Transforming Joint Air Power
The Journal of the JAPCC

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Joint Air & Space Power Conference

18th –20th November 2014

Air and Space Power in NATO

Future Vector Project

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Joint Air Power Competence Centre

Editorial

'Our Alliance now faces the increasingly dire risk of not having the right capabilities and/or sufficient quantities of air power and access to space capabilities to cope with the security challenges outlined in NATO's forward looking Strategic Concept.' – This is a quote from General Frank Gorenc, out of the foreword of the JAPCC study 'Air and Space Power in NATO – Future Vector'. It refers to the lengthy run of defence cuts over the last decades and the diminishing Air and Space Power capabilities as a consequence. Around NATO's European border, the world is more or less on fire and NATO is lacking Air Power capabilities to deal with the challenges that lay ahead. The Alliance as a whole must act now to be better prepared for the future. The steady decline of defence expenditures needs to be stopped or reversed and the actual spending should be well thought through. Investments should be directed at alliance shortfalls, rather than fulfilling national requirements. More specifically, NATO's European Member Nations need to ensure that there is a set of full spectrum Joint Air and Space Power capabilities available within these nations to conduct an operation without relying fully on US support. If the NATO Nations do not solve this issue, Air Power will continue its downward spiral relevant and will no longer be in a position to play that pivotal role in safeguarding the security of the Alliance.

This is my first contribution as editor of the JAPCC Journal. 1 September, my predecessor, Air Commodore Tom de Bok, retired. I wish him all the best in retirement!

It's my pleasure to open the 19th JAPCC Journal with an interview with our Director, General Gorenc. His view on various Air and Space Power topics can also be seen as an introduction to the 2014 JAPCC Joint Air & Space Power Conference (18–20 November 2014 in Kleve, Germany). This year's Conference theme is focused on the Future of NATO Air & Space Power and is built upon the outcomes, recommendations and key messages derived from the 'Air and Space Power in NATO – Future Vector Project' conducted by the JAPCC. Furthermore, in this edition of the Journal, we offer you an insight into the project in which Italy, the European Defence Agency and the Movement Coordination Centre Europe worked together closely in developing and executing a process for collective AAR clearances on existing and future AAR platforms. In the article on Battle Management/Command and Control (BMC2), the author discusses the importance of an airborne early warning and control asset as a suitable platform to provide responsive BMC2 capability which significantly increases the capability, flexibility, lethality and responsiveness of joint operations when integrated with other elements of the NATO Air Command and Control System (ACCS) and JISR systems.

Other articles cover topics on Cyber, Force Protection, Language Skills, Europe's Strategic Airlift Gap, Sea-Based Air Power, possible shift in the field of Close Air Support, Unmanned Cargo Aircraft and Manual Simulation Systems.

Finally, I would like to thank all the authors for their contributions, and add that the JAPCC team greatly appreciates your feedback and thoughts. Please send us an e-mail to directorate@japcc.org. More contact information is available at http://www.japcc.org/contact/Pages/default.aspx.

The Journal of the JAPCC welcomes unsolicited manuscripts.
Please e-mail submissions to: articles@japcc.org

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

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Interview with General Gorenc

Interview with Commander US Air Forces in Europe, US Air Forces Africa, Allied Air Command and Director Joint Air Power Competence Centre

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It's not your first tour in Europe. From 2009 to 2012 you were the Commander of 3rd Air Force at Ramstein AB. How does this prior experience benefit you in your new position?

I'm very familiar with the US Air Forces Europe and US Air Forces Africa mission sets having been previously assigned to Ramstein AB, Germany as the 3rd Air Force Commander. During this time frame, 3rd Air Force directly supported 17th Air Force during Operation ODYSSEY DAWN and the transition to Operation UNIFIED PROTECTOR under NATO authorities. As 17th Air Force drew down, we were also responsible for restructuring the 3rd Air Force staff to support two combatant commanders in Europe and Africa. Each of these dynamic events provided me unique opportunities to engage with European and African partners and military commanders in the course of meeting US national military and political objectives.

Additionally, having been a Slovenian born, American immigrant, I am cognizant of people's backgrounds and what people value. I understand that because of

'I am unbelievably optimistic about our future.'[1]

our different backgrounds, we each have a unique perspective with different approaches to the same problems. This mindset is extremely important when we approach our partnerships globally. It is important to understand countries come to decisions in a different way with different opinions, but at the end of the day, their point is valid and must be considered.

What are your number one goals for Allied Air Command (AIRCOM) and how do you plan to accomplish this during your time as Commander AIRCOM?

I believe the NATO Alliance's experience in Libya and Afghanistan continues to influence the NATO Command Structure (NCS) we see today. The NCS is in the process of a fundamental reorganization to become a more responsive and agile organization. As such, AIRCOM has become the largest standing organization within NATO with responsibility for delivering Air Power for the Alliance. My number one goal is to achieve Full Operational Capability (FOC) for our Air Headquarters as envisioned by the NATO nations in the Air Command and Control (Air C2) Concept of Operations. In order to accomplish FOC, we must ensure the success of our standing missions by protecting Alliance airspace through Air Policing and Ballistic Missile Defence while simultaneously developing the Joint Force Air Component (JFAC) capability for any future NATO led operations. These are not easy tasks, but in my short time as Commander of Allied Air Command, the professionalism and expertise of the Airmen throughout our Headquarters has thoroughly impressed me. I am confident in our ability to deliver Air Power for the Alliance as the single organic source of Air C2 for NATO.

Does the NATO Command Structure follow the principles of SMART Defence? How does the recently completed restructuring affect AIRCOM objectives?

In consideration of the principles of SMART Defence, all of our nations are dealing with economic concerns and decreasing defence budgets. SMART Defence is a new way of thinking that encourages Allies to cooperate in developing, acquiring and maintaining capabilities to undertake the Alliance's essential core tasks. Additionally, the Alliance's security environment has become more diverse and unpredictable, demanding the need for modern systems and facilities. As such, the NCS reorganization is a reflection of NATO's reaffirmation to collective defence through an organizational structure that is optimized to provide real capability to the Alliance and flexible options for the use of force.

As already discussed, my objectives for AIRCOM are directly linked with securing the benefits envisioned with the NCS reorganization. In delivering Air capabilities for the Alliance, we have consolidated from 10 Combined Air Operation Centres (CAOCs) and two regional Air Commands down to two CAOCs in Uedem and Torrejon, the Deployable Air Command and Control Centre (DACCC) in Poggio-Renatico and one overall Air Command here at Ramstein, Germany. This reduction in facilities and personnel requires the organization to be more flexible and responsive to NATO requirements. To ensure the requirements of SACEUR are met, our headquarters must provide quality training and hands on experience for our personnel. Furthermore, this reorganization will be facilitated through the implementation of C2 systems which are reliable, robust and secure while enabling the seamless dissemination of information from the lowest to highest echelons of command.

What do you assess to be the biggest challenges to the future of NATO Air and Space Power especially now that we are entering the post-Afghanistan era?

This is a concern for the entirety of NATO and our Partners. I will echo the concerns that SACEUR has stated in many forums.

I consider General Breedlove's focus on transitioning NATO from a deployed combat proven force to a ready in-garrison force as the Alliance's overall greatest challenge in the coming years. Military members from across all NATO nations have spilled blood together fighting in the Balkans, Afghanistan and Libya. If we fail to capture and act upon the lessons learned and unprecedented level of interoperability achieved from more than 10 years of intense combat experience, I think that will be a complete failure to the hard working men and women of our Armed Forces.

To meet this challenge, we are carefully examining the NATO training and exercise construct to ensure we prepare the NATO Response Force (NRF) to meet their obligations when called upon by the Alliance. From soup to nuts, we need to develop a systematic process to ensure all military members from across the Alliance are prepared to carry out their military responsibilities with confidence and precision. From the Air perspective, this must include live flying events that stress cutting-edge technology and proven capabilities in an increasingly diverse and unpredictable environment. We are achieving unprecedented joint effects in the fight in Afghanistan, providing responsive effects from the air to the soldiers on the ground. We should not accept any degradation in these capabilities and should look for every opportunity to improve our ability to provide precise combat power from the air.

AIRCOM has the mandate to plan and execute the full range of Crisis Response Operations (CRO). Accordingly, the AIRCOM JFAC is to be manned, trained, validated and equipped to be capable of planning and executing Air C2 of operations. How will you achieve this, and what are the challenges?

This will be the fundamental underpinning for AIRCOM to achieve FOC as envisioned by the Alliance and what it begins with is proper and effective training for our Airmen. Within the DACCC in Poggio-Renautico, Italy, we have already successfully graduated students from our Initial Functional Joint Force Air Component Training (IFJT) course. This is our first step in ensuring personnel are trained and ready to fill their positions within the AIRCOM JFAC. We are also opening up this training across the NATO Force Structure to ensure continuity and standardization of JFAC training. This will be critical in developing a sufficient pool of air expertise across the NATO nations to fall back upon during CRO. Furthermore, we have validated the AIRCOM JFAC capabilities during this year's NRF preparation during exercise STEADFAST JAZZ and demonstrated the capability to plan and task more than 450 sorties a day.

As we move towards FOC, we will continue to train and exercise our personnel to the most demanding missions to ensure tactics, techniques and procedures are in place and ready to execute the full range of CRO.

With operational Air and Space expertise concentrated within one organization, AIRCOM has become the focal point for Alliance Air and Space advice and competency. How will AIRCOM generate greater awareness of Alliance Air and Space capabilities amongst organizations Air needs to work with on Operations?

I am the primary advisor to SACEUR for delivering Air and Space Power for the Alliance. However, to generate greater awareness of Alliance Air and Space capabilities amongst NATO Command Structure (NCS) and NATO Force Structure (NFS) organizations, all Airmen must be advocates for Air Power. Our Airmen have everyday interaction with organizations throughout the NCS and NFS. It is absolutely critical that Airmen advocate the advantages of Air and Space contributions to the Joint Fight and the unique capabilities provided to our leadership. This starts with providing proper training and education for our Airmen, but there are also essential strategic messages which require persistent communication to be reinforced.

Air Power saves lives. Not only Alliance and coalition lives, but also enemy combatant and non-combatant lives. The precise application of combat power from the air enables the operational commanders to achieve precise effects with minimum collateral damage as demonstrated during Operation UNIFIED PROTECTOR. Air Power has also demonstrated the capability to quickly achieve objectives in conjunction with our joint forces. These effects are unprecedented in the history of warfare and provide our leadership with more capable options in achieving their political objectives.

Air Power supports the Joint Fight. I have been challenging Airmen from across the Alliance to critically consider the ongoing conflict in Afghanistan. And to be honest, I have been surprised to find that many still believe that the conflict is and has been primarily a land-centric operation … which I couldn't disagree with more. What we as Airmen are doing in Afghanistan every day is, in many senses, the most challenging operation for us to support. We have established levels of interoperability across the Alliance that is unprecedented in the history of warfare. From persistent Intelligence, Surveillance and Reconnaissance (ISR) coverage of the battlefield to develop pattern of life analysis to the ability to provide responsive Close Air Support (CAS) in under 12 minutes, we are providing precise effects to enable the Joint Fight.

Air Power provides Joint Effects across the Spectrum of Conflict.

Air Superiority – Without it, nothing is possible, and ensuring it provides a freedom of manoeuvre our adversaries cannot comprehend.

Strike with Precision – Deliver precise combat power from the air while minimizing collateral damage and enabling leaders to take decisive action while minimizing undesired effects.

Joint ISR – Collection, processing and dissemination of information across the Alliance and coalition partners, enabling informed decisions and integrated operations.

Mobility – Airlift and Air Refuelling that enable all other operations.

Command and Control (C2) – Ensure the effective use of resources and capabilities provided by the nations. Effective C2 is often the most difficult thing to do and requires training and practice.

Don't let Air Power be taken for granted. This also ties back in with the concept that every Airman is an advocate for Air Power. Many believe the capabilities and effects provided by Airmen just happen. They expect to know where the next threat will come from, or they expect immediate CAS in response to enemy contact. These things don't just happen; an incredibly talented team of Airmen ensures these capabilities are available every day.

Space is a force multiplier and thus access to Space is among the current top issues. How does NATO approach this topic?

This is an operationally relevant topic which is critically important to the success of future NATO operations and something we are still working towards resolution. In my own opinion, as the USAFE Commander, the Air Force component is uniquely equipped to shape Space capabilities as the primary advocate for delivering Air and Space effects for the Joint Force

Commander. I think NATO AIRCOM would be an ideal location to provide the Space Coordinating Authority for Allied Command Operations. This would be a natural progression of responsibility in coordinating national space capabilities to provide desired effects for Alliance operations.

Unlike the Air domain, space assets would not be required to undergo a Transfer of Authority (TOA) to NATO Commanders. NATO Commanders only need the information and joint effects provided by those assets, which would remain under the control of the nations which own, operate and maintain them. As the development of NATO's Space competences moves forward, we need to focus our capabilities on providing the rapid dissemination of information and effects provided by space-based systems to NATO decision makers along with operational and tactical level commanders. This was a critical lesson learned from our operations in Libya and Afghanistan. It's an issue I am keenly interested in addressing.

The JAPCC started the NATO Air Power – Future Vector project last year. What do you as JAPCC Director hope or expect that the project/paper achieves?

First, I would like to point out that being the Director of the JAPCC is an outstanding opportunity to leverage the unique capabilities of an organization specifically established to be forward thinking in regards to Joint Air and Space Power. The Air and Space Power in NATO – Future Vector Project will be critical in demonstrating the utility of the JAPCC to the Sponsoring Nations. This comprehensive study will chart our path forward and help to guarantee that Air and Space Power continues to contribute to the security and success of NATO and its Allies.

A great deal of work was done in 2012 and 2013 to refocus the JAPCC Programme of Work as a clear contribution to the future success of the NATO Alliance. I expect the Air and Space Power in NATO – Future Vector Project will be a clear demonstration of this focused effort. It is absolutely critical for NATO to actively investigate, develop and promulgate its Air Power vision for the future. This proactive planning will be absolutely essential to ensure the necessary capabilities and force readiness is available to provide a decisive advantage in future Alliance operations.

I also expect that this project will provide tangible results in addressing our near term challenges as we transition from a deployed combat proven force in Afghanistan to a ready, in-garrison force at home. With the expected drawdown of combat forces in Afghanistan, there will be the temptation to reap from the so called 'Peace Dividend'. During this time of economic austerity and decreasing defence spending, the JAPCC will be our champion in clearly communicating our future defence requirements and the ability of Air and Space Power to provide contributions across the entire spectrum of operations.

Sir, thank you for your time and your comments.

1. Quoted from Gen Gorenc at NATO Air Chiefs meeting at Allied Air Command on 8 Apr. 2014.

General Frank Gorenc

is Commander US Air Forces in Europe, Commander US Air Forces Africa, Commander Allied Air Command, headquartered at Ramstein Air Base, Germany and Director, Joint Air Power Competence Centre, Kalkar, Germany.

General Gorenc was born in Ljubljana, Slovenia. He has commanded a fighter squadron, an operations group, two wings, the Air Force District Washington, and a component Numbered Air Force. General Gorenc has served in numerous positions at Air Combat Command, the Air Staff, the Joint Staff, and at US European Command/Supreme Headquarters Allied Powers Europe. Prior to assuming his current position, he was the Assistant Vice Chief of Staff and Director, Air Staff, Headquarters US Air Force, Washington, D.C.

The General is a command pilot with more than 4,500 flight hours.

First Collective AAR Clearance Trial

An Outstanding Best Practice for Truly Collective Development

By Colonel Gustavo Cicconardi, ITA AF, JAPCC

Europe Must Do More

On 22 March 2012, the 26 European Union (EU) Defence Ministers declared Air-to-Air Refuelling (AAR) a critical capability shortfall in Europe. Indeed, only seven EU Member States can currently deploy tanker aircraft, spread across twelve different types, which are further handcuffed because more than 40 % of the required clearances are missing. The remaining 19 Member States rely heavily on US AAR capacity.

Times Are Changing

In the past, there was little cause for concern about the AAR compatibility assessment process, mainly due to most tanker nations, other than the US, having no requirement to refuel receiver aircraft from other nations. Also, most nations' tankers were versions of existing US tankers and thus generally compatible with the same receivers as the US tankers. At the same time, many NATO Nations were purchasing versions of US-made fighter aircraft, like the F-16 or F-18, which were already proven to be compatible with US type tankers.

The acquisition of new Airbus tankers (A310 MRTT, A330 Voyager, A400M Atlas), and the Italian Air Force (ITAF) Boeing KC-767 (which has no existing USAF version) have made the compatibility assessment process for the European nations much more complicated than before. European nations are now leading the way fielding completely new tanker platforms.

Europe's Way Forward

The European Defence Ministers stated their willingness to support further development of European AAR capabilities through the European Defence Agency (EDA) and agreed further capabilities should be developed in Europe as a matter of priority. This political willingness to address the AAR shortfall brought the EDA and its Member States to establish four major AAR Pillars to address the problem: *Pillar 1,* short term gap filling with potential commercial opportunities (in dormant status); *Pillar 2,* optimization of existing assets and organizations; *Pillar 3,* the pooled procurement and sharing of A400M AAR kits (in dormant status) and *Pillar 4,* the recapitalization

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of strategic tanker fleets through pooled acquisition. Pillar 2B, led by EDA, Italy and the Movement Coordination Centre Europe (MCCE), will develop a process for collective AAR clearances on existing and future AAR platforms (KC-767, Voyager, A400M, FR MRTT, etc.) to get as many AAR clearances as possible in a minimum amount of time for a maximum amount of receivers. The outcome of this project will directly address lessons identified from the Libya operations (OUP).

The Collective AAR Clearance Trial Initiative

Hence, in October 2012, a questionnaire to organize an Italian-led collective AAR clearance trial on the ITAF KC-767 (Pillar 2B), was sent to all EDA Member States, Switzerland and Norway. It received a positive response from 11 Members. The trial was organized from 4 to 12 September 2013 at Decimomannu Airbase in Italy. This project methodology was a pilot case for future collective AAR clearances trials on other new AAR platforms. The aim and objectives of this trial were:

- get the maximum amount of receivers certified on the ITAF KC-767 in a minimum amount of time;
- save time and resources (financial and human);
- identify and fine-tune a process for collective AAR clearances on other existing and future AAR platforms.

'… only seven EU Member States can currently deploy tanker aircraft, spread across twelve different types, which are further handcuffed because more than 40 % of the required clearances are missing. The remaining 19 Member States rely heavily on US AAR capacity.'

The trial concept concentrated tanker and possible receiver assets on a single airbase. All ground and flight AAR tests would be efficiently conducted to realize a reduction in time and resources while meeting all steps to certify receivers and update ATP-3.3.4.2. This EDA trial would allow for a coordinated approach for Full clearances.

However, despite the interest of eleven nations, only aircraft from France (one Mirage 2000, one Rafale) and Sweden (three Gripens) participated in the Trial. The first day of activity started with a collective briefing about airbase local procedures, AAR activity, and the operational background (by JAPCC and EDA) and finished with ground compatibility tests. The following day, flight activity officially started and went on for two weeks. The first five days of testing were dedicated to Sweden, while France flew during the second week. All flight activity was chased/videoed by an MB-339 belonging to the Italian Official Test Center (Reparto Sperimentale Volo). The result of the Trial was Full clearances for the entire AAR envelope for all three types of aircraft, with no major issues.

The crews were very satisfied to operate from one Airbase, noting the ease with which ground tests could be performed, briefings and debriefings conducted face to face for each flight and, specifically, Decimomannu AFB's proximity to the AAR areas. Additionally, the logistics support available at Decimomannu (a large ramp provided quick servicing of the tanker and receiver aircraft through a Hydrant Refuelling System (HRS)) facilitating expeditious turnaround time.

After the Decimomannu trial, the EDA organized the 4th Project Team AAR. The EDA observed the following and attributed the very low participation to:

1. No Standardized Technical Data Surveys (STDS) available (low knowledge of the entire AAR certification process: who provides authorizations, what data, etc.).
2. No test plan available. Flight test plan should be developed in close cooperation with the respective flight test centres. After common agreement, the plan needs to be approved and signed by the respective authorities of the receiver nation and sent back to the Tanking Nation.
3. In some cases, no Test Unit was available.
4. Slow staffing process aggravated by the fact the issue was not elevated to the proper level with the proper emphasis.
5. Urgent Certification vs Full Certification (some happy with 'just in time' clearance waivers).

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Decimomannu AFB. Boom Operator position in the cockpit of KC-767.

6. Some Nations not comfortable with multilateral agreements and prefer bilateral ones.
7. Non-availability of instrumented test aircraft.
8. Budget constraints.
9. Operational contingencies (e.g. Syria) cancelled receiver aircraft participation (e.g. the French E-3F) at the last moment.

What Is Next?

A second trial was organized in the autumn of 2014 at Eindhoven Air Base in The Netherlands with the ITA AF offering free tanker hours as were offered in the first trial.

In the meantime, the JAPCC has strongly promoted this kind of initiative and the JAPCC Director, General Gorenc, USAF (also COM AIRCOM), invited all NATO Air Chiefs to consider participation in the next KC-767 trial and supported the organization of similar trials with different tankers in the future. The Greek Air Chief has been one of the first to answer and the Spanish Air Chief has also had direct talks with General Gorenc on future trials. However, due to lack of receivers participation (budget constraints, interest or test unit problems) the Autumn trial has been cancelled.

Finally, Eindhoven Air Base also hosted the first European AAR-focused training ever. The European Air-to-Air Refuelling Training 2014 (EART 2014) took place over Dutch skies from 28 March to 11 April 2014. The goals of the exercise were to increase the planning, training, and standardization inside of an AAR tanker cell, to increase the pilot's skill during consolidation (tanker-to-tanker refuelling) and facilitate face-to-face debriefing between the tanker and receiver pilots, deploying tankers to one air base and receivers to another neighbouring air base (Leeuwarden/The Netherlands). Furthermore, this occasion continued the expansion of the ITAF KC-767 clearances by adding the Spanish Eurofighter using a read across clearance procedure.

The AAR Clearance Process

Currently, there are three categories of AAR clearance (Urgent, Partial and Full) depending on the urgency

Decimomannu AFB. Ground compatibility test.

and scope of the AAR requirement that directly determines the type of compatibility testing required. The first one is applied when an urgent requirement for AAR authorization due to war, conflict or other operational need exists. This clearance will be withdrawn at the termination of the war, conflict or operational need. Due to the limited timescale, there will be no opportunity for either/both ground and flight testing which may restrict the subsequently agreed/cleared refuelling envelope. It is essential that there is an open, and rapid, exchange of information (Academic Compatibility Certification) between all agencies. A successful outcome for an Urgent clearance (Cat. 1) will be enabled by:

- the maximum use of technical information and full access to accurate data from all manufacturers;
- a fully completed Standardized Technical Data Survey (STDS), if available;
- mutual acceptance that neither ground/flight testing nor instrumentation will be required.

It is important to state again that urgent clearances, limited to a specific operation, have been issued in the past on a case-by-case basis. Some examples of Urgent clearances are clearance between the ITAF KC-767 vs the ITAF Tornado and Eurofighter just before OUP, or the ITAF KC-767 vs the RAF Typhoon to support their deployment to the Malaysian Air Show.

A Partial clearance (Cat. 2) is a critical requirement for AAR as indicated in an Urgent clearance, but with opportunity for supplemental testing to minimize the restrictions to the cleared refuelling envelope. This clearance is similar to an Urgent clearance in that it is still expected to be achieved within a limited timescale. However, some ground and flight-testing will be achieved to limit the restrictions to the cleared AAR envelope.

A Full clearance is in response to a permanent requirement for an AAR clearance as defined by the requester. It is the result of the complete Compatibility Certification process and requires all requisite ground and flight testing. Restrictions to the AAR envelope only occur when available time for flight test is limited. This clearance is enduring however liable to review if there are national requirements (e.g. US quinquennial review) or changes to equipment and/or procedures. A Full clearance (Cat. 3) will require:

- a specific analysis of fatigue and stress;
- use of technical data and full access to accurate data from all equipment manufacturers;
- coordination between technical, operational and identified test agencies in addition to aircraft hardware manufacturers;
- a fully completed Standardized Technical Data Survey (STDS), where available;
- complete ground and flight tests with instrumentation as necessary to minimize limitations to the AAR envelope.

The AAR Working Group, the Aerial Refueling Systems Advisory Group (ARSAG) and the JAPCC are currently working on an update to ATP-3.3.4.2 that

would replace the current Clearance Process Annex and replace it with a new Clearance Process Standards Related Documents (SRD) that explains the process in more detail and facilitates the use of the middle ground in the clearance process between the current Urgent and the Full clearance. There has been some stigma attached to the type names of clearances; currently, it is under debate to drop the use of 'Urgent', 'Partial' and 'Full' and refer only to the clearance categories (Cat. 1, 2 and 3). Greater use of Category 2 clearances bridges the gap between a temporary Category 1 clearance with little or no testing and a standing Category 3 clearance that can include extensive testing and layers of financial and legal coordination and agreements. A Category 2 clearance is proposed as the basic starting point and should be built upon to expand the AAR clearance envelope or to remove restrictions. As time and resources permit, a Category 2 clearance would step closer to meeting all the requirements of a Full Category 3 clearance.

The JAPCC AAR Study

In March 2014, the JAPCC published a study 'Air-to-Air Refuelling Consolidation – An Update' building upon the JAPCC's initial assessment of NATO's AAR capabilities with additional analysis in light of recent AAR operations over North Africa and the introduction into service of a new generation of Tanker Transport (TT) platforms. The study provides recommendations to address the clearance problem:

Recommendation 2
Air Chiefs should impress upon their Airworthiness/Release-to-Service staffs the importance of the 'need to share' technical data with respect to AAR clearances.

Recommendation 8
Nations should aid in the revision and implementation of the proposed Standards Related Documents (SRD) to ATP-3.3.4.2. (a Clearance Process Guide is one of these SRDs).

Also, the study supports many other AAR initiatives and recommends several other solutions. The iron is hot and AAR has the attention of key decision-makers. NATO and EU AAR working groups must work hard in the next months to apply the ideas proposed in the study. We should not always force Flag officers to take the responsibility of authorizing urgent AAR clearances at the beginning of a new crisis because we, their Staff, have not done our job in peacetime. Getting the Partial or Full AAR clearance is our job, so the war fighters are prepared in time for the next combat operation. We have become accustom to facing lesser adversaries but need to be prepared for possible worst case scenario (a Russian invasion of Ukraine for example). A capable adversary will not allow us to be as complacent as we have been in the past. Now is the moment to limit national constraints and/or industrial protections that slow down and make the AAR Clearance process difficult. The bureaucracy must work quickly to gain operational results and not hinder the progress that is needed. ●

Colonel Gustavo Cicconardi

graduated from 'Nunziatella' Military School and joined the Air Force Academy in 1982 where he obtained a degree in Aeronautical Science and a commission in the Italian Air Force. He began his flying career as an AM-X fighter pilot and finished as an AB 212 SAR Pilot, amassing over 3.300 flying hours. He took part in various peacekeeping air operations in the Balkans, as well as combat operations in Kosovo in 1999. From 1999 to 2001, he served as the Commander of the 13th Squadron. Furthermore, he fulfilled the task of Chief – J3 Air at NATO HQ KFOR in Pristina between 2005 and 2006. From 2008 to 2010, he was the commander of the Air Weapons Training Installation at Decimomannu AFB, Italy. Colonel Cicconardi currently works as the Branch Head of the Air Operations Support Branch at the Joint Air Power Competence Centre in Kalkar, Germany, and as Chairman of the NATO AAR Working Group, improving NATO's AAR Interoperability.

Air and Space Power in NATO – Future Vector Project

The Future Vector Project

General Gorenc, the JAPCC Director, formed a team of highly-respected experts to study the current state of NATO Air and Space Power in order to recommend viable, near-term (2020) and long-term (2040) solutions and goals that the Alliance should strive for to underpin a future robust Air and Space Power capability.

The precise application of combat power from the air has been of strategic importance to the Alliance since NATO's inception. Time and time again, NATO and its Member Nations have turned to Joint Air Power as the first, and in some cases only, military response option. Air Power, now coupled with Space Power, continues to demonstrate its inherent ability to 'go over not through' with attributes of speed, reach, flexibility, and precision. These combined qualities provide NATO and National political leaders with a tool of unmatched responsiveness and flexibility, supporting the political-strategic objectives of both the Alliance and its Member Nations.

Despite Air and Space Power's undeniable contribution, NATO continues a drastic and increasing reduction of the very same capabilities. The current 'climate of austerity' will put investment in future Air and Space Power under further scrutiny, resulting most likely in further diminishing the minimum military Air and Space Power capabilities needed to support NATO's Level of Ambition. NATO now faces the increasingly dire risk of not having the right capabilities and/or sufficient quantities of Air Power and access to space capabilities to cope with the security challenges outlined in NATO's forward looking Strategic Concept.

The JAPCC's 'Future Vector Project' aims to significantly contribute to the wider debate surrounding Alliance and National security, and crisis response in a rapidly changing and challenging world.

The Future Vector Project 'Core Team' is comprised of well-respected leaders: Lieutenant General (ret.) Ralph Jodice (USA), Lieutenant General (ret.) Frederik H. Meulman (NLD), Lieutenant General (ret.) Stefano Panato (ITA), Lieutenant General (ret.) Friedrich W. Ploeger (DEU), Air Marshal Graham Stacey (GBR), Air Commodore Prof. Dr. Frans Osinga (NLD), Colonel Prof. John Andreas Olsen (NOR), Prof. Dr. Phil. Holger H. Mey (DEU), Dr. Hans Binnendijk (USA), Mr Daniel P. Fata (USA) and Mr Camille Grand (FRA).

Additionally, Key Leader advisors from DEU, FRA, GBR, ITA, NLD, NOR, POL, ROU, TUR and USA are also engaged. Manpower, coupled with generous funding contributions from JAPCC Sponsoring Nations, have been vital in setting the proper conditions and foundation for success.

Background

But why do we need to study something that is a vital military capability, and which has underpinned Alliance defence and security capability since its inception?

The precise application of combat power from the air is founded upon superb equipment, superior training, very high levels of interoperability, and seasoned experience; all enabled by strong air leadership exercised through a well-developed Air Command and Control capability.

With the end of the Cold War, we have witnessed an increase in NATO's utilization of Air Power. In each conflict, airmen and women have demonstrated the unprecedented value of Air Power in providing NATO and national leaders with a tool of unmatched responsiveness and flexibility.

As we prepare for future conflict, it is critical that we capture the lessons learned from recent combat experience as we transition from a deployed combat tested force to a ready in garrison force. Furthermore, the near-term cessation of operations in Afghanistan combined with the ongoing financial crisis makes it certain that investment in future Air Power will be under heavy scrutiny. It is thus critical for NATO to actively investigate, develop and promulgate its vision for Air and Space Power for the future. Proactive planning will be absolutely essential to ensure the necessary capabilities and force readiness is available to provide a decisive advantage in future Alliance operations.

Furthermore, the goal of NATO Forces 2020, set in the Chicago Summit, requires modern, tightly connected forces, equipped, trained, exercised and commanded, so that they can operate together and with

partners in any environment. However, in August 2011, NATO Secretary General, Anders Fogh Rasmussen, highlighted that since the end of the Cold War, European NATO countries defence spending had fallen by 20 % whilst their combined Gross Domestic Product had grown by 55 %. In 1991 European defence expenditure was 34 % of NATO's total; it is now 21 %. The US has made it very clear that it wants European Allies to take on a bigger share of the burden for Alliance defence in general, and for European defence in particular. The crisis in Ukraine serves as a very timely reminder that security is not a given in the European region.

The Shortfalls

For Air Power the shortfalls are numerous and significant. Shortages range from Theatre and Ballistic Missile Defence to Counter-Improvised Explosive Device technologies; Joint Intelligence, Surveillance and Reconnaissance and Joint Precision Strike are further hindered by inadequate Air-to-Air Refuelling, Strategic Airlift, Suppression of Enemy Air Defences (SEAD) and robust Cyber Defence and offensive capabilities. Special Operations Forces Aviation and Combat Search and Rescue are vital but under-resourced. Likewise, Airborne Electronic Attack, Chemical, Biological, Radiological and Nuclear capability and Ground Based Air Defence are all in short supply. So too is Deployable Medical Support. Operational equipment rates are low, flying hours are below agreed standards and concurrent operational pressure is leading to the cancellation or reduced participation in multinational commitments such as the NATO Response Force. In many areas the Alliance has exquisite capability, but it is too often only found in a

very few nations, is severely limited in its quantity and hence capacity, and is under ever growing and relentless resource pressure.

The Paradox

There is a peculiar paradox emerging. A paradox that has parallels in other walks of life but for us relates to Air Power. At a time when NATO Air Power has shown itself to politicians and policymakers to be a versatile and essential tool for conflict resolution, those same decision-makers are making reductions that could undermine the capability they have so recently used to such good effect. This has happened before, with armies slashed only to be resurrected in great haste at the onset of the next challenge. It appears to be the Western way, where few populations will tolerate the maintenance of greater armed forces than are absolutely essential, but in such a volatile and fast paced world the consequences of continual reductions or uneven burden sharing must be discussed openly and intelligently.

The disparity between the approach taken by the world in Libya and Syria demonstrates that military action does not have to be the mainstay of crisis response. But if reductions are undertaken which create the circumstances whereby there can be no realistic military option then security and political risk will have risen immeasurably. The seeming disparity between the stated goals of Chicago and the realities increasingly apparent on the flight line suggest that taking stock of NATO's Air and Space Power is a pressing need.

Present Paradox – Future Challenge

The JAPCC Staff published the results of its initial comprehensive study as a first step in this Project titled 'Present Paradox – Future Challenge' which is available to download online at www.japcc.org. This initial study provides an accurate summary of the current situation by addressing three main issues:

1. The significance of Air and Space Power in history (tactical, operational, strategic level).
2. Diminishing Air Power capabilities and capability shortfalls.
3. Future security environment.

The Final Chapter of this document provides food for thought in different domains: at the political and military level, in the realm of Research and Development, Science and Technology and industries, and in relation to Partnership.

Future Vector Project – Main Effort

The Future Vector 'Core Team' has finalized its main effort and the last phase of the Project and produced a series of essays that identify viable options and solutions to guarantee that Air and Space Power continue to be key to the security and success of NATO and its Allies for both short and long term.

'… JAPCC's 'Future Vector Project' aims to significantly contribute to the wider debate surrounding Alliance and National security, and crisis response in a rapidly changing and challenging world.'

The essays intend to provide a fresh, holistic, balanced perspective and provide innovative, actionable recommendations aimed at the appropriate political- and policymaker levels within NATO and its Nations. The series of essays are published in two compendiums, and are also available for download.

Some Key Topics:

- The Paradox of Air and Space Power and the need more than ever for Robust Political Support and Renewed Funding;
- The impact of Global Trends on Air and Space Power in NATO;
- History is Continuity in Change, The Role of Joint Air and Space Power in NATO in a Rebalanced Security Paradigm;
- The Enduring Quest for Capability Development in NATO – Aligning National Interests with Alliance Interests;
- A New Concept for Air, Space and Cyber Power;
- The Future Role of Partnerships in Transatlantic Air and Space Power;


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- Beyond Optimization: Innovation and Adaptability for NATO Air and Space Power – The Role of Industry;
- The New Burden Sharing Imperative.

Ultimately it is intended that the ideas and views expressed in the compendium will evolve into follow on activities in support of the enduring Project to guarantee that Air and Space Power in NATO is sufficiently available and fit for purpose when most needed in NATO, anywhere, anytime.

JAPCC Air & Space Power Conference

The JAPCC welcomes you to attend our 2014 Air and Space Power Conference in Kleve, Germany from 18–20 November.

'Air and Space Power in NATO – Future Vector' is the theme of this year's conference. The JAPCC conference attracts senior military, political, industry and academia leaders with attendance of over 130 flag officers in the last 2 years.

This year's Key Note Speaker is Ambassador Stephen Evans.

Ambassador Evans took up the post of Assistant Secretary General for Operations in August 2011 on secondment from the United Kingdom Diplomatic Service. He supports the North Atlantic Council and the Secretary General of NATO in the political direction and management of NATO's operational activities.

The JAPCC 2014 Air and Space Conference will debate the key themes emerging from the Project. This is your opportunity to discuss, and most importantly, influence the outcome of the 'Future Vector Project'.

Your ideas will shape the final report and help the JAPCC influence the development of NATO's vital Air and Space Power capabilities.

For further details please contact the JAPCC at: www.japcc.org or write us directly: conference@japcc.org.

Europe's Strategic Airlift Gap

Quantifying the Capability Gap and Measuring Solutions

By Major Lee Hages, USA AF, Chief Core Joint Forces Air Component Exercise Branch, Allied Air Command, Ramstein Air Base, Germany

Introduction

The identity, mission, and requirements of the North Atlantic Treaty Organization (NATO) have been evolving since the end of the Cold War. The pace of this evolution in mission sets has been increasing and on a vector towards a more global and rapid expeditionary force responding to both conflict and humanitarian need. Strategic airlift is a core capability required by NATO nations if they are to carry out these endeavours across the globe. While the United States (US) possess a tremendous strategic airlift capability other NATO nations suffer a severe gap in strategic airlift requirements and capacity.

For reasons of sovereignty and shifting strategic focus for European nations, it is important for reliance on US and even Canadian strategic airlift to be mitigated. To address airlift shortfalls, European NATO allies have collectively pooled resources through multiple initiatives. Pooled leasing of contract airlift through the Strategic Airlift Interim Solution (SALIS), the multinational purchase and operation of Lockheed C-17s via the Strategic Airlift Consortium (SAC), and the eight-nation group purchase of Airbus A400Ms constitute significant efforts in collectively addressing airlift deficiencies.

My research as part of the USAF's Advanced Study of Air Mobility (ASAM) attempted to quantify the strategic airlift requirement for deploying NATO's forces and compare these requirements to both current and projected airlift capacity, excluding North American assets. Although the study included many other aspects of research, including alternate fleets of additional C-17s, only the results of current (Table 1) and planned future (Table 2) airlift fleets are described within this article.

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Current and future airlift fleet capabilities were measured using both air campaign planning equations and deterministic modelling, specifically a modified version of the USAF's AMC Mobility Planner's Calculator (AMPCALC). Scenarios used for the research were derived from past NATO and defence industry studies. NATO Rapid Response Forces and their deployment were the focus of all scenarios. Qualitative data regarding NATO's airlift was gathered through interviews with prominent subject matter experts from NATO, US Air Forces Europe (USAFE), Air Mobility Command, RAND and others.

Scenario Framework

To quantify requirements, three key variables were determined: how much needs to be transported, at what distance and under what time constraints. Comparing current and future aircraft groupings against scenario requirements established if a capability gap existed and quantified it as a shortage of X aircraft, Y days, or Z Million-Ton Miles per Day (MTM/D).

In particular, two studies provided the force structure and timelines analysed within this research. In 2005, the Joint Air Power Competence Centre (JAPCC) conducted an airlift simulation using NATO's Allied Deployment and Movement System (ADAMS). Forces were accurately constructed using NATO's LOGBASE for deployment-related data and their Force Data Management module.[1] This data was mirrored in the first two scenarios of this research.

Additionally, a study performed by the European Aeronautic Defence and Space Company (EADS), provided a more recent scenario modelling the multinational military effort in Mali, January 2013. The force requirement provided by EADS served as an accurate estimation of actual forces deployed via airlift. Although much smaller (nearly 1/3rd) than the forces required for scenario 1 and 2, this 3rd scenario does closely approximate a smaller NRF land component, the initial response portions of a large NRF or EU battle group deployment. Past studies of the Battle Groups suggested the initial deployment phase should occur within the first 10 days.[2] Therefore a time period of 10 days was used for scenario 3 of this study to determine airlift shortfalls. The basic requirements derived are seen in Table 3.

Aircraft Fleets

Aircraft not already in AMPCALC, were added by using performance data provided by the manufacturers or obtained through published open sources. That data was then used to build a scatterplot from which a linear trend line was created. Payload-range values were determined in this manner for the following aircraft: A400M, C-130J, A-310, A-330, A-340. The average R2 value for these aircraft was 0.92588.

The capacity for Europe's current strategic airlift fleet was determined by examining actual aircraft fleets and determining their capability within each scenario.[3]

The fleet described in Table 1 was used in total for the Bahamas and Rwanda Scenarios. The Mali Scenario cargo was limited to C-17, C-130 and A400M aircraft due to airfield restrictions. The SALIS contract guarantees 6 AN-124s, but they are limited to 20 days or 800 hrs per month. Mirroring the 2005 JAPCC study, the researcher limited the AN-124 fleet using the 20 day per month constraint which approximates 66 % of full fleet use per month, or 4 AN-124 aircraft. To account for the 'assured' access to the aircraft, the maintenance capability rate for the AN-124s modelled was kept at 100 % rather than the 85 % used for the rest of the fleet.

Future airlift fleets were examined by projecting current procurement initiatives.

AN-124s provided by SALIS were eliminated in accordance with publicly stated intentions to do so once the A400Ms are operational.[4]

Results and Analysis

The three scenarios were first examined by calculating the MTM/D required to move all requirements within the specified time constraint.[5]

Next, each set of models examined the current and future fleets of European strategic airlifters and their performance within each of the three scenarios. These models first determined how many days it would take to deliver the required cargo to the given destination. The models were then run again to see how much

'Current' Strategic Airlift Fleet	
Aircraft	**Total (Europe)**
C17	10
A310	10
A330	14
A340	2
KDC10	3
KC767	2
C130J	62
C130H	107
AN124	4

Table 1: 'Current' European NATO Allies Strategic Airlift Fleet.

'Future' Strategic Airlift Fleet	
Aircraft	**Total (Europe)**
C17	10
A400	170
A310	10
A330	14
A340	4
KDC10	3
KC767	4
C130J	70
C130H	107

Table 2: 'Future' European NATO Allies Strategic Airlift Fleet.

$$MTM/D = \#\ Aircraft \times Avg\ Payload \times Block\ Speed \times Ute\ Rate \times Productivity\ Factor$$

$$MTM/D = \frac{(Tons\ Delivered \times Miles\ Flown)}{(Days\ Required \times 1{,}000{,}000)}$$

Figure 1: Cargo Network Capacity Calculations.

cargo the current fleet was capable of transporting within the specified time constraint (i.e. 30 or 10 days).

Scenario 1 Analysis (Bahamas)

Scenario 1 to the Bahamas was very taxing on the European fleet. While Scenario 2 to Rwanda did include a greater amount of cargo, Scenario 1's distance of more than 8,000 miles round trip placed an enormous stress on airlift. Both MTM/D calculations and modelling concluded that a significant gap exists in Europe's current airlift fleet, yet their future fleet should have adequate capacity.

Within Scenario 1 and in all scenarios, passenger movement was never a limiting factor. Without procuring commercial transport, NATO allies have more than enough capacity to rapidly move expeditionary forces. This is of course if airfields in or near the AOR allow access to their more commercial-like MRTT aircraft. Regarding the transport of cargo, the current airlift fleet was only capable of moving 6.94 MTM/D. This includes using all MRTT aircraft for cargo when not used in their primary role of passenger transport. This falls well short of the calculated 10.95 MTM/D required. When modelled for best closure, the results show an even larger gap by a factor of 2.16. What the allies want to move in 30 days was determined to take nearly 65. When the model was limited to 30 days available the results mirrored previous findings, showing only 47.7k s/Tons of the required 77k s/Tons could be delivered (61 %).

Modelling the future fleet resulted in much better results. With the most notable changes being the deletion of SALIS AN-124s and the addition of 170 A400Ms, all requirements were delivered in less than 21 days. These results of course benefit from the full use of all European strategic airlifters from all continental allies, hampered only by a 5 % training fence and 15 % maintenance fail rate. Although optimistic, these assumptions may not be unfeasible in an effort of grave importance to the allies as a whole.

Once the model was restricted to 30 days, it was possible to narrow down a more accurate number of A400Ms needed to complete the scenario. A more manageable 89 A400Ms (or only 52 % of the projected total) was required.

Whether looking at MTM/D, obtainable force closure timetables, or cargo capabilities within outlined timelines: Scenario 1 shows a significant capability gap. This

Requirements				
Scenario	**Cargo (s/Tons)**	**Personnel**	**Distance (NM)**	**Deploy (Days)**
*1. Bahamas**	77,000	25,000	4,267	30
2. Rwanda	93,000	20,000	3,297	30
3. Mali (consisted of 6 battalions transported from 4 locations)				
3a. Eur Battalion x3	22,577	5,400	2,025	10
3b. Afr Battalion x1	2,004	900	1,015	10
3c. Afr Battalion x1	2,004	900	856	10
3d. Afr Battalion x1	2,004	900	541	10

* This research used Lajes AB as an enroute fuel stop for the Bahamas scenario, just as the JAPCC 2005 study did. The researcher did run models with and without the Enroute stop. Using the stop Enroute to the APOD / FOB with a direct flight overflying Lajes back to the APOE resulted in significantly shorter force closure times. This routing was within aircraft capabilities, and therefore used to maximize through-put.

Table 3: Scenario Airlift Requirements.

gap however is adequately bridged through the projected purchase of A400M aircraft. In fact, only half of those under contract would be needed to accomplish European contingency objectives for the given scenario.

Scenario 2 Analysis (Rwanda)

Scenario 2, transporting a large NRF to Rwanda included the largest required cargo loads. As with Scenario 1, MTM/D calculations and modelling concluded that a significant gap exists in Europe's current airlift fleet, yet their future fleet should have adequate capacity, baring barriers to MRTT aircraft providing cargo support.

Europe's current fleet of aircraft was able to produce full force closure in 73.59 days, significantly missing the 30 day goal. The 5.89 MTM/D capability fell far short of the calculated 10.17 MTM/D requirement. Running the model with a 30 day limit on transport, the current fleet was only capable of moving 56 % of the required 93k s/Tons mirroring MTM/D calculated shortfalls. Once again, passenger movement was not a factor, however the shortage of cargo lift may be even more significant when one considers the lack of infrastructure in Africa. This model assumed MRTT aircraft would be useful in transporting both passengers and cargo. By moving cargo off MRTT aircraft for this scenario, force closure jumps to nearly 92 days. In reality, poor infrastructure and lack of adequate airfields may significantly increase the airlift gap for certain operations.

Using the full fleet of 170 A400Ms, the model results showed force closure in 26.08 days. Restricting the model to 30 days, shows a minimum of 124 A400Ms are required for force closure. Again these results included MRTT aircraft in a cargo role. With MRTT aircraft restricted to passenger transport to nearby airfields, force closure for the full 170 A400M fleet grows from 26.08 days to 32.05 days. Given MRTT constraints, when the model is run to minimize the number of A400M required to meet the 30 day goal, the result is 185.

If MRTT aircraft are further prohibited from passenger transport, the number of required A400Ms only slightly increases. With zero MRTT support, AMCALC shows passenger closure can be completed by using less than 40 C-130H aircraft for passenger transport. For the Rwanda scenario C-130H were limited to an average payload of only 3.77 s/Tons/Day, therefore only 3 additional A400M aircraft were required to make up the difference in the cargo capacity lost by using a portion of the C-130 fleet for passenger movement. With MRTT lift available, the future fleet does appear to fill the current gap. Without MRTT support however the additional 170 A400Ms projected to Europe's fleet falls just short of meeting contingency timetables.

Scenario 3 Analysis (Mali)

For the Mali scenario, varying sized forces were airlifted from four separate locations. To optimize the use of each fleet input to AMCALC the program's integration feature was used. The Integrate Cycles application allows the spread the available aircraft across any/all cycle combinations according to the percentage of the total cargo and passenger requirements.

Scenario 3, transported a rapid response force similar to that used for Mali's real-world operation in 2013, aimed for 10 day force closure. As with scenario 1, MTM/D calculations and modelling concluded that a significant gap exists in Europe's current airlift fleet, yet their future fleet should have adequate capacity to meet stated goals.

Referencing real-world airfield constraints, this scenario was limited to C-130, C-17 and A400M aircraft for cargo transport. The current fleet of available aircraft was able to close airlift from Europe and all three African locations in 16.53 days. The ability to only lift 3.25 of the required 5.05 MTM/D was significant. If only given 10 days for airlift, the current fleet would fall 29% short of transporting all requirements according to AMCALC.

Using the future fleet of A400Ms and additional C-130Js however, force closure results are achieved in less than 4 days. Two of the African battalions may actually be moved in less than 2 days. Running AMCALC to minimize the A400M fleet shows only 25 are necessary to close within 10 days. This greatly reduced number is significant when one considers that the research still used MRTT aircraft to transport passengers in this scenario. It is highly feasible that this transport may not be available in a scenario such as this, requiring austere airfield capable aircraft such as the C-130, A400M and C-17 to carry both cargo and passengers. When the model is run without the use of any MRTT aircraft, results show that a small increase in A400M numbers in coordination with C-130 passenger transport adequately meets all requirements within stated timetables. Using 27 C-130 for passenger transport and bringing the total A400M fleet up to 28, all passenger and cargo requirements are met within 10 days.

Conclusion

Europe's current strategic airlift shortfall is significant. Given capabilities, initiatives and priorities stated by NATO and the EU, a substantial gap exists between what is available and what is desired. This research supports the projected 2020 fleet of European aircraft to meet strategic airlift goals. The fulfilment of A400M orders will not only help European nations become a global contingency enabler, but will allow them to act and operate on their own for strictly European operations. Deployment of the NRF will likely be done using multimodal transportation, but the future fleet of European aircraft should enable the rapid deployment of NRF forces. ●

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Major Lee Hages

is the Chief, Core Joint Forces Air Component Exercise Branch, Allied Air Command headquartered at Ramstein Air Base, Germany. Major Hages entered the Air Force in 2000 as a graduate of the US Air Force Academy, earning a degree in Political Science, Nation Security Studies and US Foreign Policy followed by a Master of Business Administration in Human Resources and a Master of Science in Logistics. Prior to conducting his research for AMC's Advanced Study of Air Mobility, he has served as a KC-10 Flying Training Unit (FTU) Chief, 305th Operations Group Standardization and Evaluations Chief, and USAF Expeditionary Center Executive Officer and CAG Chief. Major Hages is a KC-10 senior pilot with more than 3,000 flying hours and over 100 combat sorties.

ENGLISH EDUCATION

Capacity Language Building in NATO

Language Skill as a Crucial Tool for Interoperability at All Levels

By Michael Adubato and Marios P. Efthymiopoulos (Ph.D.)

Introduction

The purpose of this article is to present a recent survey of the necessity of language skills. The primary investigation shows the current capabilities and proposes issues for consideration. As English is one of the two official NATO languages, we believe an improved and direct language skill method of teaching should be used. Language skills are of utmost importance for interoperability at all levels and therefore an important tool for strategic, operational, tactical and every day deliverables, whether in the military or civilian domain. This is extremely important for the Air & Space domain, since by its very nature, it is a combined endeavour where multinational cooperation is a *conditio sine qua non*. This article reflects the initial result of a preliminary study and address questions regarding the importance of the English language as

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a tool for NATO capabilities. The correct use of language and its understanding enables a successful administrative and operational environment. It avoids possible misunderstandings or misinterpretations across the whole spectrum of military activities and avoids duplication of efforts in NATO operations and/or NATO working environments.

The study in this article as aforementioned is in its initial research steps. Primary sources of information are presented henceforth, through an established questionnaire that will be evaluated and analysed. The questionnaire was created in order to investigate possible 'flaws' in the use of English in NATO. We evaluate this through people's (military and civilian) experiences and professional capacities. We question whether they deem the technical and everyday use of English as a working language in NATO as necessary and evaluate the importance they assign to using it properly. Finally, we examine how language is used to 'get the message through'. This article demonstrates the necessity for structural changes in how English language skills are taught and evaluated and recommends improvements.

Although this work is ongoing and currently only reaches the first level of the problem, we hope it eventually enables all members of NATO and people engaged at international or peripheral organizations to evaluate their national or multinational frameworks of language preparations, abilities and skills in what we will call a 'smarter' way. We believe that a perfect working use of English at NATO is a realistic strategic move; an administrative tool that when correctly applied or presented, can only produce success. In such a way, NATO's administrative, communicative and marketing abilities can be achieved at the same high levels NATO's strategic, operational and

tactical capabilities reach. Professional training in key aspects and wording of the English language allows members to better engage their audience, gain knowledge more easily and use communication tools more effectively.

The necessity of this paper is consequential in several issues that we experienced. We deliver this research article based on professional observations coming from both authors. Needless to say our joined information is cross examined from two separate points of views and experiences.

Our statement is clear: the linguistic capabilities and capacities of non-native speakers, used as tools for deliverables, whether administrative or operational are a severe shortcoming in NATO. Also, there are many missing elements for capacity-building in language training. Ill-equipped personnel and ill-equipped training methods for those who teach the language may not provide the necessary outcome. For those that wish to lead, command, administrate or work in an everyday business to business environment, poor use of English can negatively affect the person and/or leader in operational/administrative purposes. There is a need for capacity-building in language skills for those who do not meet the language skill requirements for the job. This can only be achieved if all Alliance members put more effort in their national level English language training. Only then will we achieve robust results that can have an effective and positive influence.

Objectives of the Survey

The objectives of the survey are twofold; first, to show that the Standardized Language Profiles (SLP) are often unrealistic and, at the same time, show shortfalls in some areas in the military members' proficiency levels in the four skills. Early testing shows that nations are not very well acquainted with joined or interoperable testing procedures for their personnel posted to NATO. Research shows that Level 3s and especially Level 4s should have no problems with listening comprehension which evidently is not the case. It is our objective to show why this is done and to analyse the validity of this argument.

Framework of Information

The basis of the Questionnaire was associated with past work conducted by the Romanian National Defense Foreign Languages Testing Center in Bucharest. Its validity in terms of time is quite recent (December 2013 to February 2014) and its technical questions are a continued source of constant evaluation of the difficulties associated with professional work at NATO.

The questionnaire was distributed to 50 military personnel, with only 15 replies, equating to a 30% participation rate. This is a small sample; however, it shows a fair representation of NATO military members ranging from senior NCOs to a flag officer. The distribution of the questionnaire was provided through electronic mail. The majority of Departments that saw the questionnaire were non-native English speakers. The questionnaire was not anonymous and includes profiles of military and administrative personnel. Questions are synonymous to NATO operational needs and evaluations for capability building.

The methodological approach is quite simple in this questionnaire. We considered past questions and raised new ones which we believe can be helpful. The questionnaire was based on the Romanian report in 2006 that aimed to evaluate what levels of English proficiency were required by NATO, in accordance with Standardization Agreement (STANAG) 6001, for the Romanian deployable forces as opposed to what levels were actually needed based on the experience of their soldiers who had participated in previous international missions.

Validity of Questions

The questions put forward to the deployable military members were based on 32 experience and mission related tasks. The questions addressed the four skills (listening, speaking, reading and writing) and ascertained which tasks they were required to perform most, their anticipated difficulty, how frequently they performed well or badly and how important they deemed these tasks to be in their daily duties during deployment. A first self-assessment for each task was also provided.

Data

For writing, the main task overall was to write notes, memos and e-mails (SLP 2 task) with 86 % stating that this was required and was performed quite frequently.

For tasks that require SLP 3 in writing, 60 % said that they are required to fulfil these tasks on an infrequent basis, and one-third found these tasks quite difficult.

Just above half (53 %) found the listening comprehension tasks (most of them SLP 2 tasks) not difficult, while some who had STANAG 6001 test SLP 3s and a 4 in listening comprehension found some of the tasks difficult.

Early Proposals

Pedagogy is a tool for constant knowledge. It not only supports arguments for a much better and successful ability to teach but also to constantly learn. The methodology of learning a language should continue to be evaluated. Language examinations should become smarter in multiple ways and levels while providing a standardized framework system of joined training on language preparation of English for NATO posts. Language training should reflect real needs and necessary knowledge that should come attached with the position at hand.

At an early stage, we recommend that structural changes should occur. They should be policy oriented and technical in terms of learning, teaching and examining. All matters should hold a positive impact in the method applied and used for teaching. A new oral and written way of English training should be considered.

Policy oriented proposals reflect four aspects that we need to consider:

1. Teaching and learning methodology of English as a working/professional language.
2. Operational preparation that differs in technical levels and research and development affairs.
3. Examination methods (how to evaluate and how to teach).
4. Creation of mid-career evaluation (constant evaluation methodology and possible comments that may lead to structural changes).

Conclusion

These findings are merely the tip of the iceberg, however should be considered as the basis of a way forward. NATO must become more involved in the training of national English language teachers as well as those who test English language proficiency in accordance with STANAG 6001. There is no official NATO test but merely national interpretations of the language levels outlined in STANAG 6001 and often one nation's Level 2 is another nation's Level 3. Allied Command Transformation (ACT), the command responsible for education and training, financially supports language testing seminars held at the George C. Marshall Center in Germany, but they do not even have the means to test their own personnel. Only Supreme Headquarters Allied Powers Europe (SHAPE) has a testing team and regularly tests newly assigned personnel to the command.


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Linguistic capabilities and capacities of non-native speakers need to be improved now that NATO has entered a new era of more extensive multinational cooperation. Especially in the Air & Space domain, this cooperation pervades the tactical level, which until recently was a purely national environment. Language use has to be seen as a crucial tool for interoperability at all levels. To achieve this, both training and testing procedures should be evaluated. The methodological approach should be simplified, in offering joined combine training as a prerequisite. It will provide quality

assurance and will lead the way to improved capacity-building at all levels in changing times to face not only external threats but also to construct a solid framework for robust administrative results that NATO requires.

On the other side of the coin, the language proficiency levels for international personnel assigned to the NATO structure are not the only problem. Too often the levels required for these posts are at a much higher level than the actual requirement. One example would be requiring a Norwegian OR4 clerk to have a mandatory SLP 3333. The level is remarkably much higher than what the duties require. This can also be said for most staff officers who require SLP 3333 regardless of what they are required to do in their day-to-day work. Within Allied Command Operations (ACO) a full Colonel requires SLP 4343 only because he is a full Colonel.

This problem has been addressed and in the near future a Language Needs Assessment (LNA) will be carried out at both ACO and ACT where a team of the Bureau for International Language Coordination (BILC), a NATO consultancy body, will do just that in order to tackle this problem and advise the organizations on how to remedy this problem.

NATO focuses on many areas, but it's amazing that the ability to communicate effectively has been overlooked for a very long time. Former United States Chairman of the Joint Chiefs of Staff, General John W. Vessey, probably said it best when he addressed this issue almost 30 years ago stating that 'more has been screwed up on the battlefield and misunderstood in the Pentagon because of the lack of understanding of the English language than any other single factor'. ●

Michael Adubato

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How is Close Air Support Changing?

By Andrea Lopreiato, ITA Army Aviation, JAPCC

How technological innovations will affect future Defence Systems is an issue more topical than ever, especially in the military industry. Considering the progress made in the field of smart artillery ammunition, it is conceivable there will be a small revolution within the Close Air Support (CAS) community in the near future. This could potentially have a significant impact as CAS has traditionally been seen as a strength of western aviation.

Brief History of Fire Support

Since ancient times, armies have sought to attack with the greatest force possible from the furthest distance away using such weapons as bows, slings and javelins; followed by catapults and ballista, but the clashes were unquestionably decided by head-on collisions of the infantry and cavalry. Even after the appearance of the first firearms clashes were decided by bayonets rather than by gun bursts. This was true until the American Civil War (1861 – 1865), the first time in history in which musket fire and artillery were decisive for victory. The tendency towards using firepower, instead of bayonets, continued with the Franco-Prussian War (1870) and later during the Anglo-Boer wars (1880 and 1899), where the numbers of units routed by a higher volume of fire without reaching physical contact drastically multiplied. Not until the First World War, did it become universally recognized that the fire-power of artillery could bring success, where infantry could not. The combined use of barbed wire and the machine gun turned out to be the decisive defence against infantry assault, where artillery fire was crucial in a support role to make infantry assaults successful. However the air 'domain' remained practically unutilized as, during the First World War it was only used for reconnaissance and surveillance of

the battlefield and occasionally for tactical or strategic bombing. Later, during the Second World War, air forces turned into an Air Power capability and proved themselves decisive for victory both at the tactical and strategic level, on sea and land.

During World War II, artillery became too slow for mechanized warfare, too limited in range, and too imprecise to compete with the rising Close Air Support (CAS) capability. This is why the Germans first operated the Ju-87 Stuka followed by the Allied Air Forces who did the same using the Typhoon, turning CAS into a key element of victory in the 'manoeuvre war'.

Birth of Close Air Support

After the Second World War the US, followed by many NATO nations, maintained CAS as a key mission of Air Power. But it was not until the Vietnam War that CAS, as we know it today, became popular. Infantry units and Special Operations Forces would call fighter-bombers, taking off from distant bases or aircraft carriers, for aid even when a single soldier was in need of fire support. Soon the US Army, in order to guarantee short notice fire support, turned its attention to the new gunship helicopters. These helicopters were seen as the panacea for all ills, since they could be positioned at short distance from the front line making them available at very short notice.

With the progress of technology, the weapon systems of helicopters became more and more powerful and accurate, as demonstrated during Operation Desert Storm in 1991 (First Gulf War). At the same time aircraft weapons became more precise and were witnessed by the wider public, who were amazed as they watched the television as guided bombs slipped into the windows of the bunkers. What was intended to be more lethal against specific targets, proved itself useful to reduce the collateral damage, first in low-intensity conflicts and later in the asymmetric ones.

As if TV- and laser-guided bombs were not enough, in the following years, the introduction of GPS technology and miniaturization of circuits allowed the creation of a generation of more precise and cheaper[1] smart bombs; even allowing the recycling of the old dumb ammunition, using precision re-configuration kits. Today, thanks to the accuracy of GPS systems, you can release smart munitions at higher altitudes, allowing more stand-off range from anti-aircraft weapon systems.

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The Birth of Artillery Smart Grenades

In the 1980s, the US produced the first laser-guided ammunition, the M-712 Copperhead[2], but very soon, the Russians took the lead in increasing the accuracy of artillery with the creation of the 30F39 Krasnopol laser-guided projectile. In 2000, the US soon redressed the balance by developing their own Excalibur laser-guided projectile. Both munitions were used in war, the Krasnopol in Chechnya[3] and the Copperhead in the First[4] and Second Gulf War. Both provided a much better performance compared to conventional artillery.

However, after the spectacular performance of the massive air intervention in the First Gulf War, artillery seemed almost destined to disappear, as towed guns were not suitable for the rapid movements of mechanized warfare and the self-propelled guns too heavy to be quickly airlifted in case of crisis response operations. Moreover, both systems were considered too aggressive and inaccurate for peacekeeping missions. If fire support was needed, there would be the inevitable use by NATO of attack helicopters or fighter-bombers.

At that time however, it was impossible to insert a navigation system into an artillery shell; GPS was still too expensive, big and complicated and many prototypes were not robust enough to withstand the acceleration inside of the gun barrel. Due to their size, only the Multiple Launch Rocket System (MLRS) munitions were suitable for improvements. But progress in miniaturization technology would soon allow even 155 mm shell to be equipped with sophisticated guidance systems.

Artillery or Close Air Support?

In recent years, a series of smart artillery munitions which are extraordinarily lethal (accuracy and impact trajectory) have been developed, attracting the attention of all branches of the Armed Forces. There are GPS- and laser-guided projectiles using different types of propelling charges; e.g. cartridge bags, metal cartridge, rocket assisted, and discarding sabot; allowing easy adaptation of new ammunition to the field guns already in inventory. This type of ammunition has the following characteristics:

Extended Range
It is taken for granted that fighter-bombers can reach targets at great distances, but in some cases the current smart artillery projectiles are able to accurately reach targets between 100–120 km away.

Smaller But in Great Number
Although an average artillery projectile weighs only about 30 kg, continuous artillery fire could provide the same effects on a target compared to a bomb dropped by an aircraft. Collateral damage could also potentially be reduced by using a small projectile.

'The existence of the "traditional" Air Force "roles" seems threatened, "surrounded" as they are by not only guided artillery munitions, but also by remotely piloted aircraft oriented to replace direct support missions and Army attack helicopters.'

High Readiness
An artillery battery is ready to fire in two minutes – the same amount of time is required to get a pilot from the ready room to his aircraft.

Persistent Fire
An additional advantage of artillery shelling is the guarantee of extended fire 'persistence' on the target, also UAS's longer endurance but limited ammunition payload compared to an average artillery ammunition stockpile.

All Weather Operations
Artillery is not affected by adverse weather conditions like poor visibility or thunderstorms.

Cost Efficiency
Another factor, which is a key consideration in all of today's military choices, is the operating cost. The cost of a fighter-bomber, its ammunition, and related pilot and FAC training, cannot compete with the cost of operating an artillery gun and the related training.

Different Scenarios

Air Supremacy or Disputed Airspace

Many criticisms have been made of the military establishment, accusing it of having changed the entire national military organization in terms of equipment, material and training, to focus solely on the ISAF mission in Afghanistan. Critics claim that many of these changes would not compete well against a medium or high technology equipped adversary. In many cases, this is a fair criticism: for example the massive use of Unmanned Aerial Systems (UAS) which are vulnerable to an air opponent or in the case of mammoth MRAP[5] trucks, which are not suitable off-road because they are too heavy. However, artillery would stand up well to this criticism and it fits either in asymmetrical and symmetrical warfare.

Facing Air Supremacy

In the event of a military confrontation with a high-tech opponent, artillery will often be able to camouflage a gun or pad and launch a salvo; such as Hamas and Hezbollah did for years against Israeli defences. Despite being one of the most technological advanced military organizations, Israel suffers these kind of attacks, let alone if these dumb ammunition were converted into smart weapons. The proliferation of surface-to-surface missile systems in the arsenals of Syria and Iran is a clear sign that, even though they cannot hold a candle to the USAF or IAF[6] in an air war, they will maintain a capability to strike targets with missiles and rockets. Even North Korea maintains its deterrence against South Korea with 170 mm and 240 mm artillery guns. These, in the event of war, would deliver a shower of shells on the enemy capital, Seoul, and it would not be an easy task to silence the thousands of pieces of artillery which are scattered and camouflaged throughout the countryside, even if the USAF and RoKAF[7] would make short work of the North Korean People's Army Air Force.

Enhancing Sea Power

Even power projection 'from the sea' provided by embarked aircraft can be supplemented by new naval artillery systems[8]. Naval gun smart ammunition are now a reality and in some cases (range permitting) can be a valid alternative for a sortie of fighter-bomber planes in support of landing forces. Future USS Zumwalt class destroyers have 20 four-cell Peripheral vertical Missile Launchers (PVLS) situated round the perimeter of the deck, while another missile system under consideration includes a tactical Tomahawk. It will be equipped with a fully automated weapon handling and storage system and a family of advanced munitions and propelling charges, including the GPS-guided Long Range Land Attack Projectile (LRLAP). Up to 900 rounds of LRAP ammunition will be carried.[9]

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Future US Navy weapons systems may include a rail-gun that is able to fire a projectile at ranges of 50 to 100 nautical miles, with an eventual range up to 220 nautical miles.[10]

A Case-Study in Point

The air assault operation 'Anaconda' carried out in Afghanistan in 2002, called for a rapid deployment of US forces in order to surround the Taliban units in the region of Shahi-Kot Valley. Fire support of the 1,800 US soldiers was achieved by only a pair of 120 mm mortars and 7 Apache helicopters. When the latter were hit by Taliban AAA, they continued to fight albeit heavily damaged and with limitations, so the US Task Force very quickly ran out of both mortar and air support. The USAF and USN provided more CAS missions than planned but they faced several problems, due to the unknown position of friendly troops and Special Forces on the move during the fighting. In 2003, long-range smart artillery projectiles had not yet become massively popular. Nowadays, the required fire support for a similar operation could be provided by artillery batteries, prepositioned at great distance and employing smart ammunition. In this way, it would be possible to share the CAS burden with the same accuracy and lethality.

Conclusions

The existence of the 'traditional' Air Force 'roles' seems threatened, 'surrounded' as they are by not only guided artillery munitions, but also by remotely piloted aircraft oriented to replace direct support missions and Army attack helicopters.

The distance between theory and practice is such that it is unlikely that CAS will be phased out and will, as it has over the last 70 years, remain the key to victory.

But are we really sure that in times of shrinking budgets it is more acceptable to invest in piloted strike-fighters, rather than in smart artillery projectiles?

Inevitably, the military 'solution' is a balanced force, consisting of a mix of different capabilities, old and modern, which in this case argues for both aircraft and smart artillery weapons, but underestimating the capabilities offered by the latter would be a fatal mistake. ●

'The only thing harder than getting a new idea into the military mind is to get an old one out.'
B. H. Liddell Hart

1. The first laser kit built in 1972 cost 100.000 $, now a laser-guided kit costs 20.000 $. http://www.airforcemag.com/magazinearchive/pages/2010/march%202010/0310bombs.aspx.
2. Lt Col Mike Milner, Product Manager Combat Ammunition Project Office, PEO Ammunition, Picatinny Arsenal, New Jersey, http://www.dtic.mil/ndia/2012annual_psr/Milner.pdf.
3. Russia's Chechen Wars 1994–2000: Lessons from Urban Combat, Oliker Olga, Arroyo Center RAND.
4. http://www.lockheedmartin.com/us/100years/stories/copperhead.html.
5. Mine Resistant Ambush Protected.
6. Israeli Air Force.
7. Republic Of Korea Air Force.
8. http://www.baesystems.com/cs/groups/public/documents/document/mdaw/mdqx/~edisp/baes_027605.pdf.
9. http://www.naval-technology.com/projects/dd21/.
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Lieutenant Colonel Andrea 'Fulmine' Lopreiato

attended the Italian Army Military Academy and graduated in 1991. After 7 years in the parachute brigade he joined the US Naval Aviation Flight School in Pensacola, Florida where he graduated as a naval aviator on multi-crew, multi-engine aircraft in 2003. After completion of Staff College he was assigned to the Doctrine and Procedures Branch in the Italian Army Aviation Headquarters in Viterbo. As Branch Head, Lt Col Lopreiato ran several capability development projects including the implementation of a Forward MEDEVAC capability and the national interface of the EDA Helicopter Training Programme. Since September 2012 he has been working as a subject matter expert in the Concepts and Development (CD) and then in the C4ISR-S branch of the JAPCC.

Future Considerations of BMC2

BMC2 Must Be Both Horizontally and Vertically Integrated to Maximize Information Exchange and Fusion

By Lieutenant Colonel Joshua W. Conine, USA AF, NAEW&C Force Command

Air Power Principles

Air Power is dependent on its ability to utilize speed, range, flexibility, precision, tempo and lethality in order to achieve successful effects at the strategic, operational, and tactical levels of warfare. History has shown the control of the third dimension is generally a necessary precondition for land and sea elements to have freedom of manoeuvre to conduct successful operations against the enemy. Critical to the employment of air forces is the fundamental principle of 'centralized control and decentralized execution'. Centralized control promotes an integrated and joint multinational effort in which unity of effort is best achieved when authority for command and control is exercised at the highest level. It is justifiable that no single commander can personally direct all Air Power actions. Hence, the importance of decentralized execution, which is essential to mission success by delegating appropriate authority to subordinate commanders and functions to execute tasks and missions.[1]

The tenant of centralized control and decentralized execution is at the forefront of Battle Management/Command and Control (BMC2) functions, as it fuses direction and guidance from the operational-level to engagement capabilities at the tactical-level. BMC2 is the art of translating real-time battle space awareness, operational guidance, and combat potential into decisive action at the tactical level across a wide range of missions including air-to-air, air-to-ground, and combat support missions. Within NATO, BMC2 systems have a direct link to exercising decentralized execution. Specifically, 'NATO AWACS aircrews are delegated tactical authorities, which enable tactical action-based on real-time information. This delegation allows NATO AWACS aircrews to operate independent of the NATO Air C2 structure'[2]; or supplementing it wherever rapidly deployable 'reach forward' control is required.

The Air Power tenant of centralized command/decentralized execution is expected to continue to be important for military operations supported by the philosophy of mission commander leadership as a prerequisite for network enabled operations. The independence of BMC2 is afforded by command arrangements through Combined Air Operations Centres (CAOC), due to the inherent fact that centralized control cannot reach the furthest point of the battle space. This delegation of tactical control to BMC2 systems achieves commander's intent and desired effects by gaining and maintaining the initiative.

Therefore, BMC2 must be both horizontally and vertically integrated to maximize information exchange and fusion.

BMC2 Competencies

Inherent to the conceptual nature of BMC2 are the competencies required to assure success of BMC2 functions. These competencies include:

Tactical Fluid Control: Detailed knowledge of joint/coalition friendly and enemy weapons capabilities and their tactics. This knowledge is the foundation for efficiently placing friendly systems in a place and time which will most effectively defeat a threat and/or protect friendly assets.

Dynamic Battle Management: Minimizing the complexity of war caused by nonlinearity, interaction and friction of simultaneous offensive and defensive operations;[3] synchronizing the integration of joint air/ground/maritime/cyber assets and the associated weapons systems of forces to minimize this chaos.[4] BMC2 platforms accomplish dynamic BM by making timely kill-chain decisions through execution of the Air Tasking Order (ATO), Airspace Control Order (ACO) and Special Instructions (SPINS) at all levels. BMC2 systems must correctly marshal forces (kinetic and non-kinetic) in time and space, which assures operational success. Through dynamic BM, BMC2 systems ensure a seamless and effective joint C2 operation for the Joint Forces Commander.

Air, Surface and Maritime Surveillance and Identification: BMC2 systems apply surveillance and identification information across all domains resulting in an accurate, integrated and common operational picture. To do this, BM personnel must have a sound working knowledge of active and passive sensor capabilities within the platform they operate, as well as with the assets they are directing in order to properly

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integrate their information. Using its organic sensors, BMC2 systems will detect and identify targets. The fusion of sensors and information allows the BMC2 systems to provide timely and accurate threat warning, develop and evaluate effects-based targets for placement into the joint targeting cycle, execute and refine identification criteria, and properly execute rules of engagement.

Battle space Situational Awareness: Collectively, BMC2 systems possess the ability to interpret the operational and tactical battle space in three dimensions, prioritize tasks, information and communication flow. Additionally, they possess the ability to anticipate, react, and mitigate problems, at all levels and communicate these effects at the tactical and operational levels.

Dynamic Information Management: BMC2 systems increase situational awareness to operational commanders and tactical forces using data-lines and IP-based networks to provide friendly/enemy order of battle updates and utilize/propagate information from active and passive sensors.

C2 Systems Integration: BMC2 personnel possess knowledge and understanding of air, space, cyber, Information Operations, and Integrated Air Missile Defence systems to fuse their platform's capabilities into a cohesive C2 architecture to achieve effects in the battle space.

Operational-level Air, Space, and Cyber Integration. BMC2 systems conduct the integration of Air, Space and Cyber domains at the operational level. BMC2 personnel possess the ability to direct planning, coordination, allocation, tasking, execution, monitoring and assessment of kinetic and non-kinetic effects in the JFC designated area of responsibility (AOR) based on Commander Joint Air Component (CJFAC) guidance.

Evolution of BMC2

The BMC2 competencies are a direct reflection of its evolution through the years. From its inception, dating as far back as World War I through the 1980s there was a single role for BMC2. The primary role was to detect and identify airborne targets at a long distance in order to provide tactical forces and operational-level commander's situational awareness and warning. During this communications using line-of sight radio communications with tactical assets and beyond line-of-sight radio communications methods were the primary methods of exercising C2.

Operations DESERT STORM, DELIBERATE FORCE, and ALLIED FORCE evolved and expanded the role of BMC2 systems. Mission sets during this time evolved to reflect the need to provide air-to-air control and threat awareness above and beyond its traditional capacity of surveillance and warning. This reflected the fact that these major combat operations employed thousands of sorties, where line-of-sight voice communications were the primary means of sharing information, as data-link connectivity was limited. As in the previous era, voice communications using line-of sight radio communications with tactical assets and beyond line-of-sight radio communications methods were the primary methods of exercising C2.

The 2000s and post-9/11 environment saw BMC2 functions further evolve with increased focus on the full range of military operations: to include roles in irregular warfare providing support to ground and special operations forces, especially during ISAF operations, integration with maritime forces; increased air to surface integration; and integration with ISR operations. BMC2 actions in support of ISAF allowed BMC2 to operate in a permissive environment supporting irregular warfare with air forces as an enabling element. With the improvement of technology and the ability to bring centralized control functions from the CAOC closer to the battle space, BMC2 effectiveness became measured by the level of technical and cognitive connectivity across the entire battle space. This was proven by the heavy reliance on information through communication nodes like Link-16, Internet Protocol (IP)-based applications like CHAT[5], imagery and video relay. The CJFAC was provided decision quality data through a Recognized Air Picture (RAP) and operational direction passed over IP-based applications. Tactical assets under Airborne Warning and Control System (AWACS) control were

also provided improved RAP and C2/targeting instructions were passed via Link 16 messages or over IP-based applications.

Throughout this evolution, one overarching JFC requirement remained, a persistent BMC2 capability is necessary to gain and maintain situational awareness for operational and tactical forces through the entire battle space.

By 2025 and beyond, one could reasonably expect that the operating environment could range from permissive to non-permissive. The demand for actionable information by decision makers at the operational level will continue to increase and be increasingly reliant on the use of non-voice means to direct tactical forces. This non-voice exercise of C2 will most certainly be done in a collaborative secure data environment. Further, the collaboration on Intelligence, Surveillance, and Reconnaissance (ISR) information will certainly drive a need to control and coordinate some of the information at a lower level in order to facilitate timely engagement of the enemy or friendly force manoeuvre.

However, just as BMC2 has evolved over time, so have potential threats. Technological advances in area denial capabilities and integrated air defence systems will increase the risk to operations in some scenarios while advances in electronic attack and information warfare capabilities will make it more challenging to detect and identify targets. Making this situation even more difficult will be the proliferation of small or stealthy manned or unmanned platforms.

BMC2 Enabling Concept

Air Power has historically been at the forefront of NATO operations and BMC2 has played a key role in these operations. As we look to the future, technological developments coupled with greater information availability will continue to allow NATO Air Power to remain a dominant force. Access to information is key to Situational Awareness (SA) and decision superiority which is seen by both military leaders and tactical experts as the vital difference between winning and losing in combat. BMC2 systems are at the core of providing SA to enable information and decision dominance. The capabilities associated with SA

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include wide-area surveillance radar, combat identification, electronic support measures, and robust communications through the use of voice, data link, and IP-based applications.

Although future BMC2 competencies may not change significantly, technological advances will require improved capabilities in order to provide adequate SA at the operational and tactical levels of command. As threats continue to evolve technologically, improved capabilities in electronic protect measures will have to be identified in order to continue to provide battle space awareness and communication. Furthermore, as communication further ventures to IP-based applications in which forces are exclusively networked, one must not forget that space denial operations could negate these and force a return to 'old school' techniques and practices which will rely on a forward presence BMC2 system to direct commander's intent and guidance. This is directly reflected in line with Military Capability Requirement 11 (MCR11) in the context of BMC2 capabilities.

MCR11 considers various types of weapon systems, sensors, and command and control centers across a spectrum of capability; ranging from surveillance systems which detect and warn, to systems which can detect, warn, track and identify, execute Air Battle Management and exercise Command and Control.[6] MCR11 sees a highly responsive BMC2 system (such as an E-3A) initially entering an operational area, establishing communications and links to the air commander, and providing surveillance and coordination functions across the joint spectrum. Over time this BMC2 system could be augmented or relieved by land or sea based deployable control and reporting centers, deployable radars (dependent on a permissive environment), and electronic intelligence systems.

The continuous development of BMC2 capabilities is expected to progress. Recent operations and the outcome of the Chicago Summit have both shown and directed that a BMC2 capability is needed in order to add harmonization to Joint ISR (JISR) operations. Operation ENDURING FREEDOM (OEF) demonstrated the unique capability of Air Power to locate fleeting targets through dense weather conditions by ISR means, communicating the data through C2 capabilities and to deliver timely, precision effects. Fast forwarding to ISAF operations, airborne ISR assets in Afghanistan have been tasked with over one million targets, to provide support in numerous troops-in-contact situations, and to assist in the capture of more than 160 high-value target individuals. Without ISR, ISAF troops would be blind and deaf, ultimately forced to employ as a reactive force. Furthermore, in Operation UNIFIED PROTECTOR (OUP), NATO employed a multi-layered ISR constellation with Ground Moving Target Indicator (GMTI) radar providing wide-area coverage and Synthetic Aperture Radars (SAR) narrowing in on specific locations. The aftermath of the operation identified a need to not only boost NATO ISR capabilities, but also improve the coordination and control of some ISR assets at the tactical level, most likely by a BMC2 system.

An additional enabling BMC2 mission set includes integrated Air and Ballistic Missile Defence (IBMD). IBMD is essential in achieving a comprehensive and effective air defence capability not only as a measure of collective defence but also during forward deployed operations. In order to preempt potential missile launches (from land or sea) during increased tensions, a tactical ability to coordinate the detection, tracking and targeting of ballistic missile capabilities will have to be coordinated and controlled at the lowest level with reach back to the operational commander.

In all of these cases, communication is the key element that must persist at all levels. The most likely asymmetric threat would create a scenario that extends the tactical level of operations beyond the reach of an operational commander. This would ultimately require the need of a BMC2 system that is able to rapidly bridge the gap between the operational and tactical levels of command as well as to have the ability to coordinate and control the commander's desired effects. The expansion of communication tools includes the use of network-enabled solutions, enabled by IP-based applications, that provides an enhanced capability to manage these requirements. This capability will provide BMC2 systems the ability to communicate with forces at all levels. Additionally, IP-based applications will allow access to documents,


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imagery, full-motion video, and GMTI feeds in order to hasten engagement effects at the tactical level. This provision is coupled with NATO's Connected Forces Initiative (CFI) introduced at the Chicago Summit. CFI looks to retain and build on the valuable gains in interoperability achieved as a result of recent NATO operations by expanding education and training, increasing NATO exercises and making better use of technology.[7]

Conclusion

The future capabilities identified are key to achieving required operational effects through battle space awareness and decision superiority. When integrated with other elements of the NATO Air Command and Control System (ACCS) and JISR systems, NATO AWACS dramatically increases the capability, flexibility, lethality and responsiveness of joint operations. These capabilities will enhance engagement in pursuit of operational objectives by providing the ability to see, decide, and act first.

Regardless of the current environment and fiscal constraints, NATO's history as well as foreseeable crisis management scenarios advocate undoubtedly for a continuing need for a BMC2 system based on accepting technology improvements mainly in the area of the information and cyber domains. When considering the future environment and the fact that non-state actors in the nonlinear asymmetric realm will most likely solicit a NATO response away from the reach of Europe, the most suitable platform to provide a responsive BMC2 capability would be an airborne early warning and control asset. ●

1. http://www.raf.mod.uk/rafcms/mediafiles/374c2506_1143_ec82_2ee142cb9ab10f7d.pdf.
2. Maj Gen Andrew M. Mueller, 'Capable, Ready and Relevant – The NATO E-3A Component', JAPCC Journal, Edition 18.
3. Smith, Hugh, 'On Clausewitz – A Study of Military and Political Ideas'.
4. Maxwell, James Clark: Chaos results where a system is non-linear and sensitive to initial conditions.
5. IP CHAT – Near-time synchronous conferencing capability designed for group and private message data transfers to provide online communications with other users. IP CHAT enhances critical communications capabilities through improved data messaging across units and echelons by simultaneously transmitting and receiving information among all participating and monitoring organizations.
6. Due to classification purposes, for exact numbers and timing please see MCR11.
7. AC/281-N(2012)0045, Defence Policy and Planning Committee, A Defence Package for the Chicago Summit.

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Lieutenant Colonel Conine was commissioned in 1995 through the Reserve Officer Training Corps at Texas Tech University. A Master Air Battle Manager with more than 2,400 hours in the E-3, Lieutenant Colonel Conine has flown in and supported numerous contingency operations including OPERATIONS NORTHERN WATCH, SOUTHERN WATCH, and ALLIED FORCE, ENDURING FREEDOM, and UNIFIED PROTECTOR.

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Intellectual Interoperability and Higher Education

Professional Training and Partnership Development with Academia

By Bruce Hargrave, Senior Lecturer and Leader of the Military Education Group in the School of Computer Science, University of Lincoln

The read-ahead material for the 2013 JAPCC Conference touched on the concept of 'Intellectual Interoperability'. In the context of how useful – or even essential – the application of this concept might be for NATO Air Power, it is worth considering the role that Universities might play in this. I will just pause here to 'declare my interest' by saying that, after 28 years as a navigator in the Royal Air Force (RAF), I recently began a new career at a United Kingdom (UK) University. I would also add that, whilst my new place of work may not (yet!) be one of the three great Universities (which, as all Blackadder fans know, are Oxford, Cambridge and Hull[1]) the University of Lincoln did have its roots in one of those three illustrious cities.

Graduation takes place in Lincoln's beautiful medieval cathedral.

The final panel of the JAPCC Conference addressed the issue of education and training post-Afghanistan and asked, specifically, *'how we will exchange ideas and challenge thinking in ways that add to understanding and effectiveness?'* One of the places where this process of challenging thinking occurs every day is at Universities across the 28 NATO Nations and beyond. NATO air forces attract quality personnel, many of whom start their military careers in their late teens or early 20s. However, the demanding tempo of intensive training and frequent operational deployments may serve to deny these young men and women the luxury of time to think deeply and to challenge that thinking. They may be too busy learning to operate complex weapons platforms and systems, too busy contributing to the mission and, from time to time, too busy simply trying to stay alive.

Some years later – perhaps as Senior NCOs or as Staff-level Officers – how can these same men and women get the breathing space that's required to engage in challenging the ideas and concepts that they and their colleagues have formulated and modified as their careers progressed? A fortunate few may spend up to a year at military staff college, but many will go on to undertake more and more demanding training. Let's take just one example of this.

Accreditation of the RAF's Qualified Weapon Instructor Course

54(R) Squadron at RAF Waddington in the UK delivers a demanding 7 month Qualified Weapons Instructor (QWI) course for subject matter experts in the field of Intelligence, Surveillance and Reconnaissance (ISR) from across the three Services of the UK military (Royal Navy, Army and Royal Air Force) and also from the USAF and US Navy. For several years now, the School of Computer Science at the University of Lincoln has accredited this QWI ISR course towards the attainment

of a Master's of Science (MSc) degree in ISR Management. This is a unique programme which brings together practitioners from a wide area of ISR systems in a comprehensive academic programme. Student experience and prior learning in this field is developed through the study of modules based on a combination of practical scenarios, open discussion and debate and independent study. They make direct contributions in workshops and student prepared and led debates. The students also focus on developing practical solutions to scenarios which build and add to the body of knowledge. The students are supported through access to both RAF Waddington's and the University of Lincoln's extensive academic facilities and use this to produce an original thesis or piece of work of around 25,000 words.

In this way, the already demanding seven month RAF QWI ISR course gains further academic rigour and lays the foundations for a two year MSc degree. This is, by no means, an easy route to take to a Master's degree. However, those who graduate from the programme know that their level of learning and academic rigour sets them alongside other holders of prestigious post graduate qualifications.

Intellectual Interoperability is Not About Teaching Everyone to Think the Same Way …

Could this contribute to intellectual interoperability across NATO? It is hard to see how it could fail to do so. ISR subject matter experts from across NATO will know that they can converse and exchange ideas at a similar intellectual level. They will know that the ideas and arguments that they may share in have been tested and hardened in the fire of academic debate. Programmes like this are by no means unique to UK Universities. Partnerships between the military and Higher Education Institutions exist across NATO, and more are being developed all the time. The model of partnership and cooperation between academia and the military is one that is open to variation and adaptation. It cannot be patented and no one can claim rights to the intellectual property. It is, therefore, available to all those who wish to make use of it.

Intellectual interoperability is not, however, about teaching everyone to think the same way – that way could lie disaster and 'groupthink'. Nor is it about teaching everyone just to think. For while this may be a noble cause, I am not alone in believing that this is something that cannot be taught, it can only be learned. But perhaps the route to intellectual interoperability lies in giving NATO military practitioners the opportunity to spend some time thinking? University programmes that run in parallel with military programmes are one way of achieving this. Programmes where military personnel spend some time at a University – even a few days each year – give an intellectual breathing space. Out of their military uniform, without their badges of rank and branch, they must rely on the power of their own intellect and the strength of their academic argument to persuade others. For even the most experienced military personnel, this can be a challenging experience.

'… perhaps the route to intellectual interoperability lies in giving NATO military practitioners the opportunity to spend some time thinking? University programmes that run in parallel with military programmes are one way of achieving this.'

The example, given earlier, of a two year MSc degree is not the only way in which Universities can add value to military education and training. The University of Lincoln is about to host a small group of senior NATO

officers for a one week residential course aimed at enhancing academic research skills. After their week in Lincoln, they will be supported via e-learning for a further eight weeks as they write an essay based on their academic research. This short University course earns them credits which can be used towards a more substantial qualification in the future.

Ideas from the JAPCC Conference

A particularly interesting point made at the JAPCC Conference was the need for non-native speakers to have the opportunity for 'total immersion' in the English language whilst, at the same time, engaging in intellectual debate. Perhaps a UK University has a role to play here? It is certainly something that we could explore together. Giving enhanced academic credibility to the professional training and education of NATO military personnel is one way in which this could be achieved. However, I feel that it is about far more than merely enhancing academic credibility and giving personnel the chance to gain universally recognised qualifications. In Air Commodore Paddy Teakle's recent article in this Journal (Ed. 17, 2013) he talks about the need to integrate the five domains of Air, Land, Maritime, Space and Cyber in order to generate optimum military momentum. He suggests that this can only be achieved *'if every element of the military machine trusts and understands the others and the key to that particular puzzle lies in education and training.'* The Universities (and not just Captain Blackadder's famous three) have a clear role to play here. ●

'Partnerships between the military and Higher Education Institutions exist across NATO, and more are being developed all the time. The model of partnership and cooperation between academia and the military is one that is open to variation and adaptation.'

1. http://www.youtube.com/watch?v=0KuHYO9TM5A.

Bruce Hargrave

is a senior lecturer at the University of Lincoln in the UK where he leads the Military Education Group within the School of Computer Science. He retired from the RAF in 2013 after 28 years' service. During a varied military career, he spent eight years as a tactical navigator and aircraft captain on Nimrod MR2 maritime patrol aircraft and also served, on exchange, with the Royal Navy as an ASW Observer on Sea King helicopters as part of the carrier air group onboard HMS Ark Royal. He has developed and taught on a variety of courses at the RAF's Air Warfare School, including the Air Battle Staff Course, the Higher Air Warfare Course and the Senior Officers' Study Programme. He gained his MBA from the Open University Business School in 2000 and taught on their Financial Strategy elective for several years. He is currently researching for a Doctorate, studying a combined model of team role and culture within multinational military teams.

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Specific know-how for mission-critical tasks.

Communication as a Service

By Dipl.-Inf. Oliver Dörre, Lieutenant Colonel (Reserve),
Frequentis, Director Defence

Understanding the Needs of Today's Military Missions

Modern threat scenarios in conflict regions are increasingly focusing on issues such as crisis management, asymmetric threats and international terrorism. This, plus the resulting shift in focus towards stabilization operations, means that the range of duties and objectives behind military response capabilities is now broader than ever before. Take, for example, the combination of operational and political influence in modern operations, which places a number of new requirements both on military personnel and on the systems and equipment used. Within this context, this tendency is exacerbated in the field of communication and communication information systems, as they are subject to the constant change that comes from the dynamic advancement and development of technologies.

National and NATO-wide concepts such as network-enabled operations (embodied by Germany's NetOpFü strategy) and the NATO Network Enabled Capability (NNEC) programme are meant to establish a framework that will make it possible to meet the needs of today's complex and dynamic military conditions. The goal is to enable military personnel to flexibly respond, on-site, to the situation at hand while using all military means (Combined and Joint) at their disposal, all within the context of the relevant overarching interests. However, the transfer of decision-making authority to subordinate units that this entails ('power to the edge') will require a realigned information policy according to which the required information will no longer be provided in a procedurally optimized manner (push principle), but will instead be provided in a prepared data pool for targeted access (pull principle). Moreover, the 'need-to-share'

paradigm will pose an additional challenge in terms of the relevant requirements, procedures, and information technology.

Taking Advantage of the Framework for a Service-Oriented Approach

In order to be able to smoothly transition to a modern, global strategy paradigm, the Armed Forces of all NATO member countries will need to change in a coordinated and perfectly fine-tuned manner. In fact, the structural reforms that Germany's Federal Armed Forces are currently undergoing are a prime example of this, as they are meant to bring about a greater focus on likely international mission scenarios. However, the impact that this will have on the corresponding organizations and processes presents a certain degree of uncertainty. Of course, technology – intended to play a supporting role – further contributes to the highly dynamic nature of this complex environment due to the breakneck speed at which it is developed. But within this context, it is important to note that the last few years have led to the now-conventional wisdom that technology by itself is not really the deciding element, and that the ideal combination and interaction between people, processes, and technology is what really makes a difference.

Using a service-oriented approach is the technological answer to the requirements of future NATO-wide missions. The fact that it can be applied with enormous flexibility allows for the continuous changes that military strategy and procedures will continue to undergo, all without losing any of its usability to users. All this being said, it is important to note that a number of important challenges are what define Frequentis' current understanding of 'Communication as a Service'.

Figure 1: Modern challenges of the market.

Recognizing and Facing Challenges

Military missions need custom solutions that not only cover the entire range of needs involved in each individual mission, but that are also able to adapt to the dynamic changes in that mission's environment. In terms of command and control systems in general, and communication systems in particular, this poses a series of strict and demanding requirements – especially with regard to quality and availability. The main challenges that will need to be overcome in the future are those related to providing enhanced *interoperability* with other systems, improving *integration capabilities* for integration into existing system networks, meeting comprehensive *IT security* requirements, and ensuring the greatest possible *cost effectiveness*.

Interoperability

Real and highly likely mission scenarios require information and communication systems to be networked across departments and military branches at a multinational level. Moreover, the resulting wide network needs to provide reliable, integral, and transparent access to a variety of transmission media and services, efficiently networking radio equipment with a variety of waveforms, satellite communication systems, trunked radio systems, and infrastructure-based telephone and data services. The reliable, high-availability communications found in today's air-ground communication networks between air traffic control and aircraft could serve as a role model within this context. In addition, it is important to mention that the key to achieving success on the path to global 'plug-and-communicate' interoperability would be relying on standards such as the Internet Protocol. However, it would also be necessary to take specific

standards and legal regulations (e.g. ICAO) into account in certain subdomains due to the special requirements and general conditions involved.

Integration Capabilities

The way in which communication and information systems are being increasingly merged into a single system is a paradigm shift in the industry. And a very relevant one, as the conceptual design and actual implementation of communication systems is precisely where 'capability-based thinking' will bring about sustainable and effective changes. In fact, the wave of the future is to leave dedicated, monolithic communication systems behind, instead opting for integral, architecture-based solutions that make it possible to meet communication requirements much more effectively. However, there are also other significant aspects to take into account, such as the increasing importance of user interfaces in environments in which security is critical, as well as within the context of Germany's NetOpFü network-enabled operations strategy. In this regard, the focus on a joint operational picture and the increasingly greater orientation towards processes will change the way Armed Forces communicate. Ultimately, of course, the goal is to make things easier for users, speeding up mission processes while simultaneously reducing the amount of errors. And when all is said and done, it is clear that today's worldwide missions and demanding mobility requirements require more flexible system architectures and a wider range of system components, especially at workstations. Because of this, open standards must become part of the approach used to improve platform independence. Furthermore, special requirements must be considered to make devices more ruggedized and secure as well as to reduce hardware footprints.

IT-Security

The (software-oriented) merging of communication and information systems, together with the accompanying (hardware-oriented) gradual replacement of dedicated monolithic communication systems, is making many of the physical security barriers we have long taken for granted disappear. Network infrastructures and end devices are now used commonly by various systems in a comprehensive IP network, increasing the vulnerability of local networks and the danger of outside attacks. This, combined with the user need for (sometimes worldwide) reliable and efficient access to a variety of security domains, yields complex multi-level security environments. All this against the background of a constantly growing risk of attacks, which is a natural result of the greater role that software plays in systems, the use of commercial operating systems, and the widespread availability of hacker tools and malware. This, of course, is why the IT security aspect needs to play a significant role in projects that revolve around designing and implementing systems.

Comprehensive solutions with flexible architectures.

Improved mobility of solutions.

Fast and flexible availability of tailored solutions.

Cost-Efficiency

The terms 'Smart Defence' and 'Pooling and Sharing' are prominent examples of the cost-cutting measures currently being taken by Armed Forces across the world – especially in Europe. One of the dominant aspects of these measures is the demand for solutions already available on the market, with creative solutions based on off-the-shelf technologies displacing traditional investments in the long-term, cost-intensive development of specific military systems. The trade-off is that users accept that this will make it impossible to meet all their requirements completely (80 % solutions). However, the fact that system environments will be integrally harmonized as part of this process will make it possible to achieve positive standardization effects and economies of scale, resulting in investment and logistical advantages. In addition, the gradual convergence of platforms and the use of network infrastructures by various 'logical systems' will result in further cost reductions and increased efficiency. Within this context, Quality of Service (QoS) management will pose special challenges in regard to high-availability communication systems. For starters, cost assessments will no longer refer exclusively to procurement costs, but will instead involve a comprehensive life cycle cost analysis. The result? The decision will now be between buying systems outright or the alternative of obtaining guaranteed access to capabilities and services based on operator and carrier models.

Proactively Developing Solutions

The challenges behind the communication and information systems of the future will set the stage for future trends not only in NATO's Armed Forces, but in the defence industry as well. On one hand, Armed Forces will have to hone their existing skills when it comes to evaluating solutions and systems, and will also have to make their procurement processes much more flexible. On the other, the industry will have to assume greater responsibilities and proactively develop capability- and service-oriented solutions. This will have to be accompanied by greater engagement and dialogue between Armed Forces and industry so as to establish a framework that will make it possible to meet the strict and demanding requirements of the military in the future.

Germany's Federal Armed Forces and the Industry – Building a Strong Team Together for Decades

For 25 years, Frequentis has proven to be a reliable partner of the German Federal Armed Forces and has consistently designed, supplied, and operated communication solutions for them, especially in the field of military air traffic control and air defence. In addition, the company has amassed a vast pool of comprehensive know-how and experience as a result of its long-time work with the Armed Forces of other NATO member countries, including the Royal Air Force, US Navy and Polish Air Force, just to name a few. Within the context of the critical security requirements involved in these operations, truly understanding 'Communication as a Service' means to understand the relevant users' processes and their communication needs, as well as to effectively integrate specific communication systems into the relevant system networks. To do this, an integral, comprehensive, and structured analysis is used from an architecture perspective in order to identify (together with the relevant users) the functionalities and interfaces that will appropriately cover the users' communication needs across all their systems.

Service- and process-orientation on multiple communication layers.

Outlook and Summary

As of this writing, future-proof solutions are already using the 'Communication as a Service' paradigm as a basis, and the need for monolithic, dedicated communication systems will disappear in all but the most specific of areas. Meanwhile, the guideposts for communication services that can be effectively provided as part of a service-oriented, harmonized integral system are being set by the search for greater interoperability, deeper integration, improved IT security, and increased cost effectiveness. Architectures, such as the Frequentis Airbase Architecture, can act as important catalysts within this context.

This means that, in today's operation environments, the concept of 'Communication as a Service' is no longer defined solely on the basis of system-related developments. Instead, it describes the concept of specifying operationally driven communication requirements, using the required functionalities, in close coordination with the relevant users and taking the relevant processes into account, as well as of effectively integrating these requirements into the relevant system environments. Innovative, multimedia, standardized (e.g., based on the Internet Protocol) user interfaces that make it possible, first and foremost, to communicate in a context-specific manner based on the relevant operational picture and the process at hand are becoming increasingly important within this context. Moreover, the change in the definition and provision of 'Communication as a Service' is resulting in a decrease in the importance of hardware, with flexible software solutions that can be quickly implemented taking over the spotlight instead.

Due to the structural and procedural restructuring processes they are currently undergoing, as well as to the development of new IT strategies, NATO's Armed Forces are in an ideal position to meet and overcome the challenges involved in state-of-the-art communications. However, being able to successfully implement the required IT systems will require even closer cooperation between these Armed Forces and industry in order to achieve an ideal combination between people, processes, and technology and optimize their interaction. ●

Dipl.-Inf. Oliver Dörre

was active as a General Staff Officer of the Air Force in the German Federal Armed Forces from 1988 to 2010. Most recently as Deputy Head of Division in the rank of Lieutenant Colonel in the planning department of the Ministry of Defence. Over the course of his military career, he served in several capacities in the area of capability management and information technology as well as in mission and commanding positions in the antiaircraft missile forces. Various military awards such as the Gold Honour Cross of the German Armed Forces or the Carl von Clausewitz Medal of Honour underscore his high level of commitment and his exceptional performance. In 2010 he moved to Frequentis Nachrichtentechnik GmbH as head of Business Development and Strategy focussing on the further development of the solution portfolio as well as military sales in Northern Europe.

100 Years of German Naval Aviation

A Continuous Change from the Beginning

By Commander Arndt Neumann, DEU N, JAPCC

In 2013, the German Navy celebrated the 100th anniversary of the establishment of German Naval Aviation. Now seems an appropriate time to take a moment and reflect on what happened during this stirring century. These 100 years have laid witness to two devastating World Wars, the Cold War, and the dramatic rise of new political and geographical arrangements in and around Europe. Currently, Western nations face the dual challenges of asymmetric warfare, while dealing with dramatically shrinking defence budgets.

Back to 1913

At that moment in history, both Germany and The United Kingdom (UK) had a powerful desire to enlarge their Navies. Germany strived to extend its influence in the world and become a global player. The UK wanted to maintain and consolidate its role as a global player and Sea Power nation. It was quickly recognized that airborne assets would become a fundamental component of maritime warfare and would gain an increased importance in sea combat. After initial resistance by German Naval leadership, the Kaiser provided decisive guidance on the matter of establishing a German Naval aviation component.

On 3 May 1913, the 'Deutsche Kaiser Wilhelm II' enacted a decree establishing the 'Marinefliegerkräfte'. With that decree, two commands were established: the 'Marine-Luftschiffabteilung' and the 'Marine-Fliegerabteilung', one for airships – the famous Zeppelins – and one for fixed wing aircraft. The increasing significance of the newly founded naval aviation commands are impressively shown by these numbers: at the beginning of World War I (WWI), the naval aviation commands included only 490 members, by the end of the war they totalled approximately 16,000 members! This was quite an achievement considering the entire German Navy today consists of approximately 13,000 members.

After WWI, the 'Treaty of Versailles' forbid Germany from possessing any kind of military forces. However, Germany was able to keep their know-how and was also able to train aviation personnel by sidestepping official political restrictions. This illegal behavior ended in 1935 with a unilateral declaration by the 'Third Reich' to reclaim its military sovereignty. Unfortunately the optimistic mood this declaration created in the Navy quickly changed when all its flying assets became part of the newly founded Air Force. However, the maritime aircraft and aviators maintained their former Naval organizational structures within the Air Force and were even recognized as 'Seeflieger'. Regardless, they were still completely dependent on the Air Force and their decision-makers despite keeping their Naval heritage.

During World War II (WWII), the 'Seeflieger' were poorly supported compared to the units founded entirely within the Air Force. This lack of support resulted in fewer assets, insufficient training, poor innovation and naval focused technological developments. These negative factors resulted in inferior support of the naval air forces because the naval aviators were forced to perform 'air warfare above the sea versus naval warfare in the air'. These two concepts reflect a completely different philosophy.

After WWII, the lessons identified and learned from this era were taken into consideration when recreating the German Armed Forces. Unlike after WWI, Germany was completely demilitarized after WWII. In 1949, Germany formed a nascent planning group at Bremerhaven to establish initial plans for the formation of a new Naval Aviation Group. This time, Germany focused on the unique operational requirements of a completely new West German Navy. These requirements were based on the objective of defending the North and Baltic Seas with a contingent of fighter, reconnaissance and anti-submarine aircraft and helicopters. In the mid-1950s, five Naval Air Wings were officially established but only four were operationally capable. Those four Air Wings included two fighter wings, one patrol wing and one helicopter wing.

The planning and implementation phase of Naval Aviation in East Germany took a little bit longer. The 'Volksmarine' officially commissioned its first helicopter wing in 1963. At the end of the Cold War, the 'Nationale Volksarmee' (NVA) had two wings at its command: one helicopter and one fighter wing.

Change of Operations

During the Cold War, (West German) Naval Aviation focused on reconnaissance and surveillance, naval fighter support and anti-submarine warfare with the main exercise and training areas were over the North and Baltic Seas. This changed profoundly in the early 1990s with participation in their first official military operations post-WWII. This change continued as Naval Aviation expanded into support for worldwide combat operations. These operations included support for mine clearing after the first Gulf War, Operation SHARP GUARD in the Adriatic Sea, support to the UNOSOM II/ OPERATION SOUTHERN CROSS, OPERATION ENDURING FREEDOM and currently ATALANTA, the mission against piracy at sea.

After 20 years of actively supporting naval operations such as ATALANTA, it is clearer today than ever before that naval air assets are an essential part of future naval operations. The unique capabilities of naval air assets improve the situational awareness of the supported fleet, operate with higher speeds than surface ships and provide enormous flexibility with their organic helicopter and fixed wing aircraft. Aircrews can easily adapt their mission according to changing operational requirements. History has proven that the distinctive capabilities of naval aircraft and their uniquely educated and trained personnel are necessary to enable the full operating capabilities of naval forces.

Fit for the Future

To prepare the German Naval Aviation Fleet for the future and to remain capable and agile despite planned defence budget cuts, the German Navy has significantly reorganized Naval Aviation. The first, and probably most dramatic, change is the decision to transfer naval fighter aircraft (then the PA 200 Tornado) to the Air Force, reducing Naval Aviation to two wings, with the Air Force providing the fighter capabilities. One wing located at Kiel-Holtenau (equipped with SAR helicopters Mk 41 SEA KING) and the other at Nordholz (equipped with Maritime Patrol Aircraft, first the BREGUET ATLANTIC BR-1150, followed by the P-3C ORION and organic helicopters MK 88A SEA LYNX). This decision is defendable from a financial viewpoint, but has major repercussions with regard to the capabilities of the German Navy. Using fixed wing fighters from the Air Force diluted naval specific knowledge, expertise, experience, tactics and procedures in the years that followed. This makes it clear naval requirements will only truly be met by forces within a naval environment and under a naval authority.

The latest, most visible change of the German Naval Aviation Community is the organizational restructuring and geographical relocation. Previously, the German Naval Air Command was integrated into the

'Marineflugstation Putzig', foundation personnel, 1913.

Naval Command or Maritime Headquarters. Since October 2012, German Naval Aviation was given its own command component, the Naval Aviation Command, located at Nordholz. Another revolutionary measure was the relocation of Naval Air Wing 5 from Kiel to Nordholz. This resulted in all German Naval Aviation assets located at one single base, designated 'Marinefliegerstützpunkt Nordholz'. This resulted in the Naval Aviation Command, Naval Air Wing 3 'Graf Zeppelin', (equipped with the P-3C Orion and DO-228) and Naval Air Wing 5 (equipped with the Sea King and Sea Lynx) being unified and operating from Nordholz. This will significantly increase the effectiveness and efficiency of the Naval Air community in Germany.

To fulfil its unique requirements in the near future, the German Navy is planning to keep its Maritime Patrol Aircraft, the Lockheed P-3 ORION, in operation for the next 15 to 20 years. It is planned to replace the 'Sea King' and 'Sea Lynx' helicopters, this is still under review. With this mixture of Naval Air assets, the German Navy will ensure that the mission requirements demanded will be accomplished. These missions include Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), Intelligence, Surveillance and Reconnaissance (ISR), Search and Rescue (SAR), Boarding and Transport.

Going New and Different Ways

It is not only necessary to adjust the structure and assets of an organization; sometimes it is more important to alter the philosophy of how to navigate obvious challenges with shrinking resources. Two examples of adjustments which were recently initiated by German Naval Aviation are helicopter pilot training and the Maritime Patrol Aircraft (MPA) Pooling and sharing initiative.

Helicopter Pilot Training

The German Navy faced extreme challenges with helicopter pilot training. Military flight hours were getting more expensive and negotiating contracts between the Armed Forces, government and industry was becoming difficult. For this reason, the Navy is currently leasing a civilian helicopter – an EC 135 – to meet its

© Bildstelle Nordholz

helicopter training requirements. The main advantage of this arrangement is the aircraft's high availability rate permitting better training continuity.

MPA Pooling and Sharing Project as Part of the NATO Smart Defence Initiative (SDI)

One outcome of NATO's 2010 Lisbon summit was, Allied Command Transformation (ACT) formation of a task force to identify potential pooling and sharing projects. MPA were identified as a critical capability shortfall due to limited availability (especially during that time frame) and led to the idea of creating an MPA pool within NATO. In this early state, the vision was to form this pool based on common missions and training as well as fulfilling the various national military requirements. The long term vision was – and still is – to use this pool to meet future EU and NATO operational requirements as well.

The DEU Navy was keen to contribute to this project. In October 2011, DEU took the lead in this project by developing the required organizational structures. Spain, Luxembourg and Poland were partners from its inception and indicated they would provide at least one MPA to the Pool. Italy, Great Britain, Sweden and Greece were also highly interested in this ambitious project and joined as observer nation. Following numerous multinational workshops, the MPA Coordination Cell (MPA CC), located in Glücksburg, Germany declared Initial Operating Capability in July 2012. It is currently manned by the DEU Naval Command for a two year test phase and consists of one DEU P-3C ORION, one ESP P-3M ORION, one ESP CASA CN-235, one LUX FAIRCHILD SW3 Merlin and one POL AN-28 BRYZA. Iceland is also prepared to contribute with their DASH-8 aircraft.

Summary

Over the course of its 100+ year history, German Naval Aviation has continuously adapted to the political and financial challenges that confronted it. The most recent reorganizations will be the foundation for its continued 'survival' in the budget constraints of the near future and the changing political and military situation in the world. German Naval Aviation mission requirements evolved and developed based on Germany's unique national military objectives over that 100+ year history and it will continue fulfilling its missions at the highest level well into the 21st century.

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Commander Arndt Neumann

is a Maritime Patrol Aircraft Pilot with more than 4,500 flying hours – mostly on the 'Breguet Atlantique' and 'Lockheed P-3 Orion'.

Commander Neumann currently works in the Combat Air Branch at the Joint Air Power Competence Centre at Kalkar in the domain of 'Maritime Air'.

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'Be the Windscreen, Not the Bug'[1]

Cyber – An Air Commander's Responsibility

By Lieutenant Colonel Dave Sexstone, CAN AF, JAPCC

Intro

What is Cyber? More importantly, why should you as a military professional, commander and airman even care to understand? Frankly, what Cyber is defined as precisely and whether it be anointed as its own domain is irrelevant. Your general awareness of Cyber, its risks and associated consequences from an operational planning and continuity of operations perspective is what is important. Leadership is what is required to act; i.e. having gained awareness of Cyber risks and implications, execute a consequence management plan to remain effective. Take the time to recognize your dependency on Cyber to operate.

Cyber in Practical Terms

A loose description of Cyber is provided here to frame understanding. Cyber is a system of any and all electronic technologies networked or linked together to allow their sum coordinated effect, function or mission. Cyber is a medium or a tool to enable. From an Air Power perspective Cyber includes, but is not limited to, the interconnectivity of aircraft, ISR platforms, fusion centres, and Air Command and Control (C2) elements.

Dependency on Cyber

The consequences to Air Power of a Cyber action is arguably potentially more harmful than to the other services due to its more centralized and Cyber dependent approach to C2 and synchronized execution. Furthermore, as Air Power is principally a supporting arm to other services in a joint or combined campaign, the required collaboration with other services/components and higher headquarters to support is also a factor. What is important is recognition of your dependency on Cyber, an understanding of the associated vulnerability and a determination of associated actions necessary to reduce the consequences of this dependency.

The degree of interconnectivity Cyber offers has enabled the potential for commanders to receive and exchange an unprecedented amount of data and information, and thus an expectation of situational awareness that supports expedited decision-making. Commanders and their staffs need to ask themselves, are we ready for the inevitable; the moment when access to critical information is slowed or prevented? Or even worse, the trustworthiness of that information becomes suspect?

Cyber Ownership: Adapt to and Exploit It

It is fair to say that most airmen today inaccurately view Cyber as a simple 'wire and router' or a desktop computer network, and hence mitigation of their dependency is transposed to the CIS/A6 staff to manage. The reality facing airmen today regarding Cyber requires an approach where Commanders and operational planners' take ownership of the problem and conduct the necessary assessments to determine courses of action to maintain effective operational function should elements of that Cyber be rendered inoperable or degraded for any reason. Much the same as an airman is eager and compelled to understand Electronic Warfare to be able to both exploit and survive in the air, he must begin the journey to understand and survive within the broader Cyber world.

'… strategy reduces Cyber risk it does not eliminate it. The message to commanders remains unchanged; plan and be prepared for reduced capability.'

The incredible level of interconnectivity achieved by information technology burdened Air C2 systems, platforms, sensors, power plants and grids, civil works, etc. have combined to introduce both threats and opportunities for the conduct of a campaign.

While NATO is of common mind about the need for Cyber Defence, it is divided over the collective development and conduct of active defensive and offensive Cyber operations. It is clear that globally a number of nations as well as non-state actors are active poking and prodding via Cyber seeking to exploit military and civilian elements. The major global powers all are known to have the ability to exploit Cyber and would not hesitate to do so to gain advantage in a military or other conflict. The same can be said for a number of smaller nations. A simple search and review of open sources alone highlights the players and the successes.

Stated in another way, the concern regarding Cyber perhaps is best summarized in a covering memorandum enclosed in the published report[2] from the Task Force on Resilient Military Systems and the Advanced Cyber Threat. Therein it states, 'There is no silver bullet that will eliminate the threats inherent to leveraging Cyber as a force multiplier, and it is impossible to completely defend against the most sophisticated Cyber attacks.' The Task Force goes on to recommend a risk reduction strategy which includes: improved Cyber Defence; refocused intelligence capability; and a segmentation of critical mission capabilities to retain some level of function and response in face of a catastrophic attack. While the strategy reduces Cyber risk it does not eliminate it. The message to commanders remains unchanged; plan and be prepared for reduced capability.

Cyber: A Principles of War Perspective

The importance of understanding Cyber may be stated from another standpoint; a back to the basics principled perspective, i.e. long recognized Principles of War (PoW). Representative PoW of a few nations and the NATO Principles of Operations[3] (PoO) are listed in Table 1 below. While western nation states and NATO have slightly different PoW/PoO, stark similarities highlight sound considerations in the conduct of warfighting or campaign conduct. The PoW are of course not dogma, but it does not take too much of an imagination to understand how Cyber could both empower and undermine a commander's campaign. Cyber directly supports or enables virtually every PoW. Stated another way, the PoW or their application have dependencies in one way or another to Cyber.

I do not intend to dissect every PoW against Cyber, just a few to provide some thought for further consideration and thereby seek to re-enforce the importance of Command understanding and leadership engagement re Cyber as part of an air warfighting mindset.

Offensive Action. This principle is about taking or seizing and exploiting the initiative, thereby imposing on the opponent a compelling need to react or defend. The ultimate aim is to get inside the opponent's decision-making and disrupt his ability to execute his plan or to command his force effectively. Offensive action in NATO's comprehensive approach environment lends itself to and is more inclusive of means leading to the required effect/objective. Certainly being able to suppress an opponent's air defence, anti-aircraft networks or associated command and control elements temporarily via Cyber attack with virtually no notice would allow the application of this principle in the right circumstances. The debilitation of command and control, disruption or severing of sustainment lines of communications or critical supporting infrastructure each offer an opportunity for offensive action in cooperation with traditional conventional methods.

American PoW	NATO PoO	British PoW
Objective	Objectives Definition	Aim Selection & Maintenance
Offensive	Initiative	Offensive Action
Surprise	Surprise	Surprise
Mass/Concentration	Concentration of Force	Concentration of Force
Economy of Force	Economy of Effort	Economy of Effort
Security	Security	Security
Unity of Command	Unity of Purpose	Cooperation
Maneuver	Flexibility	Flexibility
Simplicity	Simplicity	–
–	Sustainment	Sustainability
–	Maintenance of Morale	Maintenance of Morale

Table 1: Representative 20th Century Principles of War.

Surprise. Sun-tzu is said to have proclaimed, 'to subdue the enemy without fighting is the acme of skill'[4] and that knowing the adversary and proceeding with speed and stealth offers opportunity for surprise. Through understanding of adversary, the weaknesses or vulnerabilities are mapped and exploits identified. This principle and underlying approach was perhaps best demonstrated with the debated debilitation or set-back of the Iranian nuclear program, exercised through malicious code insertion.[5]

Security. The principle is about protecting one's own force while maintaining the freedom to act against an opponent. Physical and other measures are employed to protect the force; this clearly must include the protection of information systems and Cyber as a whole. Measures within NATO are ongoing to improve the defence of specific elements of Cyber enabled capabilities; certain networks. Defending or securing elements of Cyber enabled capabilities is a laudable goal, but as already indicated in the above-noted Task Force study, not believed to be assured. Recent expositions to the vulnerability of Cyber[6] have been laid bare by the so-called Snowden Affair, as well as the revelation of a serious flaw within arguably a more commonly used internet security encryption protocol[7]. Issues of Cyber complexity, human error, blind understanding, and a keen desire to know your adversary all play out to affect this security principle. Certain governments are known to actively feed on and exploit security measures to acquire industrial or diplomatic benefit. Refer back to Sun-tzu, and ask yourself whether such governments limit their efforts. Some nations possess professional Cyber warriors. How secure are you in the belief that your capabilities and information are protected from infiltration? Importantly, how confident are you that you have contingent or branch plans in place to counter-act or work through such an infiltration which might include an element of information corruption or a power grid failure?

Flexibility. The immaturity of Cyber law and the relative leeway afforded Cyber events compared to kinetic or lethal force offers opportunity or alternate avenues to achieve effect. Flexibility calls for creativity of mind and adaptability to changing circumstance, giving consideration to alternate means to achieve the end or effect. In a more modern yet still traditional sense, this has meant the ability to dynamically redirect conventional forces to target. While Cyber related action tends to be more deliberate, certainly awareness and consideration of such tools and capabilities and their potential for application also speaks to the principle of flexibility. A flexible mindset starts and flourishes with education and exercise. Commanders must light the fire within their staffs and subordinate commanders to pursue understanding of Cyber and to apply it in operational planning and campaign development.

Concluding Comment

In summary, the intent of this journal article was to highlight the need for Commanders as military professionals and airmen to understand Cyber and its

implications to the conduct of operations and campaigns; both opportunity and vulnerability. Ultimately, Commanders' leadership is essential to indoctrinate a mindset of awareness and consideration for Cyber opportunities and vulnerabilities in operational planning, consequence management and courses of action. The insertion of Cyber into exercise execution and concepts is a starting point.

Command and control of air capabilities which has increasingly become integrated by and dependent on Cyber must be studied and understood from a warfighting perspective. Much the same as the aircraft after its introduction at the dawn of the 20th century changed the battlefield and considerations, Cyber, as a pivotal enabler to Air Power, must now be dissected for implications to the art of warfighting. ●

1. Variation of expression; see http://www.phrases.org.uk/bulletin_board/46/messages/327.html.
2. US Department of Defense: DEFENSE SCIENCE BOARD Task Force Report: Resilient Military Systems and the Advanced Cyber Threat dated Jan. 2013.
3. AJP-01(D), Allied Joint Doctrine December 2010. A twelfth PoO, Multinationality, omitted intentionally.
4. www.goodreads.com re quotes attributed to Sun tzu in his Art of War.
5. http://investigations.nbcnews.com/_news/2013/06/27/19175276-the-worm-that-turned-how-stuxnet-helped-heat-up-cyberarms-race?lite.
6. http://www.bbc.com/news/technology-25832341.
7. http://heartbleed.com/.

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'Where are the Carriers?'

Affirming and Preserving NATO Air Power from the Sea

By Lieutenant Commander Natale Pizzimenti, ITA N, JAPCC

'Where are the carriers?' This same question sprang to Tom Clancy's mind back when he introduced his book 'Carrier' in 1998. The author borrowed that question from many previous US Presidents as they asked it whenever an international crisis involving US interests broke out in any part of the world. It is not difficult to imagine an appetite for such a powerful tool felt by politician- and decision-makers alike whenever their nations are about to face a crisis situation, either individually or in an Alliance framework, that requires prompt military intervention.

On the other hand, the same decision-makers are having difficulty with declining defence budgets that are becoming more and more affected by the world economic crisis and the resulting fiscal austerity in their countries. If sometimes it is challenging to even justify the need for costly military equipment in general (in voters' eyes), the matter becomes particularly difficult as the same eyes are easily attracted by the magnitude and majesty of their pet projects. Nevertheless, at the 2012 Chicago Summit, NATO acknowledged that security challenges will not diminish in

times of economic and financial austerity or in an increasingly complex and globalized international environment. During the Annual JAPCC Joint Air and Space Power Conference a few months later, Diego Ruiz Palmer (Special Advisor to the Secretary General for Economics and Security) assessed the risk, stating that 'because of declining defence spending, capable and deployable NATO air forces and naval air services become non-usable in expeditionary operations'. This so-called 'Air Power Paradox' affects the realm of Aircraft Carriers as well. In other words, the effort to preserve sea-based Air Power capabilities is consistent with this same paradox and consequently should be dealt with while the Alliance is setting the route to transform itself to meet the challenges of 2020–2040 and beyond.

The paradox we are facing is complex and complex problems often require complex solutions. Unfortunately, where to apply our efforts is not the only question that air power advocates should address. In the case of the 'carrier' we must ask some additional ones, such as why, what, when and how must we focus our efforts to address this issue. By looking at recent history and strategy as our background, some answers may be found by assessing if recent crisis or conflicts have rejected or reaffirmed the need for this tool.

The Foundation on Strategy (The 'Why' Question)

Two NATO Strategic Concepts were signed[1] since the end of the Cold War. Both of these Strategic Concepts stressed the importance for NATO to 'maintain the ability to sustain concurrent major joint operations and several smaller operations for collective defence and crisis response, including *at strategic distance*'[2]. Additionally, expeditionary operations from the maritime domain are emphasized in the Allied Maritime Strategy (AMS) as an Alliance's requirement for an *immediate crisis response capability*. In other words, if the latest Strategic Concepts set Crisis Management as one of NATO's core tasks, the AMS reinforces this concept by referring to the unique capabilities of maritime forces (and their organic air services). These include flexibility, mobility, agility, sustainability and freedom of access. To answer the 'why' question, the expression 'at strategic distance' can then be interpreted as a synonym for 'with minimal or no host nation support'. Carrier Strike Groups (CSG) are the most, and sometimes the only suitable and appropriate tool to fulfil operational tasks that may turn into strategic ones, especially in some early stages of a military intervention. With this regard, some important insights can be found by analysing the military intervention in Libya, especially during the initial phase (circa mid-March 2011).

Lessons From Recent Operations ('What' Carriers and 'When'?)

The Libyan campaigns[3] offered significant data for analysts in their effort to revitalize the discussion on the importance of sea-based Air Power. The list below summarizes some of the most significant ones:

1. Air-to-Air Refuelling tankers were identified as a critical shortfall. Only the US was able to provide an adequate number[4];
2. Looking at the fleet of at least 20 warships that assembled off the Libyan coast from March 2011 and on, the operation was the first major conflict in decades that did not involve any of the 11 US Navy 'Supercarriers';
3. According to British sources[5,6], 'within an impressive thirty-five minutes of UN Resolution 1973 being signed', Harrier AV-8B aircraft flown off the pre-positioned USS *Kearsarge*[7], shortly followed thereafter by air strikes from French *Rafale* jets from the carrier *Charles de Gaulle*[8] considerably contributed in destroying the majority of the Libyan air-defence network[9];
4. Throughout the sustained phase of the conflict, sea-based sorties flown from the available small carriers were an example of 'economy of force'. Due to the shorter distance to the target objectives, they did not need long transits and Air-to-Air Refuelling (unlike most of the land-based aviation).

The Libyan crisis was a good opportunity to demonstrate the utility of small aircraft carriers and amphibious assault ships (LPH/LPD)[10]. From the joint perspective,

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the latter provided a good example of their utility as they allowed the launch of Army Aviation sorties to support combat operations. British *'Apache'* and French *'Tiger'* and *'Gazelle'* Army helicopters were embarked, respectively, on LPH *'Ocean'* and LPD *'Tonnerre'*. This 'experiment' proved successful and allowed a very precise and selective air support.

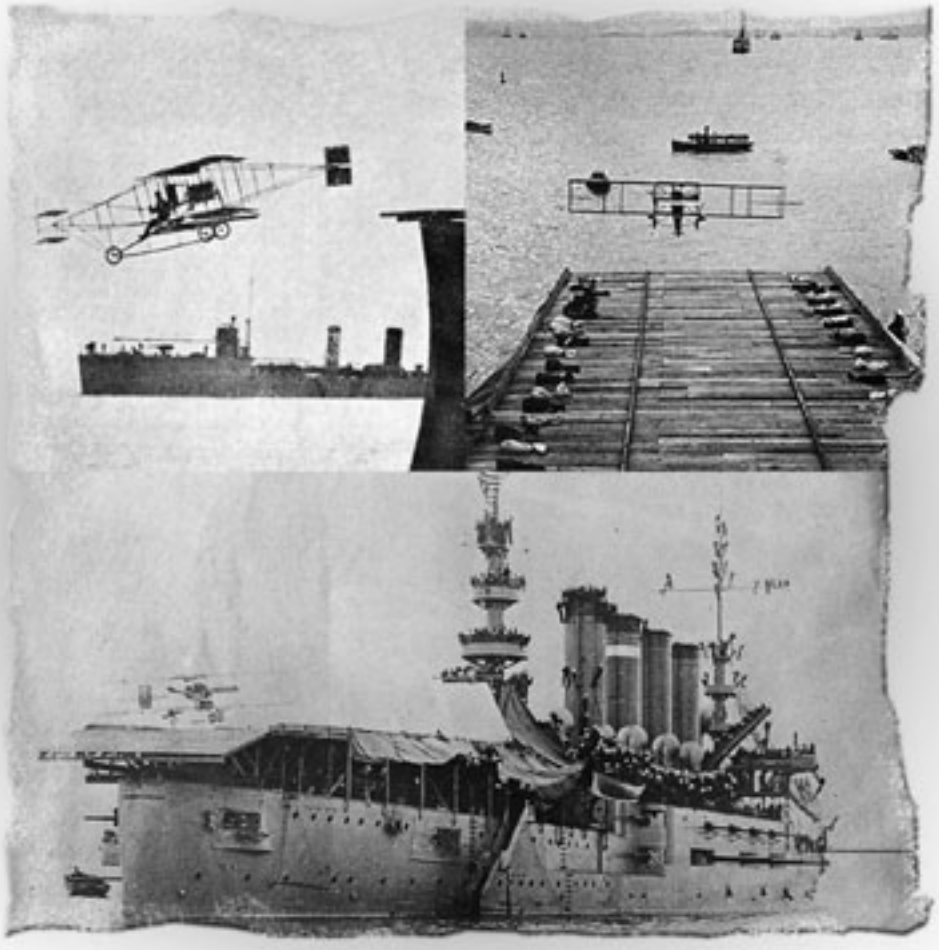
Ultimately, operations in Libya substantiated that maritime strike operations are an essential capability for NATO. Had the same crisis occurred out of reach of land-based tactical aircraft, Maritime Air Power would have been the sole available option to conduct many missions. Extending this idea, every crisis scenario where NATO cannot rely on the proximity of allied bases would require the majority of aviation sorties to be sea-based.

ECGII and SCTI (The 'How' Question)

As a solution to the 'how' question (in terms of 'how to do things together'), NATO and EU navies' enterprises stood up since 2009 (in line with both the 'Smart Defence'/'Pooling and Sharing' concepts and the Connected Forces Initiative, CFI), have sought to increase their operational and training synergy. For example, bilateral agreements are in place between the UK and French Navies that emphasize working 'closely on carrier group cooperation and on coordinating maritime security patrols in the Atlantic to deliver maximum effect'[11]. On a more extended scale, the 'European Carrier Group Interoperability Initiative' (ECGII) and the 'STOVL[12] Carrier Training Initiative' (SCTI) are worth a deeper discussion. Both initiatives have common goals, such as:

- rationalizing, by a holistic and synergistic approach, the use of aircraft carriers and their integrated weapon system (consisting of aircraft and the related support);
- enhancing interoperability by participating in joint operations and exercises across the full range of multi-role tasks (the cornerstone of the ability to project power over the sea and from the sea);
- facilitating the exchange of knowledge and lessons learned on doctrinal, operational, technical and logistical aspects, in order to enhance standardization.

As the words themselves suggest, the ECGII is a European enterprise created to enhance interoperability and capability in amphibious and carrier strike group operations through fostering enhanced cooperation and joint training and exercises at both the tactical and operational levels. The rationale behind this is to allow for more rapid and effective CSG deployments during EU or NATO operations. Since its inception in



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2012, ECGII continues to progress. In October 2012, a large Franco-Italian battle Group with participation of the French Carrier *Charles de Gaulle* and the Italian Carrier *Cavour* practiced its interoperability for 11 days in the Mediterranean Sea during Exercise LEVANTE. The exercise offered the two navies the opportunity to achieve a high level of mutual understanding, cooperation and interoperability, particularly in implementing carrier aviation capacities. This exercise marked an initial major achievement and paved the way for the future of the ECGII initiative.

SCTI is a project developed by the Italian Navy, with the goal to enhance training for STOVL aircraft and carriers, through exchange activities and interaction with the involvement of all NATO/EU navies operating STOVL aircraft. From the very beginning, SCTI received considerable interest by all participants (FR, US, UK and SP). Initially defined with a draft Operational Agreement prepared by the Italian Navy, it was presented at the first SCTI Conference, held at the Italian Naval Air Station in Grottaglie back in April 2009. The initial agreements included the establishment of procedures and regulations, as well as identifying opportunities for joint training. Meanwhile, a specific doctrine (which will presumably be called APP[13]-18) is currently being developed by the Royal Navy. This doctrine is aimed at defining minimum standards for a STOVL flight detachment to embark on another nation's carrier.

Although France does not possess STOVL aircraft, as part of the ECGII the French Navy was also involved in the SCTI. From the training perspective, SCTI and ECGII can be viewed as two faces of the same coin (SCTI being the specialized reference forum for the core training activity of STOVL air wings).

Different History, Different Options

With few exceptions, fiscal austerity has become an overarching issue whenever the future challenges for military procurements are addressed. Yet, just to put things in perspective with regards to the exponential

evolutions in technological innovation, we would discover this is not the first time in history that military expenditures are being put under close scrutiny due to an economic crisis. The strategic environment prior to World War II was shaped by the negative effects of constrained military budgets. These were amplified by the restrictive treaties in force during the interwar period … certainly not the most favourable circumstances to make big plans! Yet, it was during this time that, in the wake of Eugene Ely's exploits[14], the 'marriage' between naval and Air Power, already underway[15] before World War I, reached its maximum expression with the inception of aircraft carriers.

In those days, every nation developed pioneering solutions on its own to gain predominance in a world characterized by interstate conflicts. Nowadays, alliance frameworks offer a better background for innovative opportunities aimed at preserving, maintaining and enhancing this crucial capability more than 100 years after its initiation. European carrier strike capabilities have gradually developed, as demonstrated with the deployment and combat experience of the French aircraft carrier *Charles De Gaulle*, HMS *Ocean* and ITS *Garibaldi* in support of coalition operations in Libya. The path is set and European defence planning should stay focused and keep developing carrier strike capabilities as a common effort. With this regard, an important goal can be reached in the short- too medium-term if new and future platforms will be operating the same (or a fully interoperable) fighter aircraft. Initiatives such as ECGII and SCTI, will be force multipliers in fostering this progress.

Conclusion

Powerful and complex instruments such as sea-based Air Power are not something that can be developed overnight. On the contrary, it took (and would take) decades to mature from the initiation to a meaningful level. It is for this reason that it is vital to assess and reaffirm the strategic value of this capability, recognising the progress and achievements that NATO European Nations have reached. It is in this context that sea-based Air Power is a clear example of the required proactive attitude towards creating a more balanced burden sharing approach between the two sides of the Atlantic. The future of naval air services embracing multinational initiatives such as ECGII and SCTI is already in line with the path set forth by Smart Defence and CFI. ●

1. North Atlantic Council (NAC) meeting in Washington, 24 Apr. 1999 and NATO Summit in Lisbon 19–20 Nov. 2010.
2. 'Active Engagement, Modern Defence'. Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organization. Adopted by Heads of State and Government at the NATO Summit in Lisbon 19–20 Nov. 2010.
3. Odyssey Dawn, Unified Protector, Ellamy, Harmattan.
4. 'Present Paradox – Future Challenge', Future Vector Project.
5. 'Leveraging UK Carrier Capability – A Study into the Preparation for and Use of the Queen Elizabeth-Class Carriers', Royal United Services Institute (RUSI), www.rusi.org.
6. 'Defence Committee – Ninth Report Operations in Libya', written evidence from Admiral Sir John Woodward GBE KCB and colleagues, http://www.publications.parliament.uk/pa/cm201012/cmselect/cmdfence/950/950vw09.htm.
7. Wasp-class carrier.
8. The first non-US aircraft carrier over Libya.
9. A significant role was played by the employment of cruise missiles launched by US and British destroyers and submarines.
10. Landing Platform Helicopter and Landing Platform Dock.
11. France-UK Summit: 31 Jan. 2014: Declaration on Security and Defence (https://www.gov.uk/government/news/uk-france-summit-2014).
12. Short Take Off and Vertical Landing.
13. Allied Procedural Publication.
14. On 14 Nov. 1910, Ely's 'Curtiss Pusher' aircraft succeeded in making the first take-off from a ship, the light cruiser USS Birmingham at Hampton Roads, VA. Two months later, on 18 Jan. 1911, Ely made a safe landing on the armored cruiser USS Pennsylvania in San Francisco Bay, the arresting equipment working perfectly.
15. Most of the Naval Air Arms in the western countries celebrated their 100 years' anniversary in the latest years: UK (2009), France (2010), USA (2011), Germany and Italy (2013).

Lieutenant Commander Pizzimenti

graduated from the Italian Naval Academy in 1999. In 2001 he qualified in Anti-Submarine Warfare (ASW) and then (2001–2003) he trained as a Naval Aviator in USA. In 2003–2008 he served in the 3rd Helicopter Squadron (Catania) as a SH3D 'Sea King' helicopter pilot and embarked mainly on board ITS Garibaldi. In 2008–2009 he commanded the Offshore Patrol Vessel 'Libra'. In 2009–2012 he served in the Aviation Department of the Italian Navy General Staff. Since October 2012 he is a staff officer of the JAPCC, his Subject Matter area is Maritime Air Operations – embarked Rotary Wing.

Developing Future Force Protection Capability (Part 2)

By Wing Commander Jez Parkinson, GBR AF, JAPCC

Introduction

In the first part of this article the author set the scene for the definition of what can be described as a Force Protection (FP) Minimum Military Requirement (MMR). The thinking behind this work is that if a MMR can be defined that will provided a satisfactory level of protection across a spectrum of future scenarios, then NATO can seek from the nations the commitment of forces ahead of time as part of any national contribution to the NATO Reaction Force (NRF).

Methodology

Students attending the NATO School Oberammergau (NSO) FP Course[1] over the last 12 months have been challenged to analyse likely future military tasks and assess the FP implications. This has allowed the capture of over 150 different views, from 36 countries, all components[2] and from across a range of ranks. The resulting information has been analysed by the author who is a career FP officer.

Why the Requirement? A Brief Recap

The author's view is that the Alliance has been failing to correctly resource FP for a number of years and we have been extremely lucky that our adversaries have not exploited this weakness; this situation cannot be allowed to continue. As the post-ISAF era dawns, not only are nations now increasingly reluctant to engage in military operations, but even if they were to do so, there would be considerable pressure on governments to ensure an absolute minimum of casualties. Part 1 of this article attempted to explain the complex and interrelated reasons why FP is not being correctly resourced but the situation can be summarized as follows:

Lack of Understanding. There is a lack of understanding of the complexity of providing effective FP in both the contemporary and likely future operating environments. This is compounded by differing national perspectives and inter-Component friction.

Diversion of Scarce Resources. FP is viewed as supporting activity i.e. it is not part of why nations have chosen to deploy their forces. Nations increasingly want the whole of their contribution to be assigned to the Main Effort and providing resources for FP is unfortunately seen by many as a diversion.

Aversion to Risk. In order to deliver FP effect, forces will on occasions have to engage the enemy. Nations are becoming increasingly reluctant to deploy forces unless they can operate in a benign environment with negligible threat.

Someone Else's Problem. Specific to Air Forces, some nations will only contribute if that contribution can operate from an already established safe and secure environment but, they are increasingly looking to others to provide that environment. In a period of continuing austerity, FP is clearly seen by some as a desirable rather than essential and resources are being cut.

A key point from Part 1 should be emphasized: Whilst the author *fully* accepts that NATO FP doctrine *should* be more than the defence of fixed installations[3], in reality, beyond fixed installation other NATO or national doctrines will take precedence. Recent operations have demonstrated that the nations have a desire to gain the benefits from the economies of scale provided by operating many assets from a single location. These locations quickly become self-perpetuating and with most if not all partners operating from them become tempting targets. They are of strategic importance to and as such, this is where we *must* ensure that the FP MMR is met.

The Simple Reality

If FP does not contribute to the Mission, its absence or failure will certainly contribute to its failure. We have not correctly resourced FP for the ISAF Mission for many years and this may yet come to haunt us; we have been lucky so far but, how long will our luck hold?

Location and Threat

The most frequent response when someone is asked to *'define a FP requirement'* is: 'Where am I going and what is the threat?' Without location or a specific threat many argue that it is difficult to establish a start point for planning. *Is this a valid argument or, just an excuse to avoid confronting the issue of how to provide effective yet resource efficient FP in the future?*

If we look at the reasons why the International Community would deploy forces in the future it is safe to assume that any deployment will be to a failed or failing state and the operating environment in terms of climate, physical terrain, human terrain and distance from the home base will all pose significant challenges. In the short to medium term it is unlikely that we will become involved in state-on-state conflict. As a result, whilst an adversary may be state sponsored, they are unlikely to be in a position to challenge NATO forces directly. Therefore, we can use a scenario that sees the Alliance facing a well motivated, well equipped, capable and intelligent adversary but one that is going to rely on asymmetry in order to stand any chance of *'defeating'* NATO. Any *'defeat'* is unlikely be military rather, a strategic failure because our adversary has caused contributing nations to withdraw their support as a result of public pressure on government – a shattering of Alliance cohesion. This in turn, will have been brought about by adverse media reporting of incidents of apparently successful attacks that result in mounting casualties.

A crucial aspect when considering threat is to acknowledge that 'threat' will change over time. It is unlikely that the FP forces required at the beginning of any operation will be the forces required by the end. Numbers may rise or fall and capabilities required will change. Importantly, even if the threat is *'negligible'* at the start of an operation, the *'World Order'* is such that the presence of NATO forces will likely attract a threat in a relatively short time[4]. Put simply, the FP posture needs to be agile and capable of reacting quickly in response to new *'enemy'* Tactics Techniques and Procedures (TTPs). Whilst history demonstrates that we never correctly identify the *'next'* threat until it is almost upon us, an educated guess can be made as to some potential regions of possible involvement. From this we can deduce that there is an increasing likelihood that a future *'enemy'* will have identified that a way to have possible strategic impact on the Alliance is by attacking the home base to include Cyber attack.

Likely Future Operations

Information in the public domain, describes anywhere between 7 and 11 potential NRF Mission types; the number of types of missions depends on whether you view a mission as a separate or discreet mission or, a subset of a broader category. Of note, is that likely NRF deployments are similar if not identical to what have become known as the *'Petersberg Plus Tasks'*[5], these are: Joint Disarmament Operations, Humanitarian and Rescue Tasks, Military Advice and Assistance, Conflict Prevention and Peacekeeping, Crisis Management, Peace-making, Post-Conflict Stabilisation and Support to Counter Terrorism. To provide a little more detail to this list, deployments may include:

1. preventative deployments to forestall violence between communities or states;
2. enforcing sanctions;
3. monitoring or supervising a tense situation, stalemate, cease-fire, or settlement;
4. establishing, monitoring, or supervising cantonment areas, demilitarized zones, and buffer zones between warring parties, which may involve interposition by the field force;
5. support, supervision, and implementation of a process of disarming and demobilizing warring factions;
6. protection and support of humanitarian assistance efforts;
7. Non-Combatant Evacuation Operations (NEO);
8. establishing protective *('safe areas')* zones;
9. protection and support of national reconstruction and reconciliation efforts, including the conduct of elections;
10. helping to restore and maintain general civil order;
11. train and equip local forces in the course of their modernization, reinforcement or reorganization.

Assembling the Jigsaw

Whilst necessarily simplistic given article length and security classification, it is hoped that what has been presented so far will assist in shaping the requirement? Forces involved in delivering any mission on the ground *(or at sea)* and operating outside of main base locations will self-protect. Small or temporary bases will likely be national assets and will be protected as such. It is only when we come to large installations where most if not all nations participating in any operation come together, and no one nation accepts and/or could reasonably be asked to provide FP, do we start to see a challenge; these installations are likely to be headquarters and major operating bases such as air bases. These locations in turn will be impossible to conceal and will probably be on or develop around existing infrastructure which by their nature will be close to centres of population. We will likely be operating in a harsh physical environment. The threat we will face will be capable of massing groups of sufficient size and capability that if such a group were to attack an insufficiently protected NATO facility, it would have mission altering impact. This could include mission failure. Therefore, for planning purposes, it is reasonable to assume:

1. The operation is likely to be far from the home base.
2. Any situation will be complex both politically and militarily with multiple actors, each of which will have their own agenda.
3. We will face a capable and adaptable adversary that may well have a covert state sponsor willing and able to provide high-end technology up to including military standard[6]. The adversary will be capable of massing forces for one-off spectaculars but will make best use of asymmetric tactics and particularly any ability to *'hide'* amongst the civilian population. Any adversary will be able to adapt his TTPs rapidly in response to any Alliance countermeasures developed.
4. The location is likely present inter-cultural challenges for Alliance forces. Ethnic tensions will probably be present with religion likely to be a factor together with widespread poverty.
5. The operating environment will be geographically and climatically testing.
6. Fixed installations or temporary camps where a large number of nations are assembled will be obvious enemy targets and are likely to be in, or in close proximity to, population centres.
7. Large NATO facilities will be few in number and could be co-located e.g. a headquarters within the perimeter of an air base. However, they will almost certainly be mission critical and/or strategically important.
8. It is unlikely that the FP task of large multinational and potentially common funded installation could reasonably be undertaken by a single nation (to include any Host Nation). FP will need to be a multinational effort given the range of capabilities and number of resources required.

Creating the MMR

Before assessing how we create a FP MMR to counter the challenge described above, it is worth considering as part of the broader problem, the provision of robust measures in protection of the home base or mission enabling facilities outside of the actual theatre of operation; this should include robust Cyber Defence. What better way to create friction within the Alliance than through attacking a troop contributing nation on its own territory? If the Alliance cannot collectively mount, sustain and subsequently redeploy, then the Alliances very credibility will be at stake. Protection of the home base is vital. The serials below represent the FP MMR counter to the challenges presented above:

1. Expeditionary Capability. The FP MMR is for a FP capability that can be deployed, sustained and recovered to a secure base area. It is a little considered factor that FP forces require FP! Equally, FP assets will need to be deployed as part of any initial reconnaissance, reinforced to cover the actual mission and then not redeployed until all other forces and their equipment have been safely recovered. Any *'Exit Strategy'* is likely to involve capacity building of local forces and this need should be identified as early as practically possible and appropriate forces deployed to undertake the task. A Host Nation (HN) reaching a particular level of capability is likely to be a pre-condition for redeployment.

2. **Effective Command and Control (C2).** The nature of the FP challenge of the future is such that any FP MMR must have at its core an experienced, specialist FP Command, Control and Coordination element; every base will require a specialist FP headquarters element. This organization will need a robust planning capability which in turn will need to be fed by a dedicated intelligence cell. A FP organization protecting an installation will need *'local knowledge'* and *'local intelligence'*. The Commander and his staffs need to go beyond Situational Awareness and require true Situational Understanding if they are to be effective.
3. **Capable Forces.** A capable and resourceful adversary will need to be countered by equally capable FP forces that are present in the right numbers with the right equipment. Force levels and equipment needs will change over time as the threat evolves. A lack of specialist forces can be mitigated to by the deployment of a robust specialist FP C2 element but effective C2 cannot entirely counter a lack of appropriate forces. A point of some current disagreement is the need to deploy beyond any perimeter in order to protect what is within the perimeter. Put simply, if an adversary can pose a threat from a distance and without need to approach or breach a perimeter, then the FP organization must possess an effective counter.
4. **Ability to Influence.** Any FP MMR will need forces that have a high degree of cultural awareness. Local Nationals will be employed on our bases and the location of major bases will be such that daily interaction with the local population will be inevitable. FP forces operating on and around any installation will need to engage with the enemy in *'the battle for the hearts and minds'* of the local population and for this, appropriate resources for *'Influence Activity'* will be needed.

5. **Training and Equipment.** The nature of future operations will need forces that are appropriately trained and equipped to deal with harsh terrain and extreme climates. This would be an ideal area for the development of the concept of the 'Connected Forces Initiative (CFI)' as no single nation can reasonably be expected to resource all possible training or equipment requirement options.

'What better way to create friction within the Alliance than through attacking a troop contributing nation on its own territory?'

6. **Comprehensive Plans.** The FP Estimate is the basis of any FP plan. Any plan must be sufficiently resourced, and hence the concept of a FP MMR. The FP MMR must take account of many factors, some of which have been discussed here but importantly, any plan must provide a layered defence starting at the centre of an installation and working outwards to potentially well beyond any perimeter. It is inevitable that on occasions an enemy will *'get lucky'* and so plans must include provision for what to do post attack. And of course, no plan will succeed *(or stand contact with the enemy)* if those who have to implement it are not well led, trained, equipped and regularly rehearsed in what is expected in the event of an incident. Winning the battle for the *'hearts and minds'* of any local population will be critical as this is an area where if we do not succeed, our adversary will.
7. **Scale.** It would be easy to become overwhelmed by the apparent scale of establishing a FP MMR, however, if the information presented here is accepted as a reasonable definition of the need, then any MMR *(emphasis on the first 'M' – 'Minimum')* need only actually be established to cover a maximum of three large facilities: A single theatre headquarters, a major NATO airbase and a sea port/harbour. This could be reduced further by co-locating facilities.
8. **Interoperability.** Interoperability or at least *'Operational Compatibility'* between nations based on a common doctrine will be the cornerstone of any capability.

Summary

It is offered that the establishment of a FP MMR is a workable concept. However, to deliver the MMR and realize the benefits, there are two prerequisites. One is clearly the commitment ahead of time of sufficient quantities of the appropriate resources but for this to happen there first needs to be an agreed approach. Whilst the intention was not to write an advert for FP doctrine, it would appear that by analysing whether a MMR is achievable, the conclusion that underpins any requirement is that common doctrine is essential.

1. The author is the current Officer with Principle Responsibility (OPR) for the NSO FP Course.
2. To include Civilian, Marine and Coastguard.
3. Such as headquarters, airbases, sea ports and logistics facilities etc.
4. Measurable in weeks rather than months.
5. Petersberg Tasks from the Treaty of Amsterdam '97 and 'Plus' tasks from the Treaty of Lisbon '09.
6. E.g. Man Portable Air Defence Systems (MANPADs), anti-armour weapons and/or sophisticated Improvised Explosive Devices (IEDs).

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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Unmanned Cargo Aircraft!

A Paradigm Shift for Theatre and Tactical Level Logistics in Asymmetric Conflicts?

By Lieutenant Colonel Erik van de Ven, NLD AF, JAPCC

Introduction

A decade ago unmanned aircraft were a virtually unknown phenomenon. Today, thousands are in use worldwide and the use for military and civil applications is growing very fast. One of those applications is Unmanned Cargo Aircraft (UCA). The Advisory Council for Aviation Research and Innovation in Europe (ACARE) assumes in her strategic 2011 agenda[1] that cargo planes will be the first to fly fully automated before 2050. Where operational military use of Remotely Piloted Aerial Systems (RPAS) so far was limited to Intel, Communication and Combat (Air-to-Ground) missions, new developments in the area of logistics are explored. A good example is the US Naval Air Systems Command initiative to send Cargo Unmanned Aircraft Systems demonstrators (K-Max helicopters) to Afghanistan. This initiative is considered to be successful[2] and further improvements and developments are in progress. An example of the latter are the demos at Fort Pickett in Virginia in 2013, which included passing high-definition video to the operator providing improved situational awareness, dynamic mission re-planning, and autonomous obstacle avoidance and landing-zone selection as well as autonomous retrograde capability – bringing cargo back. The latter has been accomplished manually with the unmanned K-Max in Afghanistan with Marine Corps personnel making 'hot hook-ups' to the hovering helicopter, but with the new technology the unmanned helicopter will fly in, identify the load, autonomously attach its hook and fly away.

Another initiative in this field is the Autonomous Aerial Cargo/Utility System (AACUS) which is an Innovative Naval Prototype program. The AACUS program's aim is to explore advanced autonomous capabilities for reliable resupply/retrograde and, in the long term, casualty evacuation by unmanned air vehicles under adverse conditions. Key features of AACUS include autonomously navigating to find and land at an unprepared landing site in dynamic operational (hostile) and various weather conditions, day and night, preferably without help from a ground controller[3].

Aim

The article's aim is to highlight the increasing importance and the rapid development and applications of Unmanned Cargo Aircraft both on the military as the civilian side. The article will elaborate on the developments and the use of UCA in general and more specifically on the military employment at the operational/theatre and tactical level. Airspace integration of UCA is a future prerequisite. However, this will not be discussed in the article. Developments on the civilian side will also be touched upon, because today there is so much synergy to achieve between military and civilian capabilities and solutions, especially in the field of Logistics[4].

Developments

Unmanned Aircraft can offer important advantages for cargo transport[5]. Savings on salaries are perhaps the least significant, although one ground controller can control ten or more UCA en route. Because there is no crew on board, a UCA can take days to reach its destination, flying at speeds optimized for efficient and environmentally friendly turboprop engines, above most weather but below congested airspace used by today's airliners. Because crew and vehicle are decoupled, a UCA only needs to return to its home base for maintenance. Furthermore, UCA may not need pressurized cabins, merely conditioned containers for some types of cargo. This saves 10–20 % of empty weight and eliminates the need for a circular cabin, making new body structures feasible which may lead to reducing drag by 15–20 % and thus becoming more fuel efficient. Finally, empty return flights and rejection of loads because of scheduling issues may

be largely avoided. Even if a direct flight from an emerging economic region in Asia or Africa to consumers in Europe takes a day, this may well be less than transport via hubs or by means of surface or sea transport. It is foreseen that direct flights on thin routes is the area where UCA should excel, since it is expected that the advantages of 'unmanned' manifest themselves particularly in medium sized aircraft with a payload of 5–20 tons. This is mainly because unmanned competitors of large aircraft like the Boeing 747 are expensive to develop and probably cannot economically compete with today's passenger aircraft carrying belly freight.

Because of the advantages of smaller unmanned aircraft, UCA have the potential for unlocking the economic potential of areas with inadequate infrastructure or with limited volumes of cargo to be transported. If these areas are hundreds of kilometres from hub airports, UCA may be used to transport cargo directly to customers over intercontinental distances. So whereas the Internet made exchange of information from anywhere to everywhere possible, perhaps UCA can do the same for small volumes of cargo[6].

Military Use of Unmanned Cargo Aircraft at Theatre Level

As mentioned in the introduction, US Armed Forces are at the fore front of exploring the opportunities and advantages of UCA in operations especially at the tactical and theatre level. Although the use of UCA in operations is still in its infancy, existing technology and the rapid development of new technologies should make it possible that UCA will continue to develop into full-fledged systems quickly. But why should we opt for UCA in operations? Developing and operating such a capability is expensive and in times of fiscal austerity money counts.

Current and most probably many future operations are characterized by asymmetric warfare where troops will be deployed to austere and remote Forward Operating Bases (FOBs) from where they will conduct their operations by foot or mounted. Such environments typically lack a safe rear area and adequate infrastructure and lines of communication. However, the conventional and prevailing method for replenishing these FOBs today is the use of truck convoys and/or when circumstances dictate, through the use of (expensive) scarce manned rotary wing assets. Unfortunately the adversary's increasing use of Improvised Explosive Devices (IEDs) greatly affects truck mobility throughout the battlefield and has been proven to be successful in Afghanistan. Replenishment procedures have slowed down due to lengthy, deliberate routes and time-consuming IED clearance tactics. In addition, these delays increase the time own troops are exposed to attacks. Many incidents have been reported over the past recent years in ISAF/Afghanistan where numerous convoys have suffered significant material and human losses.

'… whereas the Internet made exchange of information from anywhere to everywhere possible, perhaps UCA can do the same for small volumes of cargo.'

How cargo replenishment of FOBs is conducted depends on the number of soldiers stationed at those FOBs, the kind of operation (high/low intensity), how far away those FOBs are from the Main Operating Base (MOB), and the level of threat expected en route to those FOBs. All supply materials will be sent from MOBs and replenish the FOBs in a hub-and-spoke supply chain. Each of these variables plays a major role in the cost of replenishment operations. All cargo systems use fossil fuel, but the use of manpower differs greatly between rotary and ground convoys. The latter has to be accompanied by significant Force Protection (including their armoured vehicles) and military transport helicopters generally will be accompanied by one or more armed helicopters. If UCA can replace some of these armoured vehicles and/or (armed) helicopters, then cost savings will occur and in case of helicopter resupply, very scarce assets will come available for 'more important' commitments. A Business Case Analysis conducted by two students from the US Naval Postgraduate School[7] concludes that UCA are a viable and affordable resupply alternative taking into account that fewer personnel and

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trucks or helicopters are required. But above all the use of UCA will reduce the risk of casualities or loss of lives which is, especially with the prevailing critical public opinion in most nations into mind, a huge strategic advantage. The use of UCA in operations, however, also involves other challenges i.e. technological risk (component reliability), threat resulting in attrition and performance risk (will new technology meet operational requirements?) which of course have to be taken into account as well when comparing with conventional supply options.

As military UCA development will continue other advantages might occur as well. It's expected that their endurance, not limited by the pilot, will increase and they will be better able to operate day and night and in weather and (landing) terrain conditions unsuitable for manned aircraft. The cost of these UCA might in the end be lower than manned aircraft due to the fact that they are specifically designed for one task, probably not carrying any or limited self-protection systems and optimized and therefore efficient for the limited (up to 6 tons) lift capacity. And because their speed may be greater than that of helicopters, they will be also less susceptible to ground fire. From a cost perspective it thus will become more efficient as well. For transport of personnel, manned assets will still be needed in the foreseeable future (although this may change) but with proper scheduling the number of personnel transport missions should be reduced significantly.

Military Use of Small Unmanned Cargo Aircraft at Tactical Level

UCA initiatives have so far been limited to the supply of FOBs. Given the large quantities of supplies and distances involved in these cases, it is required that these UCA have ample payload and reach capabilities. Because of these and other requirements these UCA will be relatively large and complex systems. Therefore they will be relatively expensive to procure and operate, and too large for some applications, and thus by nature only available in limited numbers automatically leading to the decision of operating these UCA at least at theatre level for the benefit of deployed units of battalion size and up. However, there might be a need for smaller UCA at the tactical level as well.

When mentioning resupplying of units at the tactical level, the focus is on infantry and Special Operations Forces (SOF) units up to company level. These units, although often based at remote FOBs, will have to leave their bases to execute their actual task. During these missions, which are foot patrols or small (armoured)

convoys, often under extreme terrain and weather conditions, they are limited to the supplies they can carry. It's in such situations that small tactical UCA might be of great value, while in order to increase the unit's sustainability resupply is necessary. But also in case of changing circumstances or an emergency, it might be necessary to quickly resupply a unit with water, food, medicines, ammunition and spare parts. At this time the only possibility is to resupply by helicopter or by a Joint Precision Airdrop System (JPADS), but in case of enemy contact or in a high threat area a UCA might be a better and safer solution. Also much of the control and support infrastructure for larger UCA may also be used for tactical level UCA. This should give significant advantages-of-scale for initial non-recurring investments in infrastructure.

So far no official doctrine has been written on the use of UCA as a tactical enabler, but thoughts go in the direction of UCA able to move cargo up to 30–50 kg. This kind of UCA won't be very expensive and therefore be available at the tactical level in significant numbers. Technology developments are moving fast and it can be foreseen that this kind of small UCA in the near term will be available and meet the user's requirements at a low cost.

Conclusion

Although the development and use of Unmanned Cargo Aircraft is still in its infancy, recent initiatives and new developments based on already existing technology look very promising. So far, existing manned systems were turned into unmanned versions, but when UCA in the future will be developed specifically to fit specific logistic requirements, they should become much more capable and above all cheaper to buy and operate. The use of UCA at theatre level has proven to be successful both from a technological perspective and from the side of the operational user. The next step might be the applicability of small systems to support the tactical level in their operations as well. Last but not least, civil developments parallel and expectedly in conjunction with the military will be booming. It is expected that there is a huge market for small UCA operated by i.e. parcel delivery companies and medium sized UCA which are more efficient on thin routes in or to more remote areas. It is therefore that there will be a great opportunity for both the industry as the military to move forward hand in hand gaining synergy and benefit from each other's will to create a future where UCA will add economic and operational value, and above all saves lives when it comes to military operations. Therefore JAPCC is eager to keep hold on new initiatives and developments in this field for instance by following these developments via the 'Platform Unmanned Cargo Aircraft' (http://www.platformuca.org/). ●

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Lieutenant Colonel Erik van de Ven

graduated from the Military Academy (The Netherlands) in 1992 as an Army Engineer. After serving as a Combat Engineer performing several command and supportive functions at unit level, he made the switch to the Royal Netherlands Air Force. As an Air Force Logistics Officer he gained meanwhile over 15 years of experience in the wide logistic spectrum: supply, maintenance, infrastructure and contracting. Lieutenant Colonel van de Ven held positions to include Squadron Commander, Supply Chain Manager, J4/Operational Logistics Planner and various other Staff Officer functions. He is currently employed as Subject Matter Expert in Logistics at the Air Operations Support branch of the JAPCC.

The $50.00 Cognitive Swiss Army Knife

Manual Simulation Systems – Versatility Trumps All

By Colonel Uwe L. Heilmann, DEU Air Force, JAPCC

If asked: 'Are there temporal similarities between simulation systems and aerial photographs?' Most people would answer: 'Yes. They were both achievements of the 20th century.'

They couldn't be more wrong. On 13 October 1860, James Wallace Black took the first successful aerial photographs from a hot air balloon at 1,200 feet. By chance, one of those pictures survived until today and constitutes the oldest aerial picture we know about. It shows Boston, 'as the Eagle and the Wild Goose See it', in the words of J. W. Black himself.

The story about simulation systems reaches further back into history. Indeed, it is directly linked with civilizations. Time and again, archaeologists found evidence that the rulers of their times provided and used instruments to learn and impart the profession and art of deploying, employing and leading armed forces.

What constitutes a simulation system?

[1] The purpose. The aim of a simulation is to imitate the activities of situations and/or processes of a selected object within a model in such a way that it sufficiently approaches an assumed reality.

[2] The structure. A simulation system consists of the object (what is to be simulated; e.g. a battle, a campaign, a war); the model (the mechanism used to generate, represent and proceed events, actions and results; the inevitable component of this mechanism is the effigy of Time); and the involvement of the users of the system (from following strict rules how to interact with the system to the identification of the users with the content and element of the simulation).

[3] The principles. Simulation systems yield to the basic principles of abstraction, reduction, substitution and consecutiveness. The last principle allows simultaneous events to be modelled.

[4] The quality. The simulation system must be capable of imaging all significant real object related events (in specified characteristics). Every result produced by the simulation model must represent an event possible in reality.

The basic procedure of all simulation systems deals with the creation of consequences of events or actions. By assigning deliberate ranges of numbers to the occurrence probabilities to each set of consequences, the system is enabled to determine single results. The key is a random number generator that appoints unique numbers which fall into exactly one range of numbers assigned to each consequence.

Most people will immediately assume a computer must be used for such a task. In fact, this is not necessary at all. A simulation system not using computer capabilities for any of its model components is called a Manual Simulation System.

The use of dice is actually nothing more or less than a random number generator and is likely to be the most palpable reason for refusal when it comes to convince newcomers about the potential and value of Manual Simulation Systems (MSS). Quite often, the visual random number generator is disdainfully treated as an inappropriate element of chance. This perception is nothing but a pathetic ignorance towards friction, or, as Clausewitz titled it, the 'fog of war'.

Historically, the best-known MSS might be the *Kriegsspiel* which revolutionized the approach to military operations in the 19th century. Moltke the Elder used this tool for education and training of military leaders leaving other nations' military flabbergasted about its effect on the operational efficiency of the Prussian armed forces.

Computer-based simulation systems might appear more fashionable than those unadorned MSS. A wall of flats screens, impressive graphics, flashing data displays, and daunting 'artificial intelligence' indubitably engender thoughts of precision, agility, and the scientific method.
But …

First of all, they always apply the same basic procedure as any MSS, use a (more or less efficient but well-hidden) random number generator, and refuse the user any real insight into the 'black box'.
Secondly, as sophisticated they might be, computer-based simulation systems require a horrendous effort to modify them and validate the resulting changes.

MSS are not perfect either. Using them requires a formidable effort to run the system directly by the users, as no machine shoulders the task to make the model work. A numerically high run through a MSS is plain absurd if possible at all.

MSS have two resounding traits: they are incredibly inexpensive to produce and maintain (especially when using commercial ones); and their game mechanisms are completely transparent to the user. The main effect of this: modifications, expansions, merging of the systems are no noteworthy effort of time and money, but only a question of intellect and creative capabilities.

Taking all this into consideration, MSS offer an unmatched combination of versatility for application in combination with a negligible investment in procurement and maintenance.

The following four examples illustrate this versatility.

1. Learning About a Phenomenon

During the last 20+ years, the scope of requests and challenges for Western military forces witnessed an unparalleled increase in depth and breadth. The classic types of operation (attack, defence, delaying) and the hard as bone nine principles of war no longer cover the needs, or ensures success if applied and adhered to, respectively.
From asymmetric warfare to operations to counter hyper threat, a multitude of doctrine, mission strategies, and demands regarding the exertion of military violence conducted by weapon systems and military units, came crushing down on all levels of military leaders, thinkers and especially 'the guys in the line of fire'.
Worse, is the fact that most of all those resounding alterations remain elusive as the amount of scenarios,

de facto courses of action, and lessons learned defy a timely and exhaustive analysis to form the base for a comprehensive adjustment of existing structures and processes to face the next challenge with a higher probability for success of the own forces.
MSS provide one modus operandi (mainly as a tool, never as a solution generator) to better grasp selected realms (singularly or in any desired combination) where alterations recently happened (and were already felt) or are still ongoing.
Applying the MSS inherent advantages as mentioned above, especially its short development loops, the military could compile and use dedicated interactive models for Education & Training (E&T) purposes to prepare and syntonise its personnel more efficiently for 'things to come' once they are to run real operations.

As an example, the Center for Applied Strategic Learning (CASL), the gaming center at the National Defense University in Washington D.C., developed such an MSS called COIN OF THE REALM in 2012, to expose users to, and have them experience, processes and strategies related to Counter Insurgency Operations (COIN). This system, arranged as a board game, does not aim to train the one and only path for success (which obviously does not exist), but provides users a better chance to understand COIN related concepts. The design of this MSS, as is true for all others serving this purpose, inherently expedites continuous modification based on requirements for change and adaptations as derived from the real world.

2. Analysing Future Alternatives

Resources provided for Western military forces are always facing the threat and suffer the practice of being treated as a quarry when times and circumstances reduce the military to solely an expensive and idle instrument of a nation's executive authority.
During the JAPCC 2012 Conference, an animated discussion took place when it came to the point 'How many further reduction of a nation's air power could be tolerated before it turns into a totally ineffective conglomerate of material, systems and personnel?'
An answer to 'What is the "critical mass"?' could not reasonably be provided.
It is also of great importance to have at least an indication, if a military force earmarked to run a specific operation, has any chance to succeed the way it was prepared, arrayed, supplied, tasked, etc.

The first victims of a discrepancy between the expectations and the unfolding reality are always the soldiers at the execution level.

MSS provide a resource-effective tool to generate dynamic, interactive models for running specified operations using and applying pre-set force contingents, ROE, political framework requirements, budget restraints, and whatever could be thought about.

Such a MSS was developed by Cranfield University at the UK's Defence Science Technology Laboratory in 2012/2013, named the 'Rapid Campaign Assessment Tool' (RCAT). RCAT allows to set-up whatever scenario is asked for by high level military and/or political representatives in order to demonstrate and have the participants (exactly those representatives) experience directly what the fate of the deliberately designed force package could be once kicked into the operation.

The aim is not to convince the target audience with glossy presentations et al, but to get the decision-makers involved and concerned as closely as possible.

The Cranfield University experience proves the value of this concept and the applied MSS. The direct 'play' of the target audience combined with a zero time lag when it comes to modify the scenario and/or the forces, parameter settings, overarching conditions, etc. turned RCAT into a universally accepted approach to analyse possible alternatives for the future before it is too late.

3. Fostering the Understanding of History

Nobody doubts the value of history, or more precisely: The knowledge about history.

This noble statement is evidently not in line with the plain truth that too many people do not have the foggiest notion about history.

Whom to blame? The ignorant people or the reasons why and how they became ignorant?

A one-dimensional approach to history (from BC to AD to today), coupled with the focussing on historical dates per se, are indeed the perfect method to generate those unlucky know-nothings. They never got a chance to grasp the fascination of things and events that happened yesterday and beyond but continue influencing the world of today.

MSS offer a chance to avoid this pitfall by swapping the voluntary (or not quite so voluntary) history student's role of a lackadaisical observer with that of an active participant.

'… the best-known MSS might be the Kriegsspiel which revolutionized the approach to military operations in the 19th century. Moltke the Elder used this tool for education and training of military leaders leaving other nations' military flabbergasted about its effect on the operational efficiency of the Prussian armed forces.'

This turns the probably anticipated dry and dusty topic into a lively understanding about what happened in the past and why.

Using MSS for this purpose does not replace the classic study of History, but complements it tremendously, fostering both ways of learning about history.

The challenge for the design of MSS for this field of application lies in the precision of its elements to survive the critical assessment of the historian. On the other hand, the MSS must remain usable for the intended purpose to provide the history student a manageable tool.

For example, at King's College, London, a whole set of MSS is used (based on the book *'Simulating War: Studying Conflict through Simulation Games',* Philip Sabin), where those conflicting objectives (historical accuracy and playability) are kept in balance thus achieving the original aim: a deeper understanding of history.

4. Improving Competence

All activities that take place during military operations result from decisions made by those in charge regardless of the Command & Control level. There is no 'No decision'.

This makes the competence of decision-makers regarding their profession as military key to success or failure.

Western military puts a lot of effort into the E&T of their 'human factor'. The nagging question was and remains: 'Is all this effective and lasting?'

When it comes to the 'Command & Control and Leadership' competence, the main challenge is not 'What to teach the students', but how to turn the students into capable and effective decision-makers.
As was mentioned during the JAPCC Conference 2012: 'NATO is great regarding Control, but we have lost the indispensable capability to exercise Command.'
Starting 2010, the JAPCC developed an E&T model contributing to the task of advancing the endeavour of improving the C&C/Leadership competence. The essential idea of this model is 'NOT to tell the students WHAT to think, but invite them to experience ways HOW to think'.
The tool to make this possible and happen is the use of commercial MSS. They provide the starting point and the interactive environment to have the students experience the challenge of leadership. The available broad spectrum of commercial MSS, also called Conflict Simulation (CoSim) Games, allows to focus on any selected set of competence areas, e.g. holistic thinking, motivation, effective planning and acting, conflict solving within the team, and so on and so forth.
The use of MSS forces the students into a comprehensive micro-cosmos where all phases of the OODA loop actually take place and affect the flow of actions and events once the simulated operation was set in motion. There is no escape for the students, as MSS do not offer the excuse of an obscure black box. The students are permanently confronted with the consequences of the decisions they made. Accepting this fact already provides the first improvement step of their C&C/Leadership competence.

Just having the students running a MSS would be nonsense. A MSS should be thoroughly embedded in the learning cycle for the students, using a competent cadre of instructors and observers who stay in contact with the students and offer them feedback throughout the E&T event. The key here is not to ask 'Why did you make this mistake?' but to insist on getting an answer to 'What led you to make the decision?'.

'… Western military puts a lot of effort into the E&T of their "human factor". The nagging question was and remains: "Is all this effective and lasting?"'

There is no right or wrong. There is only the appeal to the students to self-reflect on what they did and why. This starting point leads to effective discussions, evaluations about the contents, rational, and art of C&C/Leadership, and ultimately, improved competence.

Based on their inherent versatility, the four fields of application for MSS presented here provide only a portion of the options to use those systems; imagination is the only limiter.

In a time where austerity seems to impact everything and everyone, it is more than appropriate to broaden the use of effective low-cost solutions and strategies like Manual Simulation Systems. ●

Colonel Uwe L. Heilmann

is the Head of the C4ISTAR Branch of the JAPCC in Kalkar, Germany. Col Heilmann joined the Luftwaffe in 1977. His military career saw primarily appointments in the functional staff area 6, dealing with C2 from a technical as well as a leadership perspective. He graduated in the General Staff Officer Course at the Academy in Hamburg in 1992.

Joint A&S Power Thinking: Enhancing Synergy in the Community

The JAPCC has the ambition to optimize its contribution to the transformation and improvement of Joint Air and Space Power through a well-formulated engagement strategy within NATO and the Sponsoring Nations in addition to contemporary organizations and academia. The JAPCC believes we can only maintain our relevance and influence by investing in cooperation and innovation. Sharing experiences and ideas within the international community develops synergies that can lead to better outcomes. Based on discussions during the October 2013 JAPCC Steering Committee Meeting, it was decided that JAPCC will institutionalize a regular meeting with the Sponsoring Nations Air Warfare Centres/Think Tanks. The intention is to exchange ideas in an effort to solve common challenges and to coordinate Programmes of Work (PoWs).

Consequently the first Think Tank Forum was conducted in the JAPCC from 28 to 29 January 2014 under the general header of 'Joint Air & Space Power Thinking: Enhancing Synergy in the Community'.

The Forum was chaired by the JAPCC Assistant Director. Participation in the Forum included the following national representatives: HQ RNLAF Air & Space Warfare Centre, Canadian Forces Aerospace Warfare Centre, Royal AF Centre for Air Power Studies, Headquarters of the German Air Force, Polish National Defence University, Spanish Air Force HQ, UK Air Warfare Centre, Italian Air Force HQ, Italian Air Operations Command, Turkish Air War College, French Center Strategic Aerospace Studies, Romanian Air Force HQ, Belgium Air Force HQ, Netherlands Defence Academy.

The main objective of the forum was to share information regarding the composition and responsibilities of Think Tanks, Air Warfare Centres, Air Force HQs, and Military Academies of JAPCC's Sponsoring Nations that deal with the transformation of Joint Air and Space Power in order to:

- gain an understanding about what each organization does/is responsible for;
- understand common challenges;
- gain awareness of the key areas of effort;
- discuss potential areas of cooperation between our thinkers;
- prevent duplication of effort;
- discuss how to better support NATO/AIRCOM in fostering multinational cooperation;
- collect contacts to create a network foundation for information sharing;
- establish objectives and create procedures for follow-on interaction.

After two days of intensive discussions all participants agreed the meeting was successful and must get a sequel. In times of austerity, nations need to focus their efforts and work more closely together. In partnerships it is easier to identify, understand, and solve complex problems. The Think Tank Forum laid a good foundation for further collaboration for the benefit of NATO's Air and Space Power. ●

The JAPCC: Delivering Crucial A&S Power Expertise to NATO Exercises

The Joint Warfare Centre (JWC) in Stavanger, Norway and the Joint Air Power Competence Centre (JAPCC) have signed a Letter of Agreement (LoA) to closely interact and coordinate their work and thereby collectively and coherently contribute to NATO's improvement and transformation activities.

As NATO operations come to an end in Afghanistan, the Alliance finds itself at a crossroads. NATO's focus is shifting from combat operations towards preserving the knowledge gained and preparing and be ready for future contingencies. The nature of the conflict in Afghanistan has led to new doctrines, new technological developments becoming available and new players on the battlefield whom the military in the past was not used to working with. At the same time, the recent conflicts have shown the way many non-state actors are waging war, requiring a different response from NATO. Last but not least, from an Air and Space Power perspective, these conflicts have been largely fought in a permissive environment leading to the application of Air Power based on Air/Land doctrine while no air-threat was experienced.

The Air and Space Power domain has been witness to tremendous developments during the past ten years. These developments in Unmanned Aerial Systems, increased dependence on space and space based assets, the additional front posed by the cyber domain, the promulgation of asymmetric warfare, and the increased political implications of collateral damage. Many of these new developments kindled new doctrine, tactics and procedures. These, and the lessons behind them, need to be secured through education, training and exercises.

The primary organization responsible for conducting NATO Response Force (NRF) certification, along with other large-scale, joint-level, exercises is the NATO JWC. They organize medium- to large-scale Strategic and Operational level exercises which provide training and certification to the NATO Command Structure at all levels, while additionally capable to certify the NATO Force structure for the NRF and other deployments. These in-depth, full spectrum exercises are essential to increase operational preparedness and readiness. During the planning and execution of the recent exercises it became apparent that the JWC was lacking sufficient manpower to support the Air and Space domain. This led to an initiative in which JWC and the JAPCC agreed to cooperate in order to better support the Air and Space Power part of large-scale NATO, and JWC-led, exercises.

This participation can have an effect on new developments taking place within the NATO Education, Training, Excercise and Evaluation (ETEE) environment as laid down in the BI-SC Directives on Education, Training and Exercises. The currently ongoing process of appointing Requirement Authorities (RA) and Department Heads (DH) for all of the operational disciplines in NATO should lead to the establishment of RAs and DHs in the Air and Space Power domain. Currently only the RA and DHs for Air Command and Control (C2) are nominated. Through exercise support, JAPCC is able to broaden its knowledge and observe the lessons that can be used in its role of advisor to both RA's and DH's as required. Furthermore, JAPCC has been requested by NATO Allied Command Transformation to accept the role of DH for Space. JAPCC is currently assessing the implications for its resources.

JAPCC will also contribute to the development of a complete new scenario, called SOROTAN, for which all OPFOR air capabilities such as the Order of Battle, Air Forces bed-down, the Integrated Air Defence system and the Air C2 system will be developed. The SOROTAN scenario will be used for the first time during Exercise Trident Juncture 2015, the first NATO 'Flagship' exercise and one of the first visible results of NATO's Connected Forces Initiative. ●

NSHQ Air Development Programme Working Group Meeting at SHAPE

From 7 April till 11 April the JAPCC attended the NATO Special Operations Headquarters (NSHQ) Air Development Programme Working Group Meeting at SHAPE, Belgium.

The NSHQ Air Development Programme's (ADP) mission is to accelerate and synchronize Alliance efforts to enhance capability, capacity and interoperability of SOF air/aviation. The meeting was organized to improve NATO Doctrine and Standards for SOF Air. The meeting was comprised of a wide selection of SOF Subject Matter Experts (SME) in the field of Rotary Wing, Fixed Wing and Special Operations Air Land Integration (SOALI).

Each day separate groups of SME's discussed the new AJP 3.5 Air, the NATO SOF tactics and Procedures and the AFS Volumes X and XI. A summary of the group's discussions were presented to the NSQH ADP staff, who will use these inputs for the further development of NSHQ ADP publications.

JAPCC's two SMEs presented, as the custodian of the ATP-49, the development and progress of the new ATP-49G. A second presentation was given on the JAPCC project Enhancing Joint Personnel Recovery capability, education and training.

The working group meetings were very productive and opened many dialogues, the NSHQ were thankful for all the active participation and thanked the JAPCC for the high value added to the successful meeting. ●

JAPCC Looks Towards Sweden for Possible Future Cooperation

In line with the Military Committee (MC) 'Concept for Centres of Excellence' and the desire to increase the relationship and cooperation with NATO Partner Nations, the Joint Air Power Competence Centre (JAPCC) Director has invited the Swedish Air Force (SWE AF) to become a member of the JAPCC Community. Sweden has a highly professional and advanced Air Force with a very good reputation among NATO nations.

As a privileged NATO Partner Nation, Sweden has on several occasions proven their professionalism and capability like in their contribution to OPERATION UNIFIED PROTECTOR (OUP). The status of the SWE AF and their position among NATO nations makes it, from a JAPCC perspective, one of the most desired Partner Nations to establish a closer relationship with, in the near future.

Thus far, the JAPCC and the SWE AF have met at Leadership and Staff Officer level to discuss the scope, and possible areas of common interest for future cooperation. Both the JAPCC and the SWE AF are looking forward to developing areas of mutual cooperation beneficial to both parties. At this stage, the intention is to set up a less formal cooperation relationship within the framework of the JAPCC Operational MoU and the authority of the JAPCC Director. This means that the SWE AF will not take on the role as a Contributing Partner (CP) sending Subject Matter Experts (SMEs) to the JAPCC on a permanent basis. The cooperation will be limited to participation in workshops and meetings as required by the common activities committed to by the parties. The engagement to work out an agreement for a future cooperation between the JAPCC and the SWE AF was endorsed by the JAPCC Steering Committee on 17 June 2014. ●

‘Modern Chinese Warplanes’

By A. Rupprecht and T. Cooper
Houston TX,
2012 Harpia Publishing L.L.C.
Reviewed by:
Maj Hein Faber, NLD AF, JAPCC

It is challenging to find published material that explores the current evolution of the third largest air force in the world. ‘Modern Chinese Warplanes’ by Andreas Rupprecht and Tom Cooper is a great collection of information about the todays largely unknown world air power.

The book starts off with a short history of the People’s Liberation Army Air Force (PLAAF) from its foundation in 1949 thru several phases up to present time. Next, the book describes China’s combat and combat support aircraft. The information about each different aircraft is very extensive; it describes aircraft specifics, armament, background and lists all known variants. The next chapter is surprising as it catalogues all of the weapons that can be employed by China’s aircraft.

Chapter four focuses on explaining their approach to marking aircraft. Finally, the last two chapters deconstruct China’s branches and units, providing insight into the organization and structure of the Aviation Branch of the PLAAF, and the People’s Liberation Army Naval Air Force (PLANAF).

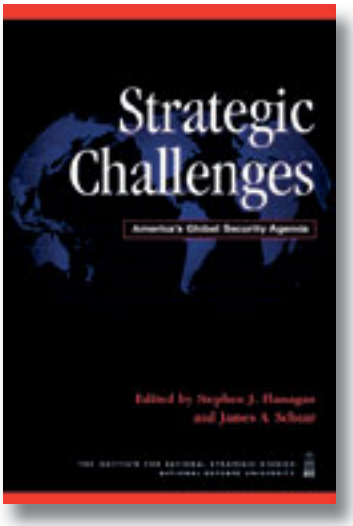
For me, there were a lot unknown and surprising facts about this formidable air power force. After reading this book, you will not underestimate China’s Air Power capabilities. Of special interest are all the illustrations which include unique, rarely seen detailed pictures of Chinese aircraft. The book is not an explanation of Chinese strategies or doctrine; instead, it is a fascinating detailed collection of Chinese warplanes facts and figures.

‘Strategic Challenges – America’s Global Security Agenda’

Jointly written and co-published in the United States by the National Defence University Press and Potomac Books, Inc., ‘Strategic Challenges, America’s Global Security Agenda’, comprises nine chapters in which the United States of America faces the following challenges: tackling global terrorism, stopping Weapons of Mass Destruction (WMD) proliferation, undertaking defence transformation, protecting the homeland, strengthening relations with allies and partners, engaging other major powers, and rescuing conflicts in unstable regions.

The authors, Stephen J. Flanagan and James A. Schear provide interesting analysis and an authoritative overview of the global strategic environment facing the United States in the next twenty years. They delve deep in to issues covering; researchers and policymakers answers about how to define the problem at hand (i.e., a short discussion of relevant trends); highlighting the current US efforts to master major challenges (i.e., US objectives, methods, degree of success or setbacks); also analysing the relevant choices that US policymakers will face during the in the next decade and, the potential consequences of alternative courses of action.

Stephen J. Flanagan and James A. Schear are both highly specialized and well researched authors. They offer diverse ideas to stimulate current thought and with this book debate a very uncertain future. A highly recommended read.



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