.
- NATO SACT – Schriever Wargame 2012 International HQ SACT Report, 2012.
- The JAPCC – 'Filling the Vacuum – A Framework for a NATO Space Policy', p.1 ff.
- NATO – Cyber defence, available from [http://www.nato.int/cps/en/natohq/topics\\_78170.htm](http://www.nato.int/cps/en/natohq/topics_78170.htm).



#### Lieutenant Colonel Steffen Neumann

serves as a Staff Officer in the Operations Branch of the German Space Situational Awareness Centre. He joined the German Air Force in 1996 and holds two Master Degrees in Aerospace Engineering and Business Administration/Project Management. His officer career includes tours of duty as Tactical Control Officer HAWK, Reconnaissance Officer PATRIOT and Conventional Arms Control Officer. He has more than 10 years' experience in GBAD Command & Control and Operational Planning, including tours as company commander of a GBAD Maintenance/Supply Squadron and a PATRIOT Squadron. From 2012 to 2014, Lieutenant Colonel Neumann served as a Space SME at the Joint Air Power Competence Centre. He participated in the NATO ISAF mission as an Army Task Force Air Liaison Officer in 2010/11.





# Standardization of Qualifications for NATO Helicopter Crews in Support of Land Operations

The Joint Air Power Competence Centre (JAPCC) conducted a study in 2012 examining the vertical lift capability of the majority of European NATO member states. The Study<sup>1</sup> identified deficiencies and shortcomings and offered possible solutions to overcome the identified challenges and improve this important capability. The findings of this study have been introduced to a variety of audiences and discussed through several activities. Some of the identified shortcomings and problem areas were addressed by other NATO activities and JAPCC projects (such as the Multinational Air Training Centre, Air Advisor Project<sup>2</sup>, etc.). However, problems related to standardization of qualifications issues across the vertical lift community still remain to be resolved.

As a result of one of the recommendations out of the 2012 Study, the NATO Helicopter Inter Service Working Group (HISWG) was tasked by the Military Committee Land Standardization Board (MCLSB) to develop a standardization document<sup>3</sup> to specify the current operational readiness level of deploying helicopter crews or units. This document will be referred to as ATP-90, with Germany designated as the custodian. The document will seek to provide NATO commanders in multinational operations or training

events with better knowledge on the helicopter force readiness and the skill and proficiency levels they possess.

The JAPCC White Paper 'Standardization of Qualifications for NATO Helicopter Crews in Support of Land Operations', published in July 2015, was developed in support this endeavour. It provides information regarding qualification standardization for NATO crews in support of land operations which could improve interoperability and increase effectiveness of NATO helicopter operations. The use of a NATO qualification standard will enhance NATO commanders' knowledge and understanding of the capabilities of assigned helicopter crews, improve understanding of individual competencies, optimize interoperability and facilitate multinational helicopter force operations.

This White Paper can be accessed online at:  
<https://www.japcc.org/portfolio/standardization-qualifications-nato-helicopter-crews-support-land-operations/> ●

1. JAPCC, 'Enhancing NATO's Operational Helicopter Capabilities', Apr. 2012.  
2. JAPCC, 'Improving NATO Support to Future Air Advisor Operations', Apr. 2014.  
3. MCLSB, NSA(ARMY)0446(2013)1/HIS Minimum Core Competence Levels and Proficiency of Skills for Helicopter Crew for NATO Land Operations – Allocation of Study Number and Detailed Tasking, Mar. 2013.





## Upcoming – The JAPCC Annual Conference 2015, 23–25 November

The JAPCC invites you to attend the 2015 Air and Space Power Conference in Essen, Germany, from 23–25 November. Our internationally-renowned annual conference provides an interactive forum for delegates to exchange ideas and perspectives on Joint Air and Space Power topics. It has attracted senior military, political, industry and academia leaders with attendance of over 130 flag officers, including Air Chiefs, in the last 2 years.

The theme of this year's conference is: 'Air Power and Strategic Communications – NATO Challenges for the Future'. Airpower is one of the primary means through which NATO deters and combats hostile regimes, as well as conducting intervention and stability operations. Now, and in the foreseeable future, the demand for NATO airpower will continue to grow. Its incredible speed, versatility and precision can achieve objectives at low cost and low risk, with little collateral damage or civilian casualties. To NATO, the value of airpower is clear. It's equally as clear to an adversary, some of whom have minimal military capability to counter it and must instead leverage the information environment as their primary weapon. Entities hostile to NATO understand that the general public's knowledge and opinion of airpower are vulnerable. Indeed,

the more prominent airpower becomes in operations, the more likely it will be targeted in disinformation campaigns designed to misinform the public and undermine support for NATO's airpower employment. The conference will be organized as a symposium and will present four themed panels:

1. Strategic Communications and its Relationship to Airpower
2. The Media and Perspectives on NATO Airpower
3. Disinformation Campaigns against Airpower
4. Preserving Credibility

This year's conference expects to bring together top experts from the political, academic, military and media spheres to encourage debate and audience engagement. It is essential we enhance our understanding and capability to use the information environment to advance our objectives, removing the ability of our adversaries to corrupt public opinion by distorting or maligning the Alliance's intent and quality of operational execution. We look forward to seeing you there!

See <https://www.japcc.org/conference/> for further information. ●



# NATO/Multinational Joint Intelligence, Surveillance and Reconnaissance Unit

The JAPCC's latest White Paper titled 'NATO/Multinational Joint Intelligence, Surveillance and Reconnaissance Unit (MNJISRU)' was printed and is currently being distributed. It contains the results of a study that seeks to determine the feasibility of an MNJISRU based on one of NATO's widely shared Medium Altitude Long Endurance (MALE) platforms. Currently, four NATO member nations possess these systems or are in the acquisition process. Except the USA, the number of such systems in national inventories is relatively small. Organizing and exploiting these MALE platforms in a multinational operational unit has the potential to significantly increase NATO's ISR capabilities and therefore help solving NATO's current ISR capability shortfall by offering additional unique capabilities to complement the NATO Alliance Ground Surveillance Force (NAGSF). The study takes into account the NATO Alliance Ground Surveillance Force (NAGSF) as well as the existing NATO Airborne Early Warning & Control (NAEW&C)

Force capabilities as examples of successful (but different) methods of building multinational programmes. Each of them could serve as a template for an MNJISRU wing, or simply provide lessons on how to address the unique challenges of such an organization.

While providing an assessment of the challenges and benefits of creating a NATO/MNJISRU, the study specifically determines how the creation of a NATO/MNJISRU is feasible, by addressing financial, operational, governance, technical and manpower aspects. Finally, the study provides recommendations for a possible future MNJISRU structure, outlines a concept for integration into the NATO command structure, and provides options for suitable RPAS platforms as well as possibilities for military basing.

This White Paper can be accessed online at [www.japcc.org](http://www.japcc.org). ●

# JAPCC as a Driver in NATO Doctrine, Standards and Procedures Development



The JAPCC's Programme of Work includes a large portfolio related to the development of NATO Doctrine, Standards and Procedures, delivering substantial support in various fields, of which we here present a small sample for our readers.

**Air Operations.** The JAPCC acts as the Custodian for the AJP-3.3 'Allied Joint Doctrine for Air and Space Operations'. Since April 2014, the JAPCC, working in close coordination with the Nations, has developed a ratification draft. The AJP 3.3 is now in the final stage of review with the Chairman of the Military Committee Joint Standardization Board (MCJSB), who has requested the Nations' approval for the document to enter the ratification process. Ratification response is expected no later than 1 February 2016.

**Air Transport.** As the chair of the Air Transport Working Group (ATWG), the JAPCC has contributed to condensing a total of 39 STANAGS into only three Allied Tactical Publications (ATPs) dealing with Air Transport Tactics, Techniques and Procedures (TTP). These are the ATP-3.3.4.1 'TTP for NATO Air Movements, the ATP-3.3.4.3 TTP for NATO Air Transport Operations', and the ATP 3.3.4.4 'TTP for NATO Airborne Operations'. All three were recently sent to the Nations for ratification, which is now expected by the end of this year.

**Space.** While an official NATO Space Policy is still missing, MCM-0108-2012 'NATO's Approach to Space' provides the mandate, guidance and tasks for the development of Space support to NATO operations. The NATO Bi-Strategic Command Space Working Group (NBiSCSWG) remains the singular forum within which the collective expertise of the JAPCC, NATO specialists

and some national agents execute their work towards evolving Space support to alliance military operations. JAPCC Space experts have held the Secretary position in this WG since its inception.

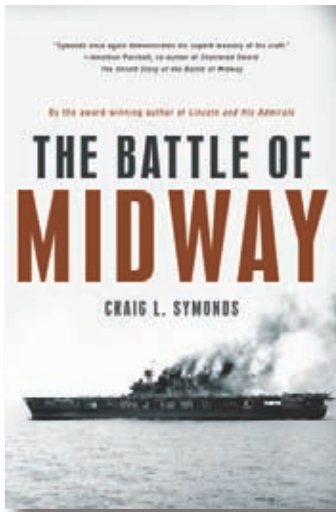
**Land Operations.** As the custodian of the ATP-49 'Use of Helicopters In Land Operations', the JAPCC completed Edition G Version 1 which was approved by the Military Committee Land Standardization Board (MCLSB) and entered the national ratification process, with responses due no later than 30 October 2015.

**Maritime Operations.** As the co-chair of the Maritime Air Coordination Conference (MACC) and a member of the Air Maritime Coordination Working Group (AMCWG), the JAPCC regularly contributes to the development, review and update of NATO Maritime Air standardization, including doctrine and tactics. While a revision the AJP-3.3.3 'Allied Joint Doctrine for Air-Maritime Coordination' was completed and promulgated in December 2014, the ATP-3.3.3.1 'Air-Maritime Co-Ordination Procedures' is currently under revision.

**Joint Intelligence Surveillance Reconnaissance (JISR).** The JAPCC works closely with the custodian of AJP-2.7 'Allied Joint Doctrine for JISR' and the Allied Intelligence Publication (AIntP-14), entitled 'JISR Procedures in Support of NATO Operations', supporting doctrine development and drafting. Both standardization tasks are subject to a short and ambitious timeline aiming at ratification in early 2016 in order to meet NATO's JISR Initial Operational Capability (IOC) criteria. AJP 2.7 Study Draft 2 was published for Nation's comments in August 2015, while the first AIntP-14 Study Draft is currently being scripted. ●



## 'The Battle of Midway'



By Craig L. Symonds, Copyright 2011,  
Published by Oxford UP, Inc.,  
198 Madison Avenue, NY, NY, 10016

Reviewed by:

Col E. Lee Wingfield III, USA AF, JAPCC

When the Imperial Army of Japan successfully executed a surprise attack on the US Fleet at Pearl Harbour on 7 December 1941, they left the US Pacific battleship fleet largely ruined. However, they failed to accomplish several other objectives which would have truly crippled the US Navy's ability to contest the Pacific. One of these failures was leaving the American aircraft carrier force intact. Set against the backdrop of the raid on Pearl Harbour and the subsequent appointment of Admiral Chester Nimitz as Commander in Chief, Pacific, Craig Symonds presents a thoroughly researched and analysed account of the Pacific contest through the end of the Battle of Midway in early June, 1942, focusing on the carrier fleet and the impact naval aviation had on the outcome of the war.

What makes Symonds' analysis unique among the numerous books about Midway is his departure from the commonly held opinion that the US victory at Midway was based on luck. Symonds argues that numerous factors led Nimitz to commit his forces to the battle with the expectation that they would, in fact, be victorious. From a Joint Air Power perspective, the book is a very worthwhile read, as it explores the command and control, intelligence, technological and tactical challenges faced during the early days of naval aviation as well as exploring the rise of the carrier as the key player in naval warfare. Very well researched and written, with an engaging and easy-to-read style, Symonds' book is a great read for students of naval and air power history. ●

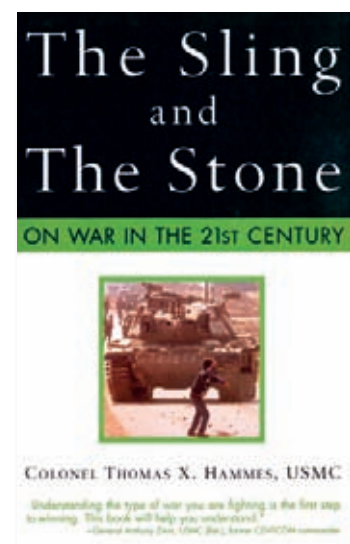
## 'The Sling and the Stone'

The Sling and the Stone is written by a retired USMC Col, Thomas X. Hammes. It explores the evolution and current practice of fourth-generation warfare.

He leads the reader through the mass build-up of armies in the context of industrializing war, manoeuvre warfare, as well as guerrilla warfare, which were all encountered in Afghanistan, Iraq and during the Global War on Terror. The author highlights an interesting point that, in all these conflicts, normal military practices like having fixed lines, a well-defined opponent, and clear operational timelines were replaced by uncertainty. These conflicts are characterized by adversaries who follow an incomprehensible ideology, without boundaries and with minimal or non-existent moral limitations guiding their use of force.

Although this book was written 2006 and from a US perspective, the core ideas are valid. In addition to the fact that Al-Qaida's threat still remains, actors like the IS are trying to establish their view of the world. Ultimately, the situation in the East is still unsolved and our armed forces should be prepared.

To counter their hybrid approach aimed at defeating our superior military power, Hammes argues we have to make sure that our forces are flexible, properly trained, organized, educated and sustainable. Success against them will not be achieved on short notice. The current Ukraine crisis shows that the evolution of warfare is on-going and that 'hybrid' wars will not necessarily substitute all fourth-generation warfare. They are a new category and we must be fully prepared. ●



By Thomas X. Hammes,  
Zenith Press, MBI Publishing  
Company LLC, St. Paul, MN, 2006

Reviewed by:

Lt Col Ralf Korus, DEU A, JAPCC

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