JOINT AIR POWER FOLLOWING THE 2016 WARSAW SUMMIT

URGENT PRIORITIES

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**Joint Air Power
Competence Centre**

**Joint Air Power Following
the 2016 Warsaw Summit – Urgent Priorities**

**An Allied Command Transformation Headquarters Study
Conducted by the Joint Air Power Competence Centre**

Joint Air Power

Following the 2016 Warsaw Summit

Urgent Priorities

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'We will ensure that NATO has the full range of capabilities and competencies necessary to deter and defend against potential adversaries and the full spectrum of threats that could confront the Alliance from any direction.'

NATO Heads of State and Government,
2016 Warsaw Summit Communiqué

Foreword

NATO is facing an increasingly diverse, unpredictable and demanding security environment, 'an arc of insecurity and instability along NATO's periphery and beyond'.[1] In recent times this has led to a range of steps by NATO to reinforce its collective defence, enhance its capabilities, and strengthen its resilience. NATO has committed itself to provide its armed forces with sufficient and sustained resources, thereby underlining its stated strategic intent that 'NATO's essential mission is unchanged and that NATO will ensure that it has the full range of capabilities necessary to fulfil the whole range of Alliance missions, including to deter and defend against potential adversaries, and the full spectrum of threats that could confront the Alliance from any direction'.

NATO's Joint Air Power forms an essential part of this set of necessary capabilities and competencies. Since the end of the Cold War, we have witnessed an increase in NATO's use of Joint Air Power, providing NATO and national leaders with a tool of unmatched responsiveness and flexibility.

Despite the strategic and operational importance of Joint Air Power, NATO nations, unfortunately, have drastically reduced their air power capabilities in recent years to the extent that there is a sincere risk that NATO will not have the required Joint Air Power capabilities and competencies to support the whole spectrum of Alliance operations and missions. This existing Joint Air Power problem, in conjunction with the changing international security situation on the periphery of NATO, has reinforced the need for the Alliance and its Member States to urgently address the shortfalls in the field of NATO Joint Air Power capabilities and competencies.

In 2014, the JAPCC completed the Future Vector Project, identifying viable options and realistic solutions to chart the path to guarantee that both Joint Air Power and assured access to relevant space-based data and information continues to contribute to the success of NATO and its Member States. Through a series of essays, a team of acknowledged experts in security and defence policy provided an extensive and balanced perspective including a broad range of recommendations.

During the 2014 Wales Summit, Heads of State and Government (HOS/G) stated that '… NATO joint air power capabilities require longer-term consideration'. Since then, NATO has taken specific steps to address this issue. One of the steps taken was a specific task to the Strategic Commands (SCs), with ACT in the lead, to provide recommendations for a long-term approach that will inform the future development of joint air power while also identifying the medium to long term Joint Air Power capability requirements that could be included in the context of the NATO Defence Planning Process. The Bilateral Strategic Command (BI-SC) final report on Joint Air Power Capabilities (JAPC), encompassing a broad range of recommendations, was presented to NATO in Brussels in December 2015. The report concluded that 'Joint Air Power will continue to be a vital, often first called upon capability for the Alliance'[2] to achieve its desired aims.

The Warsaw Summit Communiqué is the most current expression by the HOS/G of NATO of key security concerns and focus areas. It re-emphasized the need for the Alliance and its Member States to address shortfalls in essential capabilities and competencies. It is critical not to lose the momentum, and to further bring into focus the essence and intent of both the Communiqué and the outcome of other recent Joint Air Power studies.

Therefore, HQ SACT commissioned JAPCC to conduct the study 'Joint Air Power following the 2016 Warsaw Summit – Urgent Priorities' to provide a coherent set of urgent strategic, short to medium term priorities in the field of Joint Air Power capabilities and competencies, linked to the main areas of interest and concern as expressed in the 2016 Warsaw Summit Communiqué. This study will contribute to the discussion of required capabilities and competencies as part of the NATO Joint Air Power Strategy currently being drafted under the leadership of ACT.

I strongly encourage you to read this publication as it offers ideas and potential solutions to enhance NATO's Joint Air Power. Considering the current security challenges and threats, it's now time to act to guarantee that Joint Air Power in NATO is sufficiently available and fit for purpose when most needed in NATO, anywhere, anytime.

Joachim Wundrak
Lieutenant General, DEU AF/Executive Director, JAPCC/Project Leader

Endnotes

1. Warsaw Summit Communiqué, 9 Jul. 2016, para 5.
2. BI-SC Final Report on Joint Air Power capabilities, SH/PLANS/JCAP/FT/15-311417, 7 Dec. 2015.

Quotes

' *The study shows the crucial importance of NATO Joint Air Power for Deterrence and Defence. Precisely and without any sugar-coating it shows present shortfalls and future requirements. Of special importance are Hybrid Air Threats and Alliance and Partnership cooperation and capability and competency development with immediate attention to enhancing cooperation in the operation domain.* '

Volker Rühe,
former German Minister of Defence (1992–1998)

' *NATO is currently developing a new Airpower strategy to meet the formidable challenges facing the Alliance in the 21st Century. This important volume will provide vital input for that new NATO strategy. This study recommends multiple ways to improve NATO airpower to strengthen both deterrence and defense of Alliance territory. A must read for all those interested in NATO affairs.* '

Admiral (ret.) James Stavridis,
former Supreme Allied Commander Europe (2009–2013)

' *NATO's 2016 Warsaw Summit took important steps to strengthen the Alliance's deterrence posture against an aggressive Russia. This study highlights the critical role of air power to the credibility of deterrence. It offers timely recommendations on the capabilities and robust command-and-control arrangements needed to ensure NATO air supremacy in the 21st century.* '

Alexander Vershbow,
former NATO Deputy Secretary General (2012–2016)

In light of the fiscal balance challenges present across the alliance, we must both maximize the interoperability of our people and systems, as well as the integration across the priorities highlighted in this study. As we develop new capabilities to address future challenges, this paper will inform member nations and contribute to the discussions in shaping the refreshed Joint Air Power Strategy.

David L. Goldfein,
General US AF, Chief of Staff

Today's security situation challenges the air forces across the entire spectrum of their capabilities. Well-equipped, adjustable and interoperable air forces with their particular range, precision and flexibility provide credible first choice options to response to rapidly developing security challenges wherever they may occur. This paper marks an important step into a new age of Air Power: With this study we have a plan, a vision and a way forward to tackle the challenges of this century as a united NATO air force.

Karl Müllner,
Lieutenant General, Chief of German Air Force

This paper provides an overdue and clear contemporary focus on NATO air power requirements. Although not representing NATO policy, the authors' perspectives cannot be overstated, if the Alliance is going to be capable of true deterrence and agile military response.

Michael J. Hood,
Lieutenant General, Royal Canadian Air Force Commander

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Executive Summary

The 2016 Warsaw Summit Declaration, as the most current expression by the Heads of State and Government (HOS/G) of key contemporary security concerns and focus areas, is clear in its statements: 'the Alliance faces a range of security challenges and threats that originate from the east and from the south; from state and non-state actors; from military forces and from terrorists, cyber, or hybrid attacks. The greatest responsibility of the Alliance is to protect and defend our territory and our populations against attack. And so renewed emphasis has been placed on deterrence and collective defence'. NATO also remains clear in its overarching intent, which is that 'NATO will ensure that it has the full range of capabilities necessary to deter and defend against potential adversaries and the full spectrum of threats that could confront the Alliance from any direction'.

These clear statements re-emphasize the need for the Alliance and its member states to address shortfalls in essential capabilities and competencies. The Study before you, commissioned and financed by HQ SACT and conducted by the JAPCC, supports this need. It provides a coherent set of urgent strategic, short to medium term priorities in the field of Joint Air Power capabilities and competencies, linked to the main areas of interest and concern as expressed in the 2016 Warsaw Summit Communiqué. The aim of the study is to strategically inform, in a timely manner, the discussion of needed capabilities and competencies as part of the NATO Joint Air Power Strategy currently being drafted under the leadership of ACT.

An analysis of the 2016 Warsaw Summit Communiqué shows that there are eleven main areas of interest and concern with a direct association to Joint Air Power. In the context of this Study, these main areas are called Strategic Focus Areas. These are: Deterrence (including forward presence);

Collective Defence; Readiness, Deployability and Sustainability; NATO Air C2; Intelligence, Surveillance and Reconnaissance (ISR); Missile Defence; Hybrid Warfare and Resilience; Alliance and Partnership Cooperation; Defence Industry and Technology Cooperation; Cyber; and Interoperability. Out of these eleven, Cyber and Interoperability are not examined separately, but are addressed integrally, if applicable for a Strategic Focus Area. Deterrence, Collective Defence and Readiness, Deployability and Sustainability are dealt with in two separate articles. One article focuses on the political-strategic and the other on the military-strategic and -operational perspectives. Therefore, this Study includes seven independent articles, covering a total of eleven Strategic Focus Areas.

In his political-strategic perspective of 'the role of NATO Joint Air Power in Deterrence and Collective Defence', Dr. H. Binnendijk states that 'today's global trends may make deterrence harder to achieve than at any time since the end of the Cold War'. This fact was recognized at NATO's 2016 Warsaw Summit and steps were taken to strengthen deterrence and defence. NATO Joint Air Power will be critical to NATO's effort to enhance deterrence and is vital to its efforts to defeat a Russian adversary. NATO Joint Air Power would be the first responder to meet a Russian conventional challenge and could offset and deter a Russian strategy to 'strike, pause, and win'[1]. Should deterrence fail, Russia may have critical advantages with regard to time, geography, and political will, despite that nation's relatively small defence budget. In the south, Air Power currently plays the critical role in defeating the Islamic State. Unless relations with Russia improve dramatically, NATO Air Power must transition from difficult but unopposed missions in the south and focus on much more politically and militarily demanding tasks to the east. In addition, the role of NATO air forces in nuclear deterrence, missile defence, and cyber assurance is also becoming increasingly complex. To deal with these new challenges, European NATO air forces will need to maximize their early warning and rapid response capabilities and work closely with the United States to reap the

full benefits of the so-called 'Third Offset'[2]. As the trend in Europe towards reducing defence budgets since the end of the Cold War is lessening in response to both the growing threat and to United States (US) pressure, European NATO air forces will need to receive a significant portion of that additional funding, commensurate with their increasingly important role.

In his article 'Joint Air Power Priorities, Deterrence and Collective Defence', General (ret.) F. Gorenc addresses Deterrence, Collective Defence and Readiness, Deployability and Sustainability from a military-strategic and operational-strategic perspective. In essence, he states that 'NATO is the most successful Alliance in history, but that past performance does not guarantee future results. Four realities could limit NATO aspirations. Recognizing and understanding these four realities will posture the Alliance for future successes.

First, NATO potential power is not real power. A combined NATO, $36 Trillion Gross Domestic Product (GDP) does not generate real military power unless Allies increase defence spending and invest wisely. Large, well-equipped militaries do not generate real military power unless forces are fully combat capable and offered during force generation. Second, when deterrence fails, prompt consensus is pivotal and collective defence must be decisive. Potential adversaries know consensus is a NATO centre of gravity and will attack using asymmetric means to delay or prevent consensus. Long, contentious delays in gaining Alliance consensus weaken NATO's credibility because the enemy may come to believe NATO would not or could not invoke Article 5. To remain credible against the threats described in the Warsaw Summit, prompt consensus must be followed with decisive, real power to achieve collective defence. Third, the enemy has a vote and could choose war. Currently, in 'peacetime', Russia, Islamic State of Iraq and the Levant (ISIL)/Daesh and Iran are aggressive. Russia's modern missile systems could hinder NATO's freedom of movement and threaten critical infrastructure. Adversaries are pursuing and threatening

the use of nuclear weapons and Russia's implied willingness to use nuclear weapons in retaliation to an Article V response could delay NATO's decision making process or fracture NATO resolve. Fourth, NATO leaders set high expectations for their forces. They want a force that can deter, reinforce and defend against full spectrum potential threats attacking from any direction and they want the force to be deployable, sustainable, interoperable, sufficiently armed, and capable of full range spectrum operations and at high readiness! These demands come with high expenses. NATO Joint Air Power will continue to guarantee success and minimize risk during both peacetime and crisis. If deterrence fails and the enemy chooses war, NATO air forces with their speed, flexibility, range and high readiness will be the first to respond and maximize the effectiveness of the follow on joint force. Defence investment and pursuing key urgent priorities will give NATO Joint Air Power the historically asymmetric advantage Allies have come to expect. The article concludes with a focused 30 point plan for improving NATO Joint Air Power.

In his paper entitled 'Joint Air Power Following the Warsaw Summit Urgent Priorities' Action Plan – Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air Command Control (Air C2)', Lieutenant General (ret.) F. Ploeger asserts that the effective application of Joint Air and Space Power requires modern, agile and responsive C2. This is dependent on an effective and efficient organization, robust C2 systems and communication systems, and more importantly, on dedicated, trained and skilled personnel. Furthermore, a JISR System is needed that generates Indication and Warning (I&W), to permit a timely response, as well as the battle space information to enable effective joint air operations. Against the backdrop of the changed security environment, Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) in NATO shows several shortfalls in policies, concepts, and structures which need to be addressed in order to maintain the operational edge[3]. The adaptation of concepts and structures, the willingness to share informa-

tion, and the availability of trained operators in sufficient numbers in the NATO Command Structure (NCS) and in NATO Force Structure (NFS) C2 elements are essential to nearly all improvement measures. Partnering with capable national JISR and Joint Force Air Component (JFAC) staffs is an indispensable prerequisite. Furthermore, it should not be forgotten that the rapid realization of modern interoperable C2-systems is a must for improving NATO's C4ISR. The issues presented by the Cyber Domain and Space Support to Operations need to be addressed both doctrinally and operationally.

Lieutenant General (ret.) F. H. Meulman focuses his article on 'Missile Defence in NATO – towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System'. Missile Defence is one of the Strategic Focus Areas in the Warsaw Summit Communiqué. In order to meet the challenges and threats of any kind and from any direction, the explicit focus in NATO on Theatre Ballistic Missile Defence (TBMD) must be expanded to include SBAMD as part of NATO Integrated Air and Missile Defence System (NATINAMDS). This will lead to the establishment of an operationally ready, credible and effective NATINAMDS, a key pillar for the successful execution of NATO's Joint Air Power Strategy. The majority of the urgent capability and competency requirements listed in this article are primarily targeted on improving NATO's SBAMD capabilities and competencies as part of NATINAMDS. The most important shortfall areas listed are leadership development; education, training, exercises and evaluation (ETEE); and connectivity and interoperability. Other critical requirements (such as additional sensors and shooters, strategic transport, more human resources for sustained operations, force protection, enhanced cyber security etc. …) are not addressed in this article since they are undoubtedly already well-known to the responsible agencies within NATO. However, that they are not mentioned more extensively does not make them any less important. Many of the short to medium term requirements listed in this article

can be solved affordably. For this reason, addressing the SBAMD/Integrated Air and Missile Defence (IAMD) requirements mentioned in this paper must be a high priority and should be an attractive course of action for NATO and its member states. It is assessed that when the requirements listed in this paper are resolved, the operational effectiveness of NATO's SBAMD and IAMD capabilities and competencies will significantly improve.

In the article on 'Hybrid Warfare and Resilience, Lieutenant General (ret.) F. H. Meulman and Lieutenant General (ret.) P. Preziosa focus on the short to medium term requirements for dealing with hybrid attacks in peacetime and in a situation where Article V of the Washington Treaty is invoked. Hybrid attacks can occur in peacetime in the form of terrorist, criminal or cyberspace attacks. This is the Hybrid Conflict phase, where hybrid actors refrain from the overt use of armed forces. In this phase, NATO is prepared to assist an Ally at any stage of a hybrid campaign. In a situation where Article V is invoked the Alliance and Allies will be prepared to counter Hybrid Warfare as part of collective defence. In the Hybrid Warfare phase, actors resort to the overt use of conventional or non-conventional armed forces against another country or non-state actor, as well as potentially terrorist, criminal or cyberspace attacks, at the same time and in a highly integrated fashion.

NATO Joint Air Power is of great importance for countering Hybrid Air Threats throughout the hybrid threat spectrum. This article raises the question whether NATO Joint Air Power has the required capabilities and competencies for conducting these operations and countering the threats and what the urgent Joint Air Power priorities are. The answer is that there is ample room for improvement and for enhancing Joint Air Power capabilities and competencies. The urgent priorities focus on three main areas. First, the need for achieving clarity in NATO's Joint Air Power Strategy, Air Power doctrine, Rules of Engagement (RoE) and in the legal aspects and responsibilities for NATO Joint Air Power's effectiveness in countering the

full spectrum of hybrid threats. Second, the need for enhancing existing air surveillance and control capabilities and implementing distinctive radar technology thresholds for effectively dealing with the full range of Hybrid Aerial Threats. Third, the need for establishing, in the organization of Joint Forces Commands, a well-educated, trained, exercised and validated Air Advisory Support Team (AAST) that will act as a knowledge, advise and assist centre for the effective use of NATO Joint Air Power in a hybrid air attack situation in peacetime (Hybrid Conflict) and can, if necessary, act as a Hybrid Threat Coordination Cell in a situation where Article V is invoked (Hybrid Warfare). The short to medium term Joint Air Power requirements, if resolved, will strengthen NATO's preparedness to assist an Ally at any stage of a hybrid campaign in peacetime and to effectively cope with Hybrid Warfare and hybrid threats. This also encompasses measures and requirements with an effect to improve resilience and preparedness.

In his article, 'Alliance and Partnership Cooperation; Bridging Mutual Joint Air Power Interests', Lieutenant General (ret.) F. H. Meulman reflects on options and recommendations for enhancing Alliance and military Partnership cooperation. Alliance cooperation is critical to develop effective and efficient collaboration at the operational level and for capability and competency development in the area of Joint Air Power between NATO member states. Operational cooperation with Enhanced and Gulf Cooperation Council (GCC) partner countries, in particular Finland and Sweden, is important because they provide a concrete and valuable contribution to NATO's fundamental tasks. NATO wants to enhance partnerships through flexible arrangements and NATO is giving operational partners a role in shaping strategy and decisions on NATO-led missions to which they contribute. NATO's goal is also to enhance Partnership interoperability and preparedness for future operations leading to improved capabilities and competencies for cooperation during operations. Also the Warsaw Summit Communiqué is clear as regards Partnership cooperation: 'the success

of NATO partnerships is demonstrated by their strategic contribution to Alliance and international security … (and that NATO) will further develop our partnerships so that they continue to meet the interests of both Allies and partners'. Alliance members also affirmed the need for a more 'tailor-made, individual and flexible approach to make NATO's partnership cooperation more strategic, coherent and effective'. NATO can achieve this goal if it is willing to allow some more political flexibility and provide the direction to achieve greater operational cooperation with the Enhanced and GCC-partners. The requirements listed in this article will significantly enhance the possibility for Alliance and Partnership cooperation and capability and competency development in the field of Joint Air Power. The majority of the requirements can be solved affordably. By doing so, NATO will enhance Alliance and Partnership cooperation in the operational domain. This is where NATO should focus its immediate attention.

Finally, in the article on 'Industrial and Technology Cooperation', Lieutenant General (ret.) F. Ploeger and Lieutenant General (ret.) P. Preziosa state that, in times of dwindling financial resources and facing the challenges of a changing security environment, it is of vital importance that Allies and partners cooperate in research and technology and with industry in order to be able to maintain and enhance the capabilities of their forces to respond to current and, more importantly, new and emerging threats. In its work following the Chicago (2012) and the Wales Summits (2014), the Alliance identified 21 shortfalls which are considered the most urgent to remedy to achieve the operational capability and capacity needed to combat these threats.

Industry normally competes and cooperates nationally and internationally as markets and national policies demand. To stimulate, facilitate and enhance Technology and Industrial Cooperation among Allies and Partners it is important to focus on mechanisms and attractive incentives to generate new opportunities.

Science, Research and Technology lay the foundation for future capabilities. Some exemplary proposals are developed where to concentrate Research and Technology to maintain the edge in NATO's Joint Air Power.

In conclusion, the essence of these seven independent articles is that they address the key areas of concern and interest, as expressed by the HOS/G at the 2016 Warsaw Summit. The articles provide a coherent package of urgent, short to medium term, Joint Air Power priorities. Taking into account the range of security challenges and threats the Alliance faces, it is time now to put words into practice and ensure that 'NATO has the full range of capabilities and competencies necessary to deter and defend against potential adversaries and the full spectrum of threats that could confront the Alliance from any direction'. To this end, this Study will be extremely beneficial to the development of NATO's Joint Air Power Strategy and to improving the Alliance's Joint Air Power capabilities and competencies.

Key Recommendations

The aim of this study is to provide a coherent set of urgent, short to medium term priorities in the field of Joint Air Power capabilities and competencies linked to the Warsaw Strategic Focus Areas, as promulgated in the 2016 Warsaw Summit Communiqué. The seven independent articles in this Study provide the highest priority Joint Air Power requirements. This chapter deals with key recommendations for mitigating the urgent, short to medium term Joint Air Power capability gaps and competencies. The key recommendations are grouped under the respective titles of the articles. For an overview of the prioritized requirements refer to the respective articles, or to Annex C, for a complete overview.

'The Role of NATO Joint Air Power in Deterrence and Collective Defence' – Dr. H. Binnendijk

- Significantly improve the readiness, deployability and sustainability of NATO air forces and bases to effectively deter Russia from invading NATO's eastern territory.
- Focus NATO Joint Air Power Strategy on the increasingly difficult task of rapidly gaining air superiority in an Anti-Access/Area Denial (A2/AD) environment.
- Concentrate a new NATO Joint Air Power Strategy on efforts to maximize the ability of NATO/European air forces to operate with declining United States participation.

'Joint Air Power Priorities, Deterrence and Collective Defence' – General (ret.) F. Gorenc

- Meet the 2014 Wales Summit Defence Investment Pledge (DIP).
- Establish a standing, fully functional Air Operations Centre (AOC) with

a fully manned Peacetime Establishment (PE) and Joint Force Air Component (JFAC). As a minimum, establish a standing and fully manned Intelligence, Surveillance and Reconnaissance Division (ISRD) within NATO Allied Air Command HQs.

- Replace Air Policing with Air Defence as the NATO standing peacetime mission.
- Develop a strategic Indication and Warning (I&W) System.
- Stand up a NATO Command Structure (NCS) Processing, Exploitation, and Dissemination (PED) Centre with a fully trained PE.

'Joint Air Power Following the Warsaw Summit Urgent Priorities' Action Plan – Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air Command and C2' – Lieutenant General (ret.) F. Ploeger

JISR

- Create a multinational JISR unit to complement the Alliance Ground Surveillance (AGS)-based capabilities.
- Increase the availability of sufficiently trained and experienced personnel for all JISR related elements in the NCS and the JISR network.
- All NATO nations should truly commit to mutual information and intelligence sharing according to the new tenet of a 'responsibility-to-share', avoid over-classification, and apply the 'need-to-know' principle only when really necessary.

Air C2

- Nations should provide to NATO the required number of sufficiently trained and experienced personnel in all specializations and for all JFAC divisions, including Intelligence, Surveillance and Reconnaissance (ISR), Air-to-Air Refuelling (AAR), Cyber and Space.

- Resolve doctrinal issues by adapting the NATO Integrated Air and Missile Defence System (NATINAMDS) Concept/the Air C2 Concept of Operations (CONOPS).
- Develop challenging training and exercises for all Air C2-levels.
- Invest as necessary in the rapid completion of the prolonged conversion to modern C2-systems (NATO Air Command and Control System (ACCS) and NATO Air Command and Control and Information Services (AirC2IS)
- Provide a 'Cyber Awareness Capability' at Allied Air Command Ramstein.

'Missile Defence in NATO – Towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System' – Lieutenant General (ret.) F. H. Meulman

- Broaden the knowledge and experience of NATO leadership at all levels in the SBAMD/IAMD-domain.
- Optimize and enhance SBAMD/IAMD- ETEE.
- Set overall conditions and begin the process of overhauling the connectivity and interoperability throughout the NATINAMDS system.
- Remedy the specified priority 1 and 2 requirements as a matter of urgency.
- Conduct an integral assessment of existing SBAMD/IAMD shortfalls and validate the effectiveness at all levels of NATINAMDS. On the basis of the findings, action must be taken in direct cooperation with the SBAMD/IAMD community in NATO.

'Hybrid Warfare and Resilience' – Lieutenant General (ret.) F. H. Meulman and Lieutenant General (ret.) P. Preziosa

- Clarify the concept of NATO's Joint Air Power Strategy and Doctrine, the applicable Rules of Engagement (RoE), and the legal constraints and restraints for NATO Joint Air Power effectiveness in countering the full spectrum of hybrid threats.

- Enhance existing air surveillance and control capabilities and implement radar technology thresholds for detecting, tracking and identifying the full range of hybrid aerial threats.
- Establish in the organization of Joint Forces Commands a well-educated, trained, exercised and validated Air Advisory Support Team (AAST) that will act as a knowledge centre for the effective use of NATO Joint Air Power in a hybrid air attack situation in peacetime. This AAST to be able to transform into a Hybrid Threat Coordination Cell in a situation where Article V is invoked (Hybrid Warfare situation).
- Remedy the specified priority 1 and 2 requirements as a matter of urgency.

'Alliance and Partnership Cooperation; Bridging Mutual Joint Air Power Interests' – Lieutenant General (ret.) F. H. Meulman

Alliance Cooperation:

- Strengthen NATO Allied Air Command 24/7 C2 Element that supports Commander Allied Air Command in providing accurate and timely situational awareness of political and military developments around the immediate periphery of Europe as well as an overview of current events in the airspace over NATO/Europe.
- Increase NATO member states' involvement, in particular NATO/European member states, in NATO Joint Air Power.
- Develop a multinational NATO Air Warfighting Centre. Starting on the basis of the Framework Nation Concept would allow a NATO Air Warfighting Centre to gradually develop into a practical hub for NATO Joint Air Power Education, Training, Exercising and Evaluation activities.
- Remedy the specified requirements with a priority 1 and 2 as a matter of urgency.

Military Partnership Cooperation:

- Develop a deeper security partnership by providing tailor made individual country Joint Air Power packages for the Enhanced and GCC-partners.
- Increase operational partnership cooperation. Priorities must be assigned to specific areas where operational cooperation between NATO and its Enhanced and GCC-partners can be initiated quickly and then gradually developed. Special attention should be focused on Finland and Sweden.
- Develop Partnership Air Groups based on NATO's Framework Nation Concept with a lead nation that creates an information based and practice-oriented Air Group organization that plans and organizes commonly agreed Joint Air Power activities on a yearly basis.
- Remedy the specified options and recommendations with a priority 1 and 2 as a matter of urgency.

'Industrial and Technology Cooperation' – Lieutenant General (ret.) F. Ploeger and Lieutenant General (ret.) P. Preziosa

- The Framework Nation Concept is the optimal choice as it offers the best environment and prospects for close cooperation between allied and partner forces and industry.
- A prioritized list should help Allied and partner countries to better identify areas for technological and industrial cooperation.
- Concentrate cooperative research and technology for Joint Air Power Capabilities (JAPC) in areas vital to successfully operate in a hybrid/contested environment.
- Open standards should be used as tools to stimulate innovation and new ideas.
- NATO should intensify cooperation with the EU and develop instruments to make cooperation among industrial partners more attractive.

Endnotes

1. Under this strategy Russia would seize territory of a NATO member, pause while NATO mobilizes its ground forces, and seeks to win by undermining European will to retake lost territory.
2. The Third Offset is an American concept designed to use new technologies like artificial intelligence and drones to gain an operational advantage against adversaries whose technological gap with NATO is quickly closing.
3. Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR).

Introduction

<div style="text-align: right">**1**</div>

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A – Wales Summit Declaration, 5 September 2014.

B – BI-SC Final Report on Joint Air Power capabilities, SH/PLANS/JCAP/FT/15-311417, 7 December 2015.

C – Warsaw Summit Communiqué, 9 July 2016.

D – NATO Strategic Concept 'Active Engagement – Modern Defence', Lisbon, 2010.

E – NDPP Planning Process. PO(2016)0655 (INV), 24 October 2016.

F – JAPCC Future Vector Project, July 2014.

G – Strategic Foresight Analysis (SFA), 2013 Report, HQ SACT and Interim Update to the SFA 2013 Report, 2015.

H – Framework for Future Alliance Operations, August 2015.

I – Status Report on Smart Defence Multinational Projects, DI(STR)(2012) 0008 REV61, 1 October 2016.

O n the way to its 70th anniversary in 2019, NATO is in one of the most challenging periods of its existence. The international security situation that NATO faces has changed dramatically over the last couple of years. NATO is confronted with a variety of security threats. The areas from which these destabilizing threats emerge are multidirectional, but predominantly originate from both the east and the south. The threats range, amongst others, from the rise of autocratic States with the intent to expand their power base and influence; the flow of refugees to Europe; internal strife in different countries; to social and ethnic-religious contradictions that lead to civil unrest and civil wars. Based on polar ice receding, it also includes the threat of new military and civilian activities in establishing global lines of communication and supply routes in the high north.

In the last few years several European cities suffered terrorist attacks. Countless victims were regrettable and, for some parts, fear has started to determine the life for many ordinary citizens. Besides these organized terrorist attacks inside Europe, we are faced with Islamic extremism organizations, like Al-Qaeda, which operate network based and we are faced with the fight against the Salafi jihadist proto-state called the Islamic State of Iraq and the Levant (ISIL), also known under its Arabic acronym Daesh. NATO supports the Global Coalition to Counter ISIL by providing NATO AWACS to improve situational awareness. NATO is also creating a new regional Hub for the South, based at NATO's Joint Force Command (JFC) in Naples. It will be a focal point for increasing both the Alliance's understanding of the challenges stemming from the region, and its ability to respond to them.

The most pressing example of a country that shows a revival of traditional power is Russia. This is not a new Russia, but a country that is ruled now by an autocrat basing his presidency on assertive national policy and an even more aggressive international posture, thereby reviving nationalism among the Russians. The President of Russia has claimed that 'a unipolar

world is unacceptable and that Russia will play an increasingly active role in establishing a reasonable balance between the interests of all partici- pants in the architecture of global security' (Munich, 2007). Already a dec- ade ago, Russia launched an extensive 10-year modernization programme of its armed forces, in particular the Air Defence and Air Forces, to meet Russia's security and defence interests. The recent examples of Russia's assertive power in a regional and global sense have put the relations with NATO under significant strain. Especially, Russia's recent military actions in the eastern part of the Ukraine and in the Crimean Peninsula and her assertiveness in international security have shifted the military balance, or at least has changed the balance of the security paradigm for NATO.

NATO is not only confronted with security threats from outside Europe, but also from risks within. It faces the development of nationalism and populist thinking in some of its member countries that can have an im- pact on internal stability and, ultimately, on the cohesion of the Alliance as a whole. But, it is also about expectations of NATO countries. This con- cerns, in particular, the strategic discussion on the State of the Alliance and the trans-Atlantic relationship, specifically the United States' desire for all member nations to contribute their share of the burden to NATO defence spending and capability and competency development.

NATO, faced with this diverse, unpredictable and demanding security en- vironment, has recognized a paradigm shift and placed emphasis on measures for strengthening deterrence and collective defence. It has led to a range of steps by NATO to reinforce its collective defence, enhance its capabilities, and strengthen its resilience. NATO has committed to en- hance the Alliance's role in establishing stability to include a 360 degree approach. It has also committed to provide its armed forces with sufficient and sustained resources, thereby underlining its strategic intent, that 'NATO's essential mission is unchanged and that NATO will ensure that it has the full range of capabilities necessary to fulfill the whole range of

Alliance missions, including to deter and defend against potential adversaries, and the full spectrum of threats that could confront the Alliance from any direction'. Part of this is NATO's capability to undertake Crisis Management Operations, alone or in cooperation with other countries and international organizations. Currently, NATO is operating in Afghanistan, Kosovo and the Mediterranean.

It is clear that there is a need for NATO, European members in particular, to take on more responsibility for their own security and increase the amount of funding they spend on defence[1]. Although NATO countries boosted defence spending by more than $10 Billion last year, more needs to be done. Only five out of the twenty-eight NATO members are meeting the target of allocating 2 % of their Gross National Product to defence. But, the signs of change are positive. There are credible signs of increasing defence budgets in virtually all NATO countries. The changes and challenges in the international security situation are too large to disregard any longer. For too long the focus was on reductions and changes in the defence organizations. It has resulted in the genuine risk that NATO will lack the capabilities and competencies to meet its Level of Ambition (LoA).

In view of the recent changes in the security environment, the NATO Summits in Wales (2014) and, in particular, in Warsaw (2016) were pivotal in formulating and promoting the necessary processes of change in NATO. At the 2016 Warsaw Summit, the Heads of State and Government (HOS/G) of NATO emphasized the need to address shortfalls in essential capabilities and competencies. Beside these initiatives, it must be noted that NATO has been actively pursuing initiatives to improve its operational capabilities and competencies for more than fifteen years.

In the last few decades, Joint Air Power in NATO-led operations played a crucial role, providing NATO and national leaders with a tool of unmatched responsiveness and flexibility and forming a sine qua non for the

integral and effective execution of the operations. Joint Air Power is, therefore, an essential part of the capabilities and competencies required for effective implementation of NATO's Essential Core Tasks: Collective Defence, Crisis Management and Cooperative Security[2]. Paradoxically, NATO nations have drastically reduced their air power capabilities in the last two decades to the extent that, if the current situation remains unchanged, it will leave NATO and, in particular, NATO European nations with less than the required Joint Air Power capabilities and competencies. Consequently, it will degrade NATO's ability to effectively plan, task and execute Joint Air Power operations throughout the entire spectrum of Alliance Operations and Missions.

These concerns, in conjunction with the changing security environment along the periphery of NATO, have led to a heightened awareness in the Alliance of the requirement to solve existing capability and competency shortfalls in the field of Joint Air Power. In 2013, the JAPCC started the Future Vector Project to identify viable options and realistic solutions to chart the path forward to guarantee that Joint Air Power and assured access to relevant space based data and information continuous to contribute to the success of NATO and its Member States. Through a series of essays, a team of acknowledged experts in the field of security and defence policy provided an extensive and balanced perspective including a broad range of recommendations.

The 2014 Wales Summit Declaration (ref. A) was clear about the direction that NATO should take: 'NATO needs, now more than ever, modern, robust, and capable forces at high readiness, in the air, on land and at sea, in order to meet current and future challenges. We are committed to further enhancing our capabilities. To this end, today we have agreed a Defence Planning Package with a number of priorities, such as enhancing and reinforcing training and exercises; Command and Control (C2), including for demanding air operations; intelligence, surveillance, and reconnaissance;

and NATO's Ballistic Missile Defence (BMD) capability.' … 'We have agreed this Package in order to inform our defence investments and to improve the capabilities that Allies have in national inventories. In this context, NATO joint air power capabilities require longer-term consideration.'

This clear guidance led to a task for the Strategic Commanders, with ACT in the lead, to answer three questions. First, to determine whether Joint Air Power has a future. Second, if so, to provide recommendations for a long term approach that will inform the future development of Joint Air Power while also identifying the medium to long term Joint Air Power capability requirements. Third, to consider how to improve and instigate coherence and cooperation in employing all aspects of Joint Air Power. The outcome of this capability requirements-based gap analysis was presented in a Bilateral Strategic Command (BI-SC) Report on Joint Air Capabilities, dated December 2015 (ref. B). The Report provided NATO with a well prepared, wide-ranging set of recommendations for the medium- and long-term Joint Air Power capability requirements. As a follow-on step in the process of longer-term consideration of NATO Joint Air Power, the Strategic Commanders recommended the development of a NATO Joint Air Power Strategy. Having noted the military advice, the Council tasked the NATO Military Authority (NMA) to develop a Joint Air Power Strategy for the Alliance. Accordingly, the Strategic Commanders, with ACT in the lead, were tasked to deliver the Joint Air Power Strategy, following the Ends – Ways – Means construct, through a two-step approach. First, the Conceptual Basis for the Joint Air Power Strategy, which was approved by the Military Committee and noted in the North Atlantic Council (NAC). And second, to complete the Strategy by addressing the development of future NATO Joint Air Power Capabilities (JAPC) (i.e. the Means), not later than 16 November 2017.[3]

The 2016 Warsaw Summit Communiqué (ref. C) is the most current expression by the HOS/G of key contemporary security concerns and focus areas. They stressed that 'NATO's greatest responsibility is to protect and

defend our territory and populations against attack and that renewed emphasis has been placed on deterrence and collective defence'. They also expressed their intent 'to ensure that NATO have the full range of capabilities necessary to deter and defend against potential adversaries and the full spectrum of threats that could confront the Alliance from any direction'. These clear statements re-emphasize the need for the Alliance and its member states to address shortfalls in essential capabilities and competencies.

The Methodology of the Study

The Executive Director of the JAPCC acknowledged this key guidance and direction of the 2016 Warsaw Summit and decided to initiate a focused analysis that aligns with and supports work that is currently being conducted in the field of Joint Air Power capability and competency development. The Study is titled: 'Joint Air Power following the 2016 Warsaw Summit – Urgent Priorities', the results of which are the subject of this paper[4]. It provides urgent Joint Air Power priorities and recommendations within the context of the main areas of interest and concern as emphasized by the HOS/G in the Warsaw Summit Communiqué[5]. In the context of the Project, these main areas of interest and concerns are labeled: Strategic Focus Areas.

An analysis of the 2016 Warsaw Summit Communiqué reveals the following Strategic Focus Areas, which can be directly associated with NATO Joint Air Power:

• Deterrence (including forward presence);
• Collective Defence;
• Readiness, Deployability and Sustainability;
• NATO Air C2;
• Intelligence, Surveillance and Reconnaissance (ISR);

- Missile Defence;
- Hybrid Warfare and Resilience;
- Alliance and Partnership Cooperation;
- Defence Industry and Technology Cooperation;
- Cyber domain[6;]
- Interoperability.

The association between the Strategic Focus Areas and NATO Joint Air Power can be better understood by connecting these to NATO's Essential Core Tasks. These are the Tasks which contribute to safeguarding Alliance members. The Strategic Focus Areas are main areas of interest and concern to NATO and include a range of activities to effectively give substance to each of the named areas. NATO's Core Air Power roles are the main tasks that can be performed by Joint Air Power. The Core Air Power roles and their strategic effects make a fundamental contribution to the successful execution of NATO's Essential Core Tasks and achieving the requirements for each of the Strategic Focus Areas. The matrix on page 25 illustrates the various links.

What stands out is that each Strategic Focus Area, with the exception of Collective Defence, has a relationship with two or more Essential Core Tasks. All Strategic Focus Areas, except Alliance and Partnership Cooperation, have a relationship with most Core Air Power Roles through their related strategic effects. Although the relationship between Alliance and Partnership Cooperation and the Air Power roles and strategic effects might not be directly apparent, experience from recent Joint Air Power operations attests that dedicated partner countries were engaged in one or more Core Air Power roles and in achieving strategic effects. The conclusion is that there is an obvious and strong bond between NATO's Core Essential Tasks, the Strategic Focus Areas, the Core Air Power roles and the strategic effects that can be achieved with the implementation of these roles. Consequently, it reveals the significance and extent to which

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		Essential Core Tasks			Core AP roles *1	Strategic effects *2
		Coll. Defence	Crisis Man.	Coop. Security		
Strategic Focus Areas	Deterrence (incl. forward presence)	x	x		1 2 3 4	1 2 3
	Collective Defence	x			All	All
	Readiness, Deployability and Sustainability	x	x		1 2 3 4	All
	NATO Air Command and Control	x	x		All	All
	Intelligence, Surveillance and Reconnaissance (ISR)	x	x	x	1 2 3 5	All
	Missile Defence	x	x		1 3 4	1 3 4
	Hybrid Warfare and Resilience	x	x		All	All
	Alliance and Partnership Cooperation	x	x	x	2 5	1
	Defence industry and Technology Cooperation	x	x	x	All	All
	Cyber Domain	x	x	x	All	All
	Interoperability	x	x	x	All	All

*1 Core Air Power Roles	(1) Command of the Air	(3) C2	(5) Precision Strike
	(2) Strategic Mobility	(4) ISR	
*2 Strategic Effects	(1) Deter and prevent	(3) Protect	(5) Support and Sustain
	(2) Project	(4) Counter	

NATO Joint Air Power is linked to the list of main areas of interest and concern (Strategic Focus Areas), which was distilled from an analysis of the Warsaw Communiqué.

As stated before, this Study is titled: 'Joint Air Power following the 2016 Warsaw Summit – Urgent Priorities'. It provides urgent Joint Air Power priorities and recommendations linked to the Strategic Focus Areas. The question, however, is what urgent means. So far, the focus of the intellectual work conducted by the JAPCC in its 2014 Future Vector Project and the 2015 BI-SC Final Report on JAPC was predominantly on recommendations for long term, future development of NATO Joint Air Power and medium- to long-term Joint Air Power capability requirements.

The short- to medium-term focus is important because recent developments in the security environment in and surrounding Europe show the imperative of high readiness and preparedness and the availability of the full range of essential Joint Air Power capabilities and competencies to deter and defend against potential adversaries throughout the entire threat spectrum. This focus is also important since most existing capability and competency development initiatives or processes, except NATO Forces 2020 (Connected Forces Initiative (CFI) and Strategy Division (SD)), focus predominantly on the medium- to long-term requirements. Finally, the emphasis on the short- to medium-term priorities is important because the options provided under NATO Forces 2020 have, so far, not adequately solved the full range of shortfalls in essential Joint Air Power capabilities and competencies, despite the fact that the goal of NATO Forces 2020, is to achieve 'modern, tightly connected forces, equipped, trained, exercised and commanded so that they can operate jointly and with partners in any environment'.

NATO, however, not only needs modern, robust, and capable forces at high readiness in order to meet future challenges. It already needs these

modern, robust and capable forces to meet current challenges. Therefore, a focused approach on urgent, essential, and so far unfulfilled short- to medium-term Joint Air Power capability requirements is needed today. This is the immediate focus, what matters most, to help achieving the goals set under NATO Forces 2020. In order to address shortfalls in essential Joint Air Power capabilities and competencies it is necessary to determine whether there are gaps in the Strategic Focus Areas and which must be addressed urgently i.e. which are most needed now or at least in the short- to medium-term and which, if unresolved, will prevent NATO from successfully planning, tasking and executing key air power roles and/or achieve desired effects[7].

Aim of the Study

The aim of this Study is to provide a coherent set of urgent priorities in the field of Joint Air Power capabilities and competencies linked to the Warsaw Strategic Focus Areas, as derived from the 2016 Warsaw Summit Communiqué, with the intention of:

- 'Strategically informing, in a timely manner, the discussion of needed capabilities and competencies as part of the NATO Joint Air Power Strategy currently being drafted under the leadership of ACT and to support the achievement of the goals of NATO Forces 2020, set in the 2012 Chicago Summit.'
- 'To provide a timely input for the February 2018 Defence Ministerial meeting, where the Ministers are expected to agree on the finalized NATO Joint Air Power Strategy.'

In seven independent articles, the Study presents the urgent Joint Air Power priorities linked to each Strategic Focus Area, thereby fulfilling the aim of this Project. Furthermore, Annex B contains a list of likely trends for the development of future JAPC.

Prioritization Matrix

In a series of articles, covering all the Strategic Focus Areas, the Study presents a broad range of priorities of Joint Air Power capability and competency requirements. Each article will provide an overview of requirements and contains a matrix showing the relationship between these demands and the key attributes in determining the overall priority (i.e. impact and cost), which leads to the priority indication.

In the context of this Study, impact, cost and priority are defined as follows:

Impact can be defined as low, medium and high. Low means a low effect on the improvement of the capabilities and increasing knowledge and skills. Medium implies not a great effect, but still significant. High means a great effect on the capabilities and increasing knowledge and skills.

Cost associated with the proposed option or opportunity can be low, medium or high. Low means less than 1M €. Medium: means between 1–10M €. High means that the costs associated amounts more than 10M €. Within the context of this paper low and medium cost are defined as affordable. The affordability of medium cost assumes a high impact.

The priority of the options and recommendations ranges from 1 to 4. Prio 1 includes the following combinations of impact and cost: high impact – low cost and high impact – medium cost. The rationale is that medium cost is affordable. Prio 2 includes: medium impact – low cost and medium impact – medium cost. The rationale is that a medium impact still leads to a significant effect. Prio 3 includes: medium impact – high cost and high impact – high cost. Prio 4 includes: low impact – high cost.

Apart from impact and cost, the principle is that the proposed options also comply with the following criteria. First, have strategic implication,

which is related to a high and medium impact on the improvement of JAPC and increasing knowledge and skills. Second, they must be politically and militarily attractive. Third, preferably, they are joint/combined in nature. Fourth, they should be actionable.

		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
1	Requirements 1			x	x			x			
2	Requirements 2			x			x			x	
3	Requirements 3			x	x			x			
4a	Requirements 4a			x	x			x			
4b	Requirements 4b			x	x			x			

An overview of these prioritization matrices is given in Annex C.

Starting Points and Assumptions

The following starting points and/or assumptions apply to the Project:

- NATO's Strategic Concept 2010 forms the basis for this study. In this respect, NATO will continue to effectively fulfill its three Core Tasks: Collective Defence, Crisis Management and Cooperative Security, in accordance with international laws and the interests of the member states.
- NATO Joint Air Power must possess the full range of capabilities and competencies to deter and defend against potential adversaries and the full spectrum of threats that could confront the Alliance from any direction.
- Joint Air power will be dealt with from a joint/combined perspective. Central to the Project will be the urgent requirement to address essential Joint Air Power capabilities and competency gaps that contribute to the effective planning, tasking and execution of the Core Air Power roles.

- Space capabilities serve as critical enablers to all domains, especially those capabilities that operate in the air domain. Cyber warfare and information networks are dimensions of the battlespace. Due to current restraints of different nations a combination of Air, Space and Cyber into one operational domain is not acceptable at this time.
- Contradiction, overlap or duplication of the comprehensive work in the realm of Joint Air Power capability and competency development must be prevented. The work of this Project should align with and support the existing efforts in the field of Joint Air Power capability and competency developments[8].

Acknowledgement

The development and emergence of this study was not possible without the involvement and support of a number of key officers and organizations. First and foremost, the Executive Director of the JAPCC, Lieutenant General (DEU AF) J. Wundrak, showed a sense of urgency to actively address the outcome of the 2016 Warsaw Summit and starting the discussions on the feasibility of the Study. Ongoing support for the Project was provided by the Director of the JAPPC, General (USA AF) T. D. Wolters. Without the support of ACT, and in particular from the Deputy Chief of Staff Capability Development, Lieutenant General (USA AF) J. G. Lofgren, the Study would not have been started. A sincere thanks, of course, goes to the Staff officers of the JAPCC and the Staff of ACT, who, because of their continued commitment, have shaped the progress of the Project. A specific word of thanks goes to Colonel E. Abma (NDL AF) and Lieutenant Colonel R. Korus (DEU AF). Special thanks goes to those who, in discussions and interviews, were willing to share their experiences and thoughts with the various authors of the articles or provided inputs to the Study in different ways.

All these people were instrumental in setting the conditions for successful completion of the Study. The actual content of the Study was provided by

the members of the Expert Team. Their knowledge, substantive expertise and commitment led to a series of excellent articles, thereby meeting the objectives of the Study. The broad variety of urgent priorities they have presented will be important for further work in NATO and is aimed at reducing short- to medium-term Joint Air Power capability and competency shortfalls. Therefore, a sincere word of thanks to the members of this Expert Team.

In Conclusion

This study provides the urgent strategic priorities in the field of Joint Air Power capabilities and competencies linked to the Strategic Focus Areas, as derived from the 2016 Warsaw Summit Communiqué. The outcome of this Study is important for: the future development of capabilities and competencies needed for successfully executing NATO's Joint Air Power Strategy; optimizing the NATO Forces 2020 initiatives; and for mitigating the concerns expressed by the HOS/G during the 2016 Warsaw Summit. In particular, the outcome of this Study might be used as a timely input for the February 2018 Defence Ministerial meeting, where the Ministers are expected to agree to the finalized NATO Joint Air Power Strategy. Overall, this coherent package of urgent, short to medium term Joint Air Power priorities will support NATO in ensuring that it has 'modern, tightly connected joint air forces, equipped, trained, exercised and commanded so that they can operate together and with partners in any environment and throughout the whole range of Alliance Operations and Missions'.

The Expert Team advises NATO to urgently address Joint Air Power priorities 1 and 2 listed in this study. By doing so, NATO will mitigate the critical short- to medium-term Joint Air Power shortfalls that might prevent NATO from successfully conducting their Essential Core Tasks. The Expert Team believes that many of the requirements are achievable

in the short- to medium-term and are affordable. The Team is of the opinion that the improvements to the availability, quality and operational readiness of NATO Joint Air Power capabilities and competencies will be significant. Although many of the individual demands are assessed as affordable, the associated total costs will be considerable. However, the positive effects in Joint Air Power capability and competency development that can be achieved by addressing the priority 1 and 2 requirements are substantial. It will leave NATO less vulnerable. Most importantly, though, is that by delivering on the urgent Joint Air Power priorities the member states will contribute to ensuring that NATO continues to have the full range of necessary capabilities and competencies to deter and defend against potential adversaries and the full range of threats that could confront the Alliance from any direction. NATO as a whole, will continue make a credible contribution to achieving an effective deterrence and defence posture.

Contributions

This Study addresses, in total, eleven Strategic Focus Areas from the Warsaw Summit Communiqué that have a direct association with Joint Air Power. As outlined in footnote 6, Cyber and Interoperability are not examined separately, but are assessed and addressed integrally if applicable for a Strategic Focus Area. The remaining nine Strategic Focus Areas are treated in seven independent articles. The topics of Deterrence (forward presence), Collective Defence, and Readiness, Deployability and Sustainability are analyzed and assessed from both a political- and military-strategic perspective. The political dimensions and priorities are dealt with by Dr. H. Binnendijk, while General (ret.) F. Gorenc (USA AF) focuses on the military aspects and priorities. Lieutenant General (ret.) F. Ploeger (DEU AF) analyses the urgent priorities of NATO Air C2 and ISR and also the Strategic Focus Area of Defence Industry and Technology Cooperation. Lieutenant General (ret.) F. H. Meulman (NLD AF) focuses

on the Strategic Focus Areas of Missile Defence, Alliance and Partnership Cooperation and Hybrid Warfare and Resilience. Lieutenant General P. Preziosa (ITA AF) acted as co-author for the articles on Hybrid Warfare and resilience and Defence Industry and Technology Cooperation.

Endnotes

1. In the Warsaw Summit Communiqué new emphasis was put on Article 3 of the Washington Treaty, stressing the need for NATO Member States to meet the commitment of 'maintaining and developing their individual and collective capacity to resist attack'.

2. Capabilities and competencies cannot be separated from the notion of capacities. Capability is the potential of a platform in terms of effectiveness and efficiency. Competencies are linked to the proficiency and skills of humans in the 'Joint Air Power loop'. Capacities are linked to quantity or size of the air power organization. The concept of force structure best describes these notions in conjunction: this relates to the composition and quality of NATO's Joint Air Power. For the sake of brevity, only capabilities and competencies are mentioned in the text. The extent or quantity is a direct outcome of capability oriented planning, which is the prerogative of the respective NATO member states.

3. Reference MCM-0272-2016(INV), date 20 Dec. 2016.

4. The study is being carried out by a small team of external experts that started in Nov. 2016 (Annex A). The basis for the Team's work is provided by the Wales Summit Declaration (Ref. A); the Warsaw Summit Communiqué (Ref. C); and NATO's Strategic Concept 'Active Engagement – Modern Defence', Lisbon 2010 (Ref. D). Furthermore, the team took significant note and incorporated applicable Doctrine, publications and work conducted previously in this subject area e.g. the NATO Defence Planning Process (Ref. E); JAPCC's Future Vector Project (Ref. F); HQ SACT's Strategic Foresight Analysis and Update (Ref. G); HQ SACT's Framework for Future Alliance Operations (Ref. H); the BI-SC Final Report on Joint Air Power Capabilities (Ref. B); and the Status Report on Smart Defence Multinational Projects (Ref I).

5. The meaning of the word strategic is not linked to the level of the priorities, but to their importance e.g. short term urgent priorities at the tactical level can be of strategic importance for successful mission execution.

6. Cyber domain and interoperability are both of utmost importance for NATO Joint Air Power. Having evolved beyond 'enablers' for other Domains, they are now recognized as critical for mission assurance. They are not restricted or described to any specific core air power role, achievement of a particular effect, or a specific urgent strategic joint air power priority. However, both must be considered during the planning, tasking and execution of each of the core air power roles in achieving strategic, operational or tactical effects, independently or in a more coherent manner. For these reasons, although listed as Strategic Focus Areas, these topics, are not examined separately, but are assessed and addressed integrally in each relevant Strategic Focus Areas.

7. In the framework of this study, short-term is defined as 'within a year, short- to medium-term within five years, medium- to long-term within 10 years and long-term more than 10 years.' It goes without saying that realization of short-term requirements is possible only to a very limited extent. Because of longer lead-in times the realization of the urgent priorities in the short- to medium-term is considered more realistic.

8. The Expert Team prepared this analysis independent of the BI-SC Study (reference B). After the work of the Expert Team was completed, the results were compared with the Recommendation Summary Table of the BI-SC Study and the Expert Team tends to confirm and expand on the BI-SC conclusions. This study provides more detail and context for many of the BI-SC recommendations.

The Role of NATO Joint Air Power[1] in Deterrence and Collective Defence

11

By Dr. Hans Binnendijk[2]

Introduction

T he review of NATO air power conducted pursuant to the Wales summit communiqué and the subsequent February 2016 NATO tasking has set in motion an important two-step process to deliver a NATO air power strategy. Under this process, a conceptual basis analyzing 'Ends and Ways' will be considered in a first study. A second step due a year later will finalize the joint air power strategy by considering Means. As a result, NATO air power will be on an equivalent footing with NATO naval power, where a much higher profile effort to create and implement a NATO maritime strategy has been highlighted in recent summit communiqués.[3]

This article is one of several being prepared for NATO's Joint Air Power Competence Centre and for ACT in support of this new air power strategy. It reviews the new directions set for the Alliance at the Warsaw Summit with regard to deterrence and collective defence. The footnotes at the end of each of the ten subtitles reference the provisions of the Warsaw Summit Communiqué that relate to that section. The essay further seeks to draw conclusions that will set priorities for NATO air power. This is one of two contributions made in this project on deterrence and defence. The other is being prepared by General (ret.) Frank Gorenc (USA AF). This article will focus in particular on the political and strategic issues raised at the Warsaw Summit.

Top Recommendations

Under these circumstances this article makes three key recommendations. Details can be found in each section and in the prioritization matrix at the end of this essay.

- The new NATO Joint air power strategy should be built around the notion that given current NATO ground troop deployments, **air power provides the ability to enhance deterrence** by convincing Russia that attacking the modest number of forward deployed ground forces will not give it an advantage that it can use following its strategy of attacking, pausing, and then suing for peace before NATO reinforcements arrive. **To achieve this, the first task should be to significantly improve the readiness, deployability and sustainability of existing air forces and air bases.** This includes a stronger commitment to Baltic Air Policing, higher level of pilot training, technical upgrades for existing aircraft, preparing air bases for forward operations, increasing munition stocks, maximizing multinational cooperation, and attaining overflight rights. This is the low hanging fruit that can pay quick dividends.
- **The second task of a new NATO Joint air power strategy should focus on the increasingly difficult task of rapidly gaining air superiority in an Anti-Access/Area Denial (A2/AD) environment.** To achieve this, NATO/European air forces need to acquire adequate numbers of both fifth generation fighter aircraft and advanced standoff munitions. Political decisions relating to targeting and Rules of Engagement (RoE) will need to be made as far in advance as possible.
- **The third task of a new NATO Joint air power strategy should concentrate on efforts to maximize the ability of NATO's European air forces to operate with declining US participation.** This may take many years, but interim goals should be set in the strategy. To implement this task NATO/European air forces should start to invest in enablers currently provided almost exclusively by the US like Intelligence,

Surveillance and Reconnaissance (ISR) assets, refuelling aircraft, Unmanned Aerial Vehicles (UAV) and strategic lift.

Part 1: Strengthening NATO's Deterrence Posture

Part I of this article looks at the changing nature of NATO's deterrent posture given current global trends and the role that air power needs to contribute to that posture. Section 1 looks at current global trends and their impact on deterrence. Section 2 reviews multiple phases of conventional deterrence and assesses the role of air power. Next, it reviews the role of air power in nuclear deterrence and the role of missile defences. Finally, it assesses the prospects for deterring cyber-attacks on the Alliance.

The Impact of Changing Strategic Trends on NATO Deterrence[4]

The July 2014 JAPCC Future Vector Project report contained an essay which highlighted eight global trends that, together, demonstrated the importance of air and space power for the NATO Alliance.[5] Those eight trends continue today. Some of those trends have become more urgent and dangerous since 2014. Below are four trends, each related to one of the eight described three years ago, which will shape the strategic environment for future Alliance deterrence efforts. Together they may make deterrence more difficult to achieve.

A. **Allied relations with Russia are in a downward spiral.** The risks of Russian aggression described in the 2014 project report have magnified as Russia has annexed Crimea, fought Ukrainian forces in the Donbas area, fought with Assad's forces in Syria against Western interests, practiced hybrid warfare against several of its neighbors, increased defence spending and modernization, accelerated nuclear intimidations and transferred nuclear weapons to Kaliningrad, strengthened its A2/AD capabilities in the Baltic and Black Sea areas, interfered in US and

West European political elections, and conducted snap exercises and air patrols that could result in dangerous incidents. The risk of conflict between NATO and Russia is at the highest point since the end of the Cold War. President Donald Trump's desire to improve relations with President Putin and Russia could, conceivably, improve this situation but the costs to Western interests might be high.[6] For example, the future of NATO enlargement, economic sanctions, and NATO missile defence might be on the negotiating table. Many in the US Congress and in Europe oppose President Trump's initiative, and he is beginning to modify his policies in response. The negotiations will need to be approached with planning, caution and partnership consultations. If they succeed and Russia curtails its hostile activities, then the need for enhanced deterrence may decline. Alternatively, **if a new effort by President Trump at detente is not successful, then relations are likely to plummet even further and enhanced deterrence will be more important than ever**.

B. **Challenges from the south are becoming more dangerous and are difficult to deter.** The 2014 report projected dire Malthusian trends[7] for the Middle East. Those negative trends continue and are impacting Europe directly. Civil wars continue throughout the greater Middle East, with major conflicts continuing in Afghanistan, Iraq, Syria, Yemen, Libya, Egypt's Sinai and Somalia. But now, Europe's security is increasingly affected by these conflicts as several million refugees head north and (Islamic State in Iraq and Syria (ISIS)-inspired terrorist operations consistently hit European cities and, in particular, in Belgium, France, Germany and Turkey.[8] NATO has varying degrees of involvement from Operation Resolute Support in Afghanistan, to training missions in Iraq, to support for anti-ISIS air operations in Syria. The fight against ISIS is slow but going well in both Iraq and Syria. In general, however, Western military involvement in the greater Middle East is shifting to lead nation and coalition operations that tend to place NATO in a minor, supporting mission.

This may change when the fighting stops in Syria, Libya and Yemen and when Europe is called upon to support Stabilization and Reconstruction missions. While air power is being actively used in the war against ISIS, naval forces and local constabulary forces are the principal instrument used to deter piracy, the flow of migrants, and terrorist attacks. Looking to the future, **it is unclear whether NATO nations have the political will to sustain the long term stabilization missions that will be needed to deal with the security effects of these Malthusian trends**.

C. **As challenges grow in the east and south, the United States may be a less reliable partner in providing deterrence for NATO.** The 2014 report suggested that America was in relative decline. In the future it may also be an unreliable ally. The 'America First' slogan of President Donald Trump has an element of international retrenchment attached to it. Throughout his campaign President Trump threatened to withdraw America's commitment to its treaty allies in Europe and Asia if they do not shoulder a larger portion of the defence burden. Trump has called NATO 'obsolete', in part because he believes the Alliance is not doing enough to combat terrorism. He has also been highly critical of the EU, calling it a consortium. After his inauguration, President Trump reversed course somewhat and talked about 100 % ironclad guarantees for America's treaty allies.[9] He plans to attend the May NATO summit in Brussels. But, doubts remain. European efforts, both national and through the EU, to spend more on defence is moving very slowly; the decline has generally been halted but reversing the trend to achieve the 2 % of Gross Domestic Product (GDP) defence spending goal may take the full decade allocated at Wales. President Trump appeared to invite some allies to develop their own nuclear capabilities rather than relying on the US. He has rejected US joint intelligence estimates about Russian meddling in the US election process. He does not see Russia as a significant threat to US interests. His values may clash with those of main stream Western Europe. The prospects for a new Transatlantic Trade and

Investment Partnership (TTIP) agreement look distant. It remains to be seen if he supports enhanced US and NATO forward deployment efforts agreed at Warsaw to deter Russia. President Trump's transactional 'art of the deal' style seems to be to strengthen his negotiating position by taking extreme and unorthodox stances and moving from there. It remains to be seen whether these are indeed just negotiating positions and not new American policy. President **Trump's assertive policies towards China and North Korea could lead to circumstances in which American military forces would need to be deployed primarily to Asia, at Europe's expense**.

D. **Europe appears ever more divided and incapable of deterring Russia in the east without strong US support.** The 2014 JAPCC Future Vector project report suggested that Europe was complacent about security issues. That complacency may have been mitigated in Eastern Europe, but the divisions in Europe as a whole have become deeper. The tough message contained in the Warsaw Summit Communiqué concerning deterrence and Russian aggression hides a high degree of disunity within the EU and the NATO Alliance. The EU is fraying if not imploding due to the Euro crisis, the migration crisis, and the resulting rise in populism. Brexit may be just the first element in the dismemberment of the EU and a re-nationalization of Europe. Right wing populist parties often supported by Russia are on the rise throughout Europe. Public opinion polls show alarmingly low public support for the common defence of the Baltic Area, especially in Mediterranean countries. In a sense, the low dissolution of the 'European Project' may cause Russia to continue with political pressure but avoid military actions which could re-unite Europe. Things are going Russia's way. But, Europe cannot count on modest Russian behavior. **Europe must renew its deterrence efforts, not just to show unity in the face of Russian aggression, but to convince the US that it is making a credible contribution to the common defence.**

Conclusions and Recommendations

- Global trends have compounded NATO's deterrence challenge in the past three years.
- To offset this concern, the Warsaw Summit sought to enhance '360 degree deterrence'.
- NATO's air power is critical to war fighting in the south, but its deterrent role there is limited.
- NATO air power is critical to deterrence in the east; this is where NATO's air power should be focused in terms of deterrence.
- Burden sharing has become a hot button issue in the US that Europe ignores at high risk to the Alliance. Failure to address this issue could make the US an unreliable partner.

NATO/European air forces are in a position to both demonstrate greater burden sharing and to further enhance deterrence towards the East.

Enhancing Conventional Deterrence Towards the East[10]

Russia's operations in Georgia and Ukraine, and its use of brutal tactics in Syria, have raised fundamental concerns in Eastern Europe about Russia's willingness to use force, either overtly or covertly, to seize vulnerable portions of the NATO area.[11] While NATO spends about ten times as much on defence as does Russia, Moscow would have some important advantages relating to timing, geographic proximity, and will, especially in the Baltic area. Scenarios abound in which Russia would seize territorial advantage using ambiguous means and then threaten nuclear strikes should their advantage be reversed. Therefore, NATO now places a new emphasis on deterrence.

Despite the four trends discussed above, NATO has taken important steps at both the Wales and Warsaw Summits to strengthen conventional

deterrence in the East.[12] This has taken place in steps. Significant progress will have been made if current deployment plans are sustained. But many analysts still question if NATO can have a credible deterrence without being able to deny a potential enemy the ability to take and hold NATO territory.

One might consider various stages of conventional deterrence in Europe today, starting from the lowest level. NATO has been slowly moving to higher levels of deterrence. NATO air power can play a significant role, especially in progressing from deterrence by forward presence to deterrence by mobilization and assured punishment.

A. **Deterrence through detente:** After the end of the Cold War, NATO saw Russia as a potential strategic partner. The 1997 NATO-Russia Founding Act and the NATO-Russia Council established a new relationship of detente under which a deterrent posture was thought unnecessary. That began to change following Russia's invasion of Georgia and coalesced at the Wales Summit. For example, Baltic Air Policing mechanisms were created. But, deterrence was not NATO or US policy as evidenced by continued defence cuts and the withdrawal of two American Brigade Combat Teams (BCT) from Europe. During this period, NATO air power was focused primarily on out-of-area missions and not on deterring Russia.

B. **Deterrence through reassurance:** At the Wales Summit, NATO took steps to reassure its Eastern Allies that Article 5 was credible. The rhetorical emphasis was still on reassurance rather than Cold War notions of deterrence. The means of reassurance rested with the creation of a Readiness Action Plan which included a new 15,000 person Very High Readiness Joint Task Force (VJTF) which would be postured to move to a conflict area within about a week. The 45,000 person NATO Response Force (NRF) was also enlarged to reinforce the VJTF. Materiel would be

forward deployed to equip reinforcing units. On its own, the US deployed one Army company in each of the Baltic States and in Poland as a stop gap measure. NATO air power was adjusted to support the VJTF and the NRF.

C. **Deterrence through resilience[13]:** The Wales and Warsaw Summits also emphasized national resilience as an antidote for Russian hybrid warfare. The notion was that a nation that could resist political, economic, asymmetric, cyber and limited **military** attacks would provide a degree of deterrence, since conquering or destabilizing that nation would be difficult. In Warsaw, national resilience requirements and guidelines were agreed to. NATO also agreed to help individual allies to enhance resilience. The role of NATO air power in this form of deterrence is quite limited to perhaps supporting national forces.

D. **Deterrence through horizontal escalation:** Some NATO officials, when pressed, will suggest that Russia is deterred today because their vital interests would be damaged should NATO pursue horizontal escalation in another theatre. For example, if Russia were to attack a Baltic State and NATO is unable to retake that territory in a timely fashion, NATO might initiate military action elsewhere, where Russia is weaker. It might conduct a naval blockade, or massive economic sanctions, or launch cyber-attacks that could destroy the Russian economy. NATO air power might play a significant role in putting Russian assets at risk as part of a horizontal escalation strategy. Similarly, US Air Force Chief of Staff General David Golden recently stated that the US should play chess not checkers, meaning that it needs to respond not just in theatre but globally.[14]

E. **Deterrence through forward presence:** After the Wales Summit, it became clear that rapid reinforcement of relatively small NATO units would be late and lack adequate fire power. Russia might be able to deter that

reinforcement by making it clear that the VJTF would be soundly defeated. So, additional measures were needed and taken at Warsaw. Four NATO multinational battalions (about 1,000 soldiers in each) will be forward deployed (led by the United States, Germany, the United Kingdom and Canada), one in each of the Baltic States and in Poland. NATO Force Integration Units (NFIU) were also forward deployed to organize reinforcement of these battle groups. The US will also deploy a BCT forward on a rotational but continuous heel-to-toe basis. Deterrence in this case will rest on the assumption that these units would be engaged in conflict with any invading armies and that several nations would take casualties, forcing those nations to commit and escalate. This is a capable force that could engage in combat, not just act as a trip-wire. Hence, many believe, an aggressor would be deterred. Critics argue, however, that these battle groups and the US BCT would be soundly and quickly defeated by a major Russian force and, therefore, do not offer adequate deterrence.

F. **Deterrence through mobilization and assured punishment:** The next step in deterring Russia should be to make it clear that reinforcements would include not just the VJTF and NRF, but large numbers of national follow-on-forces. Those forces would be able to retake lost ground and would punish Russia for its aggression. Defence cuts, however, have left most European militaries dramatically reduced with a low state of readiness for such operations.[15] US forces are also not postured for rapid reinforcement. Today it could take many months to reinforce NATO's forward deployed multinational battle groups with adequate ground forces to roll back an invasion. The pause in fighting while waiting for reinforcements might be seen by Russia as an opportunity to sue for peace before major conflict begins. That opportunity for success for Russia would weaken deterrence. Reversing this and attaining a higher degree of deterrence will require a significant improvement in the readiness, deployability and sustainability of all NATO

forces.[16] **This is where NATO air power can play its most significant role in deterring a Russian attack on NATO territory.** By improving NATO's ability to achieve air superiority[17] over contested Alliance territory in a timely fashion, Russian ground forces would become vulnerable to constant attack.[18] The pause in fighting that Russia might count on would be negated in part by air power. A delay in NATO ground force reinforcement would become less important. This might also be called 'deterrence by continuous response'. Achieving this, however, would require NATO air forces to make ineffective Russia's A2AD capabilities, especially in Kaliningrad which would raise the risk of further escalation.

G. **Deterrence through denial:** This is the gold standard for deterrence. The RAND Corporation in 2014/2015 conducted a series of war games designed to determine the results of conflict in the Baltic area that started with current assumed force levels.[19] In their scenarios, NATO air forces had 18.5 squadrons at their disposal[20] and Russia had 27 squadrons available. The asymmetries in ground forces were even greater. The key conclusions of the series of RAND games were:

- 'Across multiple games, using a wide range of expert participants playing both sides, the longest it has taken Russian forces to reach the outskirts of Tallinn and Riga is 60 hours.
- Because the Russian Air Force is sufficiently powerful to resist NATO's quest for air superiority for multiple days, the Red team was able to create "bubbles" in space and time to launch massed waves of air attacks against this NATO force.
- Such a rapid defeat would leave NATO with a limited number of options, all bad.
- Having a force of about seven brigades, including three heavy armored brigades – adequately supported by air power, land-based fires, and other enablers on the ground and ready to fight at the onset of hostilities – might prevent such an outcome. (This would require an

increase of about 4 BCTs above the force level currently available for an initial Baltic conflict.)

- This relatively modest force (of seven BCTs including three heavy) is not sufficient to mount a forward defence of the Baltic States or to sustain a defence indefinitely. It is intended to keep NATO from losing the war early.
- A successful defence of the Baltic States will call for a degree of air-ground synergy whose intimacy and sophistication recalls the US Army – US Air Force 'AirLand Battle' doctrine of the 1980s.
- Preventing a quick Russian victory in the Baltic States would also require a NATO Command Structure (NCS) able to plan and execute a complex, fast-moving, highly fluid air-land campaign.'

Forward deploying these additional ground forces together with related air defences is financially feasible given the stakes.[21] But, the political support for this increased level of forward deployment and deterrence does not appear to exist except in Eastern Europe.

Conclusions and Recommendations

The principal role for NATO air power in deterring Russia conventionally may be convincing Moscow that a quick victory over forward deployed NATO ground forces would not end the conflict quickly on Russia's terms.

Punishment and retaking of occupied land would be sure to follow because air power will continue the fight while ground forces mobilize. If NATO air power can convince Moscow that it is taking steps to gain air superiority rapidly and to apply precision strike against occupying forces, then Russia should conclude that it could not use a pause in the fighting to consolidate its positions in occupied territories and sue for peace on their terms.

What would it take to convince Moscow that NATO air power has this capability and will? The short-term priority list might include:

- Meeting and improving the NATO air forces 'deployability and sustainability' goals (upwards from 40 % and 8 % respectively).[22]
- Assigning national air forces to specific air superiority and ground attack missions.
- Preparing air bases to conduct forward operations.
- Deploying cruise missile defences forward.
- Exercising for the A2AD environment.
- Developing and deploying more effective Suppression of Enemy Air Defence (SEAD) munitions, anti-armor munitions, and area munitions; and stockpiling these in theatre.
- Improving digital links between F-22s, F-35s and other platforms that can attack A2AD targets.
- Conducting scenario-based discussions in the North Atlantic Council (NAC) with regard to the risks inherent in attacking Russian A2AD assets in Kaliningrad.

Sustaining Nuclear Deterrence[23]

Measures to enhance NATO's conventional deterrence are hard to separate from nuclear deterrence. During the Cold War when the Soviet Union had conventional advantages, NATO used the threat of nuclear escalation as a balancer. Now that NATO has conventional superiority, except in certain regional contexts, Russia takes a similar position. In both cases, these declared policies have tended to connect conventional and nuclear deterrence.

Russia has recently doubled down on its nuclear policies. They have developed a policy of 'escalation to deescalate' which threatened first nuclear use. They may have violated the Intermediate Range Nuclear Forces (INF) Treaty. They are modernizing non-strategic nuclear weapons, where they

have a significant advantage over NATO's deployed forces.[24] They have sought to intimidate allies with nuclear threats. And they have apparently moved nuclear tipped non-strategic missiles to Kaliningrad to underline those threats.

The Alliance has developed a formula for nuclear weapons that was originally outlined in the 2010 Strategic Concept and elaborated in the 2012 NATO Deterrence and Defense Posture Review.[25] The Review concluded that:

- 'Nuclear weapons are a core component of NATO's overall capabilities for deterrence and defence.
- The circumstances in which any use of nuclear weapons might have to be used are extremely remote.
- As long as nuclear weapons exist, NATO will remain a nuclear alliance.
- The supreme guarantee of the security of the Allies is provided by the strategic nuclear forces of the Alliance.
- Allies concerned will ensure that all components of NATO's nuclear deterrence remain safe, secure, and effective.
- NATO will develop concepts for how to ensure the broadest possible participation of Allies concerned in their nuclear sharing arrangement.'

During the 2016 Warsaw Summit, these policies have been augmented by a new declaration which states that 'any employment of nuclear weapons against NATO would fundamentally alter the nature of a conflict'. This is intended to make clear to Russia that nuclear intimidation will not be tolerated and that first nuclear use would not necessarily lead to the de-escalation that Russia desires.

Now NATO must take steps to make that new declaration viable. This does not necessarily mean increasing NATO's current nuclear inventory, nor does it mean forward deployment of NATO's nuclear stockpiles,

though some have suggested both ideas. Those suggestions would be contentious and could unravel the NATO nuclear consensus. In the realm of regional nuclear deterrence, the number and types of weapons on each side are of less importance than the fact that that a safe, secure, and reliable deterrent exists in theatre. **But, these new developments do mean that a continued NATO nuclear presence in Europe is vital, absent a negotiated reduction.**[26] The five nations who host US nuclear bombs[27] and the countries who have a dual-capable aircraft delivery mission will need to reaffirm those commitments.

Conclusions and Recommendations[28]

The need for nuclear deterrence is back. To stabilize the balance and assure that NATO's doctrine can be implemented, the following recommendations are suggested:

- make clear to the European as well as North American public why nuclear deterrence remains a vital element of the security of NATO and their societies;
- make sure that nuclear storage facilities in Europe are safe and secure;
- maintain and, as needed, modernize the existing modest B-61-based nuclear deterrent deployed in Europe;
- **maintain and modernize Europe's aging dual-capable aircraft delivery capabilities;**
- exercise potential responses to Russian nuclear threats; and
- seek ways to integrate France more directly into NATO nuclear planning efforts.

Developing an Appropriate NATO Ballistic Missile Defence[29]

There is a close relationship between deterrence and missile defences, though they are not the same thing. If NATO missile defences are effective,

any nation seeking to attack the Alliance with missiles would risk 'wasting their shot' and still face NATO retaliation. So, effective theater and Intercontinental Ballistic Missile (ICBM) defences, both, contribute to deterrence and NATO air and space power is critical to its success.

The Warsaw Communiqué reiterated the basic purpose of NATO's missile defence initiatives, noted that they are on track, including voluntary contributions from allied nations, and reinforced the Alliance's longstanding position that these strategic defences are 'not directed against Russia'.[30] Phase I and II deployments have been completed and Phase III is on schedule for Poland in 2018. The Heads of State and Government (HOS/G) declared at the Warsaw Summit that Initial Operating Capability (IOC) had been achieved and that BMD C2 was being transferred to NATO. This relatively positive consensus assessment of the programme's trajectory, however, masks several emerging strategic issues which could affect the programme's direction.[31] Those issues are discussed below.

H. **The changing threat from Iran.** The 2015 Iran Nuclear Framework Agreement reduced the risk of Iran deploying nuclear-tipped missiles over the next decade, but it did not limit Iran's missile capabilities which continue to grow. That fact has allowed consensus to lag behind the current pace of NATO's missile deployment plans. Under President Trump, however, the Iran deal may be at risk. Should the deal collapse, Iran's nuclear programme would likely resume and accelerate. At that point, NATO would need to decide how to proceed. On the one hand, should a Trump Administration be blamed in Europe for scuttling the deal, developing a new consensus might be contentious. On the other hand, the tensions surrounding an accelerated Iranian programme might require a more robust missile defence programme, including deployment of more interceptors and reconsideration of the termination of European Phased Adaptive Approach (EPAA) Phase IV (see next page).

I. Defending against an enhanced Russian short range missile threat. Russia's effort to create an A2AD zone in northeastern Europe and beyond and its efforts at nuclear intimidation both include missile deployments. Russia has recently announced the deployment of its nuclear capable Iskander ballistic missiles to Kaliningrad.[32] The need exists to optimize an Integrated Air and Missile Defence (IAMD) capability to deal with Russia. As it optimizes this capability by upgrading the NATO Integrated Air and Missile Defence System (NATINAMDS), NATO needs to make clear that its intent is not to threaten Russian ICBMs and, thereby, destabilize the strategic nuclear balance.

J. Continuation of the INF Treaty. Current plans for NATO's missile defences assume that the INF Treaty will remain in force. Questions have been raised about Russia's compliance with that treaty. Should either side abrogate the INF Treaty, NATO's missile defence problems would rapidly multiply. Current NATO missile defence plans would have to be reconsidered.

K. A deal with Russia on missile defence cooperation? At the other end of the spectrum of relations with Russia, it is possible that one element of a Trump Administration effort to normalize relations with Russia would involve a credible agreement on Ballistic Missile Defences (BMD). Unilateral US abrogation of the ABM Treaty is a major Russian grievance. The Warsaw Communiqué states that NATO remains open to discussion of missile defences with Russia, 'subject to Alliance Agreement'. That effort might include limits on NATO missile defence deployments and/or arrangements which might give Russia some degree of control over cooperative missile defences.

L. The Future of Phase IV. In March of 2013, the US announced that it would terminate Phase IV of the EPAA. Phase IV would have developed and deployed the Standard Missile 3 (SM-3) Block IIB system which was

intended to have an anti-ICBM capability. Both technical and political considerations apparently went into this decision. Some saw this as a US concession to Russian concerns about their ICBM vulnerability. As a result of this US decision, the NATO missile defence approach no longer defends the US. At the same time, and to compensate, the US anti-ICBM capability against smaller powers was strengthened by increasing the number of Ground-Based Interceptors (GBIs) to be deployed from 30 to 44. The GBI deployment would be most effective against North Korea. Should the Iranian nuclear threat become real again, and should technical problems with the proposed SM-3 Block IIB be correctable, then the US might reconsider cancellation of Phase IV.

M. Coverage for European partners? The Warsaw Communiqué states that the purpose of NATO's missile defences are to protect the 'population, territory and forces' of NATO countries. Given the ever closer relationships being formed between NATO, Sweden and Finland; given the unpredictable nature of missile attacks and given the fact that MOUs exist on military cooperation between NATO and these two countries, at some point NATO and individual NATO nations may need to face the question whether NATO nations will defend these two countries it they are attacked by enemy missiles, and under what circumstances.

N. European contributions to NATO missile defences. Europe contributes to NATO missile defences in several fundamental ways: they host radar and missile facilities, as well as Aegis ships' they escort US Aegis ships armed with Surface-to-Air Missiles (SAMs); they provide some BMD missiles of both European and US origin, and now, as a result of a decision taken at the Warsaw Summit, NATO as an organization, will take over the Active Layered Theatre Ballistic Missile Defence (ALTBMD) C2 system. Procedures and RoE will need to be refined. As the US focuses more on European burden sharing, maximizing Europe's contribution to what is essentially a US-provided capability will be particularly important.

Conclusions and Recommendations

Remarkably, a consensus still exists for the three phases of NATO's ICBM defence system despite the reduction of the nuclear threat from Iran which originated the programme. **While development of NATO's BMD system still seems to be on track, a number of pending strategic issues could profoundly affect the programme's future direction.** Perhaps the single most important of these factors is NATO's future relationship with Russia. Given current trends, NATO is currently faced with the military need to develop a stronger integrated air and ballistic missile defence system.

- As NATO contemplates the future direction of its missile defence system, it will be important not to lose the political consensus that has enabled it.
- NATO needs to make Command and Control (C2) of its strategic BMD a top operational priority.
- European nations need to maximize their individual contributions to NATO inventory of missile interceptors.
- **NATO needs to strengthen its IAMD capabilities.**

Enhancing Deterrence in the Cyber Domain[33]

The scope of cyber-attacks is quite broad, ranging from nuisance and criminal intrusions, to interference in Western democratic processes, to attacks on defence industries, to attacks on national critical infrastructure, to attacks on military systems in peacetime and wartime. For example, the closing months of 2016 saw attacks on the Democratic Party in the US and on the electrical grid in Ukraine, probably both initiated from Russia.

The recent US Defense Science Board (DSB) study on cyber deterrence distinguishes between attacks made by major powers (Russia and China),

regional adversaries (Iran and North Korea), and non-state actors.[34] DSB director Craig Fields has noted that the US can defend against the lower level threats, but it must deter cyber-attacks launched from Russia and China.[35]

Cyber defences are imperfect. NATO networks and allied national defence establishments are under constant attack. Secretary General Jens Stoltenberg stated recently that NATO facilities are hit with 500 cyber-attacks that require extensive intervention per month.[36] These threats are aimed against both NATO policy making and its operational systems.

Responding to these threats over the past half-decade, NATO has begun to expand its focus beyond the narrow protection of Alliance networks. For example, it has established:

- a high level Cyber Defence Committee;
- a working level Cyber Defence Management Board;
- a Computer Incident Response Capability;
- a Cyber Defence Centre of Excellence in Tallinn;
- a NATO-Industry Cyber partnership;
- an Enhanced Cyber Defence Policy;
- that cyber-attacks can constitute an Article 5 attack (Wales);
- that cyber defence will be considered a separate domain (Warsaw);
- a national cyber defence pledge for the protection of national defence networks (Warsaw);
- an expanded cyber range (Warsaw).

In a recent paper for the Atlantic Council, Frank Kramer and his colleagues have suggested that allied nations identify which of their national military assets should have the highest priority protection and that the US become a NATO 'framework nation' for cyber defences, sharing more capabilities and approaches with its allies.[37] Others have suggested the creation of a

NATO cyber command that could centralize responsibility for both cyber defences and deterrence.[38]

The key to cyber deterrence is attribution and punishment. It is becoming clear (for example, with the evidence that Russia hacked the US Democratic National Committee) that attribution may take time but it is increasingly possible to identify the original attacker. The US DSB's 2017 report on cyber deterrence stressed the need for 'enhanced foundational capabilities' in the area of attribution.[39] Once proven, sanctions or other forms of punishment including retaliatory cyber strikes need to be swift and severe. If a state of cyber deterrence can be achieved, then it may be possible to negotiate enforceable cyber rules.

Conclusions and Recommendations

Cyber is a critically important domain for NATO air forces.

- **A cadre of NATO European air force officers should be trained to lead the Alliance in this domain.**
- Air power officials should also advocate for the creation of a separate NATO Cyber Command to focus the Alliances energies on this critical area. A senior NATO European air force officer might serve as its commander.
- Closer relations should be developed between US national and NATO cyber security operations.

Part II: Collective Defence

Part II of this essay examines various issues related to collective defence, should deterrence fail. The first section looks at the missions that NATO air forces would conduct in the East. The second section explores ways in which NATO might regain the conventional technological advantage that it is beginning to lose. The third section reviews the importance of early warning and rapid response in dealing with a conventional threat. The fourth section analyzes air power missions in dealing with the Southern threat. The last section addresses sharing the conventional defence burden and suggests a model for European NATO air forces.

Providing Collective Defence in an A2AD Environment[40]

Russia, like China, is building formidable A2AD capabilities that make gaining air superiority for US and NATO Air Forces more difficult. Former NATO SACEUR Wesley Clark recently observed that Russia and China are outpacing American military modernization efforts, especially in areas like air defence. He noted that Russia's new air defence system is changing the 'air-ground dominance where the United States could easily get air supremacy in the past'.[41]

The Warsaw Summit did re-focus attention on collective defence against this Russian capability. Should armed conflict break out in the NATO Area of Responsibility (AOR), several, primarily political, factors would determine the role of NATO air power. NATO officials should review these factors in advance to determine their impact on air operations. Those factors would include:

• Would Russia seek to keep the conflict localized? If Russia relies on non-conventional means and limits its own use of air power, then NATO would need to decide whether it would escalate and unleash its own air

power or whether it, too, would seek to win by using only those forces that are in the region.

- Did NATO forward deploy enough ground troops, air defences, and prepositioned equipment? The previous discussion of deterrent options included various levels of forward-deployed NATO troops. If there is an adequate number of forces forward-deployed with their own air defences it would affect the mission of NATO air power. If there are only a few NATO battalions forward-deployed with inadequate integrated air defences, then providing air cover for those troops would become the top priority.

- Is it a NATO operation or a coalition of the willing? One assumes that this would become a NATO Article 5 operation, but that may not be the case. Individual allies have a national commitment to other NATO nations, even if the NAC does not declare an Article 5 situation to be in effect. If the operation becomes a coalition of the willing, the NCS and other NATO assets may not be available.

- What would the air power balance look like? If all NATO and Russian air assets were to be deployed at the outset, then NATO would have a clear advantage.[42] But, US air assets are deployed globally and many European forces operate at low levels of readiness. If an adequate amount of US aircraft are not available, it might take NATO/Europe several weeks or more to gain air superiority over the Baltic region.

- Would the NAC give political authority for its air forces to attack A2AD sites in Kaliningrad and in Western Russia? Russia has the capability, using assets in Kaliningrad and in Western Russia, to make NATO air operations over the Baltic very difficult. Should Russia use these capabilities, then the NAC would need to decide whether to attack Russian territory and risk further escalation of the conflict, including escalation to the nuclear level. Without this NAC authorization, however, NATO ground forces in the region would be extremely vulnerable.

- Would Sweden and Finland cooperate? While NATO could probably win an air battle over the Baltic region without cooperation from these two

Partnership for Peace (PfP) states, it would be much easier with their cooperation. Cooperation from Sweden would be particularly important.[43] MOUs have been signed between NATO and these two non-aligned states outlining cooperation, but little has been done to prepare air bases in either country to accommodate NATO aircraft in time of conflict. In return, Sweden and Finland might require NATO air defences, and those air defences are unlikely to be available in a timely fashion.

- To what degree should NATO nations build stronger defences against conventionally armed cruise missiles? War games have shown that AWACS-supported Combat Air Patrols (CAP) using fourth generation fighters to deal with the cruise missile threat would need additional ground-based, Short-Range Air Defences (SHORAD) to be successful.

Should major conflict break out, then NATO air forces would need to take on the following five conventional missions:

1. gain rapid air superiority;
2. provide adequate ISR coverage over the battlefield area;
3. provide C2 over the battlefield area;
4. provide precision strike against ground targets; and
5. provide mobility and lift to reinforce NATO ground forces.

Conclusions and Recommendations

To deal successfully with these five conventional missions, the following Air Force upgrades are judged to be particularly important:

- Large quantities of more capable SEAD munitions; specifically longer-range, high-speed radar-homing missiles to suppress SAM tracking and guidance radars.
- Adequate quantities of Small Diameter Bombs (SDB), including SDB II integration with advanced fighters.

- Some form of standoff, area anti-armor weapons.
- Means of conducting ISR in contested air environments (such as stealthy UAVs).
- Upgrade to Active Electronically Scanned Array (AESA) radars in 4th generation fighters (for improved effectiveness against cruise missiles).
- Improved defensive Electronic Counter Measures (ECM) gear for strike aircraft.
- Greater European independent lift capability.
- Ground based SHORAD systems against cruise missile attacks.[44]
- The eight items listed above are part of a broader list of priority shortfalls identified by NATO commanders.[45]

NATO air power officials need to coordinate very closely with Sweden and Finland to discuss use of their air bases in time of conflict, including required construction. In addition, these two nations need to acquire adequate air defence capabilities to protect their populations and their air bases.

Developing Third Offset Technologies to Retain Operational Superiority[46]

Russian and Chinese efforts to match US military technology have yielded some success, which has raised concerns about the A2AD problem. Russia for example, has developed new missile technologies, capable tanks, and near fifth generation fighter aircraft. Faced with this challenge and with tight defence budgets, the US has sought what Deputy Secretary of Defense Robert Work[47] has referred to as the Third Offset. The First Offset was the Eisenhower Administration's development of a strong nuclear capability (The New Look) to offset Soviet conventional advantages. The Second Offset was the development of precision strike weapons on stealthy platforms that enabled initial military victories in Desert Storm, Kosovo, Afghanistan, and Iraq.

The Third Offset is still very much a work in progress. As with any good military transformation, it seeks to gain advantage, not just with new technologies, but also with new operational concepts. The 2017 US defence budget requests $3.6 billion for research and development for Third Offset technologies, with a total of $18 billion requested over the Future Years Defense Program (FYDP). Those technologies include autonomous vehicles, artificial intelligence, greater human-machine interface, and use of a 'combat cloud network' to provide better situational awareness for US forces throughout the battlefield. One good example of a Third Offset approach is a recent Naval Air Systems Command exercise (designed in cooperation with the Strategic Capabilities Office) in which F/A – 18s dropped over 100 small Perdix drones which swarmed and adapted by communicating with other drones.[48] Another example might be the US Air Force's effort to develop brain-inspired computer chips that can automatically identify vehicles such as fuel tanks for anti-aircraft systems.[49] It remains to be seen if the new Defense Secretary, James Mattis, will embrace this focus on the Third Offset.

US Air Force General (ret.) Larry O. Spencer believes that 'the US Air Force will be front and centre of any offset strategy'. He added 'with major investments to come in intelligence, surveillance, and reconnaissance, the B-21 Raider, F-35, GPS III, and KC-46, it is vital for the United States to have a strategy that combines these platforms with the C2 our commanders need to stay ahead of and meet the challenges of our enemies'.[50]

Conclusions and Recommendations

While these technologies may not have an immediate effect on NATO air operations, they will have a profound long-term impact. NATO's ACT is already working with the US Defense Department to cooperate on Third Offset strategies.

- JAPCC and ACT should concentrate on the implications of the Third Off-set for NATO air power.
- The European defence industry should be directly involved in these Third Offset discussions.
- NATO air forces need to quickly integrate these emerging technologies into operational plans.

Maximizing Early Warning and Rapid Response

NATO early warning and decision making capabilities in any conflict are likely to lag behind those of Russia. Russia will likely be the aggressor that can choose time and place, is an autocratic state with a single decision maker, and has regional geographic advantages. If the early warning and decision making gap grows too large, it could significantly impact the outcome of regional combat.

This fact was clearly recognized at the Warsaw Summit[51]. Steps were taken to improve Joint ISR and to create, at the political level, an Assistant Secretary General for Intelligence and Security. Some have suggested the creation of a NATO Intelligence Committee as a next step. The NAC has sought to improve its own decision making capabilities by holding 'scenario based discussions' to work their way through difficult political contingencies. But, more needs to be done. Former SACEUR Phillip Breedlove called for improved 'indications and warning' using all source intelligence, including imagery, signals, measurement and signature, human intelligence, open source intelligence, social science information, and cultural awareness. Declassifying information quickly will be important to inform the NATO public and build quick consensus.

In 2014, Dr. Charles Barry suggested that the following air power improvements would significantly enhance the readiness and sustainability of European air power.[52] That analysis is still relevant.

- more standoff, Precision Guided Munitions (PGMs);
- greater Dynamic Targeting Capabilities;
- larger aerial refuelling capacity;
- more drones (both reconnaissance and attack);
- more deployable support for air operations;
- more medium to large helicopters, survivable and all-weather capable.

Conclusions and Recommendations

The role for NATO air forces, both national assets and NATO assets, is profound in the Alliance's effort to maximize its early warning and rapid response capabilities. Air and space assets are principle collectors of intelligence: strategic, operational and tactical. Air power is also the first responder in most cases to an early warning alert. Several steps should be taken to assure that air power is contributing its vital role to early warning and rapid response. These steps include:

- NATO plans to focus Joint Intelligence, Surveillance and Reconnaissance (JISR) assets on first responders (VJTF and NRF) need to be accelerated;
- Europe needs over time to reduce its dependency on US JISR.
- NATO AWACS modernization and operationalization of Alliance Ground Surveillance (AGS) capacity by 2017 need to be delivered.
- Readiness of European fighter aircraft and especially pilot training needs improvement.
- Legal obstacles need to be removed relating to overflight rights in time of conflict, including with Sweden and Finland.
- Back fit fourth generation fighters with AESA radars for cruise missile defence.

Dealing with NATO Southern Missions: the Role of Air Power[53]

The Warsaw Summit placed special attention on threats coming from NATO's south. This was done for several reasons. Southern allies were concerned that NATO's focus had shifted too much towards the east, where they see little direct threat to themselves. Second, the threats from the south have become more immediate and complex, with direct effects felt in the streets of major European cities (both refugee movements and terrorist strikes). And third, NATO does not have a clear southern strategy, where most military efforts are now being conducted by lead nations and coalitions of the willing.

Air Power in southern missions is paramount today. Ground force operations are being conducted increasingly by non-NATO, local forces, such as Iraqi and Afghan Army forces, and Kurdish or Libyan militias. Given the reluctance in NATO nations to deploy large numbers of ground forces post-ISAF, NATO ground forces will be limited primarily to advisory missions and Special Operations Forces. The naval missions in the south are limited to counter-piracy, some counter terrorism patrols, and interdiction of migrant flows. (That may change as Russian naval forces become more active in the Mediterranean and Black Seas). It is the air forces belonging to NATO nations, operating often as part of a coalition of the willing, that fight the battle against the Islamic State.

The intensity of these air operations has provided Allied air forces with valuable joint operational experience. For example in the air operations against ISIS, which started in August 2014, coalition aircraft have flow nearly 133,000 sorties which yielded over 17,000 air strikes that destroyed about 31,000 targets. Of the 17,000 air strikes, nearly 4,000 were conducted by America's coalition partners. NATO nations that have participated in combat operations are: Belgium, Canada, Denmark, France, the Netherlands, the United Kingdom, and Turkey.[54]

In April, 2017, the Trump Administration launched two US air strikes that have further enhanced the role of air power in NATO's southern region. First, a US cruise missile attack was launched against Syrian air bases in response to the Assad regime's use of chemical weapons against their own population. In this case air power was used both to compel and deter the Assad regime from further chemical use. Second, it launched a GBU-43/B attack against Islamic State fighter in Afghanistan. This strike signaled American willingness to use larger munitions against terrorist targets.

While these experiences are vital to the future success of Allied air power, this southern experience against ISIS is different from the high intensity operations that might occur should deterrence fail in the east. Allied air power would need to adjust.[55] These differences include:

- In the south coalition air forces have total air superiority; aircraft attrition would be much higher in the east.
- A high intensity war in the east would use munitions at a much higher rate than in the east.
- Nations such as Germany, Italy, Poland, and Spain have not participated in these recent combat operations.
- The command structure in the east would likely be NATO with EUCOM rather than CENTCOM as the American counterpart.

There are two additional aspect of southern operations highlighted by the Warsaw Summit that NATO air power will need to focus on.

First, the Warsaw communiqué stresses NATO deployment to the southeast and notes that efforts to strengthen Alliance naval and air capabilities in this region will be assessed. That may mean larger European air power deployments, possible in Bulgaria. Those deployments could support operations to the south and east.

Second, NATO will stress building the defence capacity and resilience of partner countries to the south. For European air forces, that may mean an enhanced advisory role in key partner states such as Morocco, Tunisia, Jordan, and possibly Egypt.

Conclusions and Recommendations

In considering the role of NATO joint air power in southern contingencies, four recommendations stand out:

- Air power advocates should encourage the Alliance to develop a much clearer southern strategy which embeds the role of air power in it.
- Air forces need to adjust their operations from the southern missions (to which they have become accustom) to the much more challenging eastern missions.
- Air power deployments to the southeast, possibly in Bulgaria, are suggested in the Warsaw summit communiqué, and plans should be developed by NATO air forces.
- Air power officials should develop their contribution to the Alliances Building Partnership Capacity efforts in the south.

Managing the Burden Sharing Problem: Air Power's Opportunity[56]

The Trump Presidency is likely to place a major focus on adjusting burden sharing disparities within the Alliance.[57] Just fulfilling the Wales Summit's NATO Defence Investment Pledges (DIPs) and the recent EU pledge to spend an additional Euro 5 billion in defence procurement may not be enough.[58] Europe is beginning to turn the corner on defence spending, with an estimated 3 % increase in 2016. But that will be seen in the US as 'too little, too late'. Europe needs to develop a plan to boost defence spending more dramatically as a way to keep the US fully committed to the Alliance.

This has been done in the past. European defence spending jumped fairly dramatically in constant dollars from $207 billion in 1970 to $286 billion in 1980.[59] (European defence spending has remained just above this 1980 level during the past 35 years). The strategic environment that led to these significant defence spending increases included:

- a rise in the Soviet threats with interventions in Eastern Europe and SS-20 deployments;
- an American pivot to Asia (in Vietnam) followed by US retrenchment under President Jimmy Carter;
- amendments by Senator Mike Mansfield to cut US force levels from Europe if burden sharing did not improve; and
- reasonable economic growth in Europe.

Similar characteristics exist today. So, despite European protestations, Europe can and, in the past, has done better. In the realm of air power, European air forces are particularly dependent upon the US for SEAD, Airborne Electronic Attack (AEA), Air-to-Air Refuelling (AAR), strategic lift, and PGM.[60]

Conclusions and Recommendations

European air forces need to position themselves to take advantage of the increase in defence spending. Providing lists of needed equipment and improvements such as those suggested above is important, but it is unlikely to result in air power receiving its adequate share. A better approach is to set a goal so that NATO/European air power can take care of missions in its own AOR, should the US be unavailable. NATO/European air power should, as a short term goal, be able to support one Small Joint Operation (SJO) air heavy, without the US.

Prioritization Matrix[61]

The Role of NATO Joint Air Power in Deterrence and Collective Defense		Criteria								
		Impact			Cost			Priority		
	Task	L	M	H	L	M	H	1	2	3
Task 1	Enhance Deterrence Toward the East							X		
	Improve Upon Deployability (40 %) and Sustainability (8 %) Goals			X		X		X		
	More Pilot Training	X				X			X	
	Ready Key Air Bases			X			X		X	
	Enhance Baltic Air Policing			X	X			X		
	Upgrade Existing Fighter Aircraft		X			X				X
	Increase European Munitions Stocks		X			X			X	
	Maximize Cooperation Through Framework Nations			X	X			X		
	Pre-Authorized Overflight Rights			X	X			X		
	Modernize B-61 (Us)		X				X		X	
	Modernize Dual Capable Aircraft (Europe)		X			X		X		
	Safety and Security of Nuclear Weapons			X	X			X		
	Continue with Ballistic Missile Deployment			X		X		X		
	Develop Better Defenses Against Cruise Missile Attack		X				X	X		
	Develop Better Attribution of Cyber Attacks			X	X			X		
	Develop National Cyber Deterrent Capabilities		X		X				X	
Task 2	Improve Collective Defense in A2AD Environment							X		
	Purchase More Fifth Generation Aircraft		X			X				X
	Purchase Advanced Stand-Off SEAD Munitions		X			X		X		
	Purchase More Anti-Armor Munitions		X		X					X
	Improve Digital Links of Fifth Generation Fighters		X		X			X		
	Cooperate on Third Offset Capabilities			X	X			X		
	Conduct ISR in Contested Environment			X		X		X		
	More Ground Based Forward Deployed Air Defenses		X			X		X		

NATO UNCLASSIFIED – PUBLICLY DISCLOSED

The Role of NATO Joint Air Power in Deterrence and Collective Defense		Criteria								
		Impact			Cost			Priority		
	Task	L	M	H	L	M	H	1	2	3	
	Improved ECM Gear for Strike Aircraft			X		X			X		
	Exercise in A2AD Environment			X	X			X			
	Conduct More Scenario Based Discussions in NAC on A2AD Options			X	X			X			
Task 3	Create a More Independent European Air Power Capability X									X	
	Set NATO/Europe Air Power goal:one SJO Air Heavy Alone			X			X	X			
	More European ISR		X				X			X	
	More European Refuelling		X				X			X	
	More European UAVs		X			X			X		
	More European Strategic Lift		X				X			X	
	More European SOF aviation		X			X			X		

Endnotes

1. NATO Joint Air Power includes primarily air assets provided by individual member states to achieve common goals as well as certain NATO assets like AWACS and JISR.

2. Hans Binnendijk is former Special Assistant to the US President for Defense Policy and former Director of the Defense Department's Institute for National Strategic Studies. He is currently a senior fellow at the Center for Transatlantic Relations, Johns Hopkins University, SAIS. These views are his own and do not necessarily represent the views of any institution.

3. Warsaw Communiqué paragraph 48: 'The Alliance maritime posture supports the four roles consisting of collective defence and deterrence, crisis management, cooperative security, and maritime security, and thus also contributes to projecting stability. The Standing Naval Forces are a core maritime capability of the Alliance and are the centrepiece of NATO's maritime posture. They are being enhanced and will be aligned with NATO's enhanced NATO Response Force to provide NATO's highest readiness maritime forces. We will continue to reinforce our maritime posture by exploiting the full potential of the Alliance's overall maritime power. Work is under way on the operationalization of the Alliance Maritime Strategy, as well as on the future of NATO's maritime operations, which are key to NATO's maritime posture. Allies are also considering complementary maritime governance initiatives to contribute to this endeavour.'

4. NATO Warsaw Summit Communiqué, 9 Jul. 2016 paragraph 4: 'Today, faced with an increasingly diverse, unpredictable, and demanding security environment, we have taken further action to defend our territory and protect our populations, project stability beyond our borders, and continue the political, military, and institutional adaptation of our Alliance.'
Warsaw Communiqué paragraph 5: 'There is an arc of insecurity and instability along NATO's periphery and beyond. The Alliance

faces a range of security challenges and threats that originate both from the east and from the south; from state and non-state actors; from military forces and from terrorist, cyber, or hybrid attacks.'

5. 'Future Vector Project: Air and Space Power in NATO' JAPCC, Jul. 2014, page 31–63. The eight trends identified in 2014 were: Trend #1: European Complacency; Trend #2: An Agressive Russia; Trend #3: Relative American Decline; Trend #4: Shifting Power; Trend #5: Malthusian Future; Trend #6: Impact of Technology; Trend #7: Inadequate Rule of Law; Trend # 8: Complex Conflict.

6. Hans Binnendijk and William Courtney, 'Can Trump Make a Deal with Putin?' US News, 1 Dec. 2016.

7. These three negative trends relate to demographics, resources, and global warming.

8. Turkey has been the hardest hit with about 600 killed by terrorist acts and the coup attempt in the past year. Its future stability is increasingly of concern. See statistic.com 'terrorism – statistics and facts'.

9. Secretary of State Designate Rex Tillerson confirmed that NATO's mutual defence provision was 'unbreakable'. see Joe Gould, Trump's Secretary of State Nominee Talks Tough on Russia, 11 Jan. 2017. Defense Secretary Designate James Mattis made similar comments during his confirmation hearings. More recently, President Trump, in conversations with several European leaders, reinforced America's commitment.

10. Warsaw Communiqué paragraph 11: 'NATO has responded to this changed security environment by enhancing its deterrence and defence posture, including by a forward presence in the eastern part of the Alliance...'
Warsaw Communiqué paragraph 38: 'We have decided to establish an enhanced forward presence in Estonia, Latvia, Lithuania and Poland to unambiguously demonstrate, as part of our overall posture, Allies' solidarity, determination, and ability to act by triggering an immediate Allied response to any aggression. Beginning in early 2017, enhanced forward presence will comprise multinational forces provided by framework nations and other contributing Allies on a voluntary, sustainable, and rotational basis. They will be based on four battalion-sized battlegroups that can operate in concert with national forces, present at all times in these countries, underpinned by a viable reinforcement strategy.'

11. Others feel that Russia would have much more success using what might be termed 'political warfare' or hybrid warfare to gain influence and disrupt the current strategic balance.

12. Hans Binnendijk, 'NATO's Future: A Tale of Three Summits', Center for Transatlantic Relations, Johns Hopkins University / SAIS, Nov. 2016.

13. See Daniel Hamilton (ed), 'Forward Resilience: Protecting Society in an Interconnected World', Center for Transatlantic Relations, Johns Hopkins University, SAIS, 2016.

14. Stephen Losey, 'Goldfein: Air Force must hone its skills to face growing global threats', Defense News, 3 Mar. 2017.

15. Since the end of the Cold War, European armies have been cut by roughly 60 %, air forces by 50 % and navies by 40 %.

16. Current NATO targets are 50 % deployability and 10 % sustainability for ground forces, 40 % deployability and 8 % sustainability for air forces, and 80 % deployability and 27 % sustainability for naval forces.

17. See BG Alex Grynkewich, 'The Future of Air superiority, Part I: The Imperative', War on the Rocks, 3 Jan. 2017.

18. RAND games indicate that it would take several weeks or more for NATO to achieve air superiority over the Baltic area (assuming crucial assets were available in theatre) depending upon tactics used by both sides. Two additional problems would exist. First, NATO air forces would need political authority to attack Kaliningrad, which could easily escalate the conflict. And second, after an initial ground attack on the Baltic States, Russian ground forces would dig in and civilian collateral damage might be high.

19. David A. Shlapak and Michael W. Johnson, 'Reinforcing Deterrence on NATO's Eastern Flank', RAND, see tables 3 and 4.

20. These included 13 US squadrons (F-15s, F-16s, F/A 18s, F-22s, B-1s, and A-10s) and a total of 5.5 squadrons from the UK, France, Norway, Canada, and Denmark.

21. RAND estimates for this plus up would have an initial cost of less than $13 billion, plus annual additional operating costs of $2.7 billion.

22. The Washington NATO Project, Alliance Revitalized: NATO for a New Era, Center for Transatlantic Relations, Apr. 2016, page 13.

23. Warsaw Communiqué paragraph 53 'NATO's nuclear deterrence posture also relies, in part, on United States' nuclear weapons forward-deployed in Europe and on capabilities and infrastructure provided by Allies concerned. These Allies will ensure that all

components of NATO's nuclear deterrent remain safe, secure, and effective. That requires sustained leadership focus and institutional excellence for the nuclear deterrence mission and planning guidance aligned with 21st century requirements. The Alliance will ensure the broadest possible participation of Allies concerned in their agreed nuclear burden-sharing arrangements.' Warsaw Communiqué paragraph 54: 'Any employment of nuclear weapons against NATO would fundamentally alter the nature of a conflict.'

24. Amy F. Woolfe, Nonstrategic Nuclear Weapons, Congressional Research Service, 23 Mar. 2016.

25. This paragraph has been taken from 'Alliance Revitalized: NATO For a New Era', Hans Binnendijk, Dan S. Hamilton, and Charles L. Barry, The Center for Transatlantic Relations, SAIS, Johns Hopkins University, Apr. 2016, page 18.

26. One concept for a negotiated reduction would be a zero option for non-strategic nuclear weapons in Europe, similar to the INF Treaty.

27. Dan Lamothe, 'The US stores nuclear weapons in Turkey'. Is that such a good idea? The Washington Post, 19 Jul. 2016.

28. These recommendations are adapted from 'Alliance Revitalized' page 20.

29. Warsaw Communiqué paragraph 55: 'The threat to NATO populations, territory, and forces posed by the proliferation of ballistic missiles continues to increase, and missile defence forms part of a broader response to counter it.'
Warsaw Communiqué paragraph 56: 'The aim of this capability is to provide full coverage and protection for all NATO European populations, territory, and forces against the increasing threats posed by the proliferation of ballistic missiles.'
Warsaw Communiqué paragraph 57: 'We are also pleased that additional voluntary national contributions have been offered by Allies, and we encourage further voluntary contributions, all of which will add robustness to the capability.'
Warsaw Communiqué paragraph 59: 'NATO missile defence is not directed against Russia and will not undermine Russia's strategic deterrence capabilities. NATO missile defence is intended to defend against potential threats emanating from outside the Euro-Atlantic area. We have explained to Russia many times that the BMD system is not capable against Russia's strategic nuclear deterrent and there is no intention to redesign this system to have such a capability in the future. Hence, Russian statements threatening to target Allies because of NATO BMD are unacceptable and counterproductive. Should Russia be ready to discuss BMD with NATO, and subject to Alliance agreement, NATO remains open to discussion.'

30. This statement applies only to the EPAA BMD wide-area/upper tier territorial and population defence system.

31. This discussion is intended to complement the paper on NATO missile defences by Lt Gen (ret.) F. H. Meulman.

32. Tucker Reals, CBS News, 21 Nov. 2016.

33. Warsaw Communiqué paragraph 70: 'In Warsaw, we reaffirm NATO's defensive mandate, and recognise cyberspace as a domain of operations in which NATO must defend itself as effectively as it does in the air, on land, and at sea.'
Warsaw Communiqué paragraph 71: 'Today, through our Cyber Defence Pledge, we have committed to enhance the cyber defences of our national networks and infrastructures, as a matter of priority. Each Ally will honour its responsibility to improve its resilience and ability to respond quickly and effectively to cyber-attacks, including in hybrid contexts. Together with the continuous adaptation of NATO's cyber defence capabilities, this will reinforce the Alliance's cyber defence. We are expanding the capabilities and scope of the NATO Cyber Range, where Allies can build skills, enhance expertise, and exchange best practices.'

34. Mark Pomerleau, 'DoD scientists offer cyber deterrence framework, report', C4ISRNet, 3 Mar. 2017.

35. Brad D. Williams 'Senate mulls national cyber policy, strategy: deterrence vs defense,' in Fifth Domain Cyber, 3 Mar. 2017.

36. Cynthia Kroet, Politico, 19 Jan. 2017.

37. Frank Kramer, Robert J. Butler, and Catherine Lotrionte, 'Cyber and Deterrence: The Military-Civil Nexus in High End Conflict', Atlantic Council, Jan. 2017.

38. Alliance Revitalized page 26.

39. Pomerleau, C4ISRNet, 3 Mar. 2017.

40. Warsaw Communiqué paragraph 4: 'Today, faced with an increasingly diverse, unpredictable, and demanding security environment, we have taken further action to defend our territory and protect our populations, project stability beyond our borders, and continue the political, military, and institutional adaptation of our Alliance.'

Warsaw Communiqué paragraph 38. 'Taken together, the measures we are approving at this Summit will enhance the security of all Allies and ensure protection of Alliance territory, populations, airspace and sea lines of communication, including across the Atlantic, against all threats from wherever they arise.'

Warsaw Communiqué paragraph 45: 'We will ensure that NATO has the full range of capabilities necessary to fulfill the whole range of Alliance missions, including to deter and defend against potential adversaries, and the full spectrum of threats that could confront the Alliance from any direction. In line with our defence planning priorities, we are committed to delivering heavier and more high-end forces and capabilities, as well as more forces at higher readiness. The primary responsibility for achieving this remains with Allies, individually. Multinational approaches are valuable in meeting these vital needs.'

41. Nikita Vladimirov, Ex-NATO commander: 'US falling behind on military modernization', The Hill, 5 Mar. 2017.

42. In 2015, the US had 2,308 fighters/interceptors and 2,785 fixed wing attack aircraft. Russia had 751 fighters/interceptors and 1,438 fixed wing aircraft. France had 284 fighter/interceptors and an equal number of fixed win attack aircraft. Germany had 169 fighter/interceptors and a similar number of attack aircraft. The UK had 91 fighters/interceptors and 168 fixed wing aircraft. See 'Fighter Aircraft Strength by Country', in Global Fire Power, Stanford University,

43. Finland lies within range of Russian S-400 missiles.

44. This list is the result of unclassified discussions with RAND analysts, including David Ochmanek.

45. The majority of the identified shortfall areas relate to air power such as Air C2, BMD, AAR, airborne Electronic Warfare (EW), JPS/PGM, etc. For most of these shortfalls, 'NATO relies very heavily on the USA'.

46. Warsaw Communiqué Paragraph 50: 'We welcome the many concrete multinational and national initiatives, carried out independently or under the auspices of Smart Defence or the Framework Nations Concept, which strengthen the Alliance. They contribute directly to capability development and to our strengthened deterrence and defence posture. We will ensure overall coherence and unity of effort across all elements of Allied capability development and military presence, including between forward presence and Allies' multinational and national military activities and initiatives.'

47. Work may be asked to stay in his position during a transition period.

48. Thomas Gibbons-Neff, 'Watch the Pentagon's new hive-mind-controlled drone swarm in action', The Washington Post, 10 Jan. 2017.

49. Andrew Rosenblum, 'Air Force Tests IBM's Brain-Inspired Chip[an as Aerial Tank Spotter', MIT Technology Review, 11 Jan. 2017.

50. Gen. Larry O. Spencer (ret.), US Air Force Key to Third Offset Strategy, Defense News, 7 Nov. 2016.

51. Warsaw Communiqué paragraph 47: 'We will further improve our strategic anticipation by enhancing our situational awareness, particularly in the east and south and in the North Atlantic. Our ability to understand, track and, ultimately, anticipate, the actions of potential adversaries through Intelligence, Surveillance and Reconnaissance (ISR) capabilities and comprehensive intelligence arrangements is increasingly important. These are essential to enable timely and informed political and military decisions. We have established the capabilities necessary to ensure our responsiveness is commensurate with our highest readiness forces.'

Warsaw Communiqué paragraph 75: 'Allies also intend to work together to promote intelligence-sharing, as appropriate, by using NATO platforms and networks and optimizing use of multilateral platforms and networks to enhance overall JISR efforts, including but not limited to the JISR Smart Defence project.'

Warsaw Communiqué paragraph 76: 'Moving forward, we will sustain these achievements and support future NATO Response Force rotations with the necessary JISR capabilities. We will also expand the scope of our JISR initiative, making the most effective use of Allies' complementary JISR contributions to enhance both strategic anticipation and awareness. It is within this context that we also note the significant progress made on NATO Alliance Ground Surveillance (AGS). This capability will become operational in 2017 as planned, and will be complemented in some cases by Allies' contributions in kind.'

Warsaw Communiqué paragraph 77: 'NATO's Airborne Early Warning and Control Force (NAEW&C) continues to prove itself instrumental not only to monitoring our airspace, but also as a critical part of NATO's command and control (C2) capabilities. NATO AWACS will continue to be modernized and extended in service until 2035. By 2035, the Alliance needs to have a follow-on

capability to the E-3 AWACS. Based on high-level military requirements, we have decided to collectively start the process of defining options for future NATO surveillance and control capabilities.'

52. JAPCC Future Vector Project, 2014, p. 144.

53. Warsaw Communiqué paragraph 26: 'We are adapting our defence and deterrence posture to respond to threats and challenges, including from the south. At the same time, we are continuing to draw on our cooperative security network to enhance political dialogue, to foster constructive relationships in the region, and to increase our support for partners through practical cooperation, as well as defence capacity building and crisis management. We are also exploring options for possible NATO contributions to international efforts to bring stability in the region.'

Warsaw Communiqué paragraph 41: 'We will also develop tailored forward presence in the southeast part of the Alliance territory. Appropriate measures, tailored to the Black Sea region and including the Romanian initiative to establish a multinational framework brigade to help improve integrated training of Allied units under HQ Multinational Division Southeast, will contribute to the Alliance's strengthened deterrence and defence posture, situational awareness, and peacetime demonstration of NATO's intent to operate without constraint. It will also provide a strong signal of support to regional security. Options for a strengthened NATO air and maritime presence will be assessed.'

Warsaw Communiqué paragraph 41: 'As part of the Readiness Action Plan and as a contribution to our deterrence and defence posture, we have established a framework for NATO's adaptation in response to growing challenges and threats emanating from the south. The framework focusses on better regional understanding and situational awareness, the ability to anticipate and respond to crises emanating from the south, improved capabilities for expeditionary operations, and enhancing NATO's ability to project stability through regional partnerships and capacity building efforts. We will proceed with the implementation of this framework.'

Warsaw Declaration paragraph 8: 'NATO AWACS aircraft will be made available to support the Counter-ISIL Coalition.'

Warsaw Communiqué paragraph 84: 'NATO will continue to enhance its role in projecting stability, including through enhancing regional understanding and situational awareness, further adapting to the challenges and threats from all directions, reinforcing its maritime dimension, and developing a more strategic, more coherent, and more effective approach to partnerships. These efforts will draw upon the important contributions that partners can bring.'

54. The figures are current as of 4 Jan. 2017, DoD web site for 'Operation Inherent Resolve: Targeted Operations against ISIL Terrorists'; Germany and Italy have participated in non-combat operations.

55. US Air Force Chief of Staff David Golden recently said that roughly 80 % of the US Air Forces time and energy was focused on the Middle East which didn't leave much left over for considering the rest of the world and 'near peer' adversaries that have comparable militaries to the United States. See Defense News, 2 Mar. 2017.

56. Warsaw Communiqué paragraph 33: 'The Defence Investment Pledge we agreed at the Wales Summit is an important step in this direction and today we reaffirm its importance. Through this Pledge we agreed to reverse the trend of declining defence budgets.'

Warsaw Communiqué paragraph 34: 'Efforts to achieve a more balanced sharing of the costs and responsibilities continue. Defence Ministers will continue to review progress annually.'

57. In 2016, European nations plus Canada spent an estimated $255 billion on defence while the US spent about $664 billion according to a 4 Jul. 2016 NATO Press Release.

58. Only four European nations join the US in spending the NATO goal of 2 % on Defence (Greece, UK, Estonia, and Poland). On average, Europe spends 1.46 % of GDP on defence while the US spends 3.36 %. Nine European nations join the US in meeting the 20 % of defence spending for equipment pledge (Luxembourg, Lithuania, Romania, Poland, Norway, France, Turkey, UK, and Italy.

59. These figures are in 2011 US dollars. See Hans Binnendijk, Friends, Foes, and Future Directions, RAND, 2016. p. 85.

60. For example, of NATO's 709 refuelling aircraft, only 71 are European. With regard to strategic lift, Europeans holdings will improve with the planned purchase of about 150 A-400M aircraft by European nations.

61. The cost figures in this article are relative and do not necessarily reflect the cost categories included in the other articles.

Deterrence and Collective Defence

11

By General (ret.) Frank Gorenc, USA AF

Introduction

'NATO is a defensive Alliance with a goal to prevent war with credible deterrence. If deterrence fails, Article 5 of the Washington Treaty guarantees a collective defence.'
Washington Treaty, Article 5

The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognized by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.

Almost 70 years of security and stability is testimony to the power of the most successful alliance in history and effectiveness of Article 5. However, the Alliance legacy, a Europe whole, free and at peace, is at risk because potential adversaries are aggressively challenging the Alliance and the traditional rules-based world order.

After the Russian annexation of Crimea, NATO leaders developed a plan for assurance, adaptation and increased defence spending at the 2014 Wales Summit.

The rise of Islamic State of Iraq and the Levant (ISIL)/Daesh and more Russian aggression in eastern Ukraine shifted Alliance focus to deterrence and defence at the 2016 Warsaw Summit. Today, the 2010 Strategic Concept core tasks remain unchanged but collective defence is clearly a higher priority than crisis management and cooperative security.

The Warsaw Summit communiqué used the words deterrence and defence over 125 times. Article 32 and 52 linked deterrence and defence to describe the strategy needed to meet Alliance aspirations:

- Article 32 articulated the end state: 'Deterrence and defence are at the heart of the Alliance's mission and purpose – as the fundamental means of preventing conflict, protecting Allied territories and populations, and maintain the Alliance's freedom of decision and action at any time …'
- Article 52 described the means: 'As a means to prevent conflict and war, credible deterrence and defence is essential. Therefore, deterrence and defence, based on an appropriate mix of nuclear, conventional, and missile defence capabilities, remains a core element of our overall strategy.'

Article 5 of the Washington Treaty links deterrence and collective defence because when deterrence fails and an ally is attacked, the Alliance will invoke Article 5, and then begin collective defence. Deterrence is the preferred option; collective defence is the option of last resort. Deterrence prevents conflict by threatening to inflict unacceptable damage on anyone who attacks an Ally. Whereas, collective defence delivers the unacceptable damage. Deterrence is a marathon requiring persistence, resolve and tenacity. Collective defence is a sprint requiring power and speed to win as quickly as possible. The alternative to collective defence,

accepting terms dictated by the enemy to avoid armed conflict, is not an acceptable option. The failure to invoke Article 5 and execute decisive collective defence would fracture the Alliance.

NATO secured peace for decades; however, past performance does not guarantee future results. Four realities could limit the Alliance. The first reality is NATO potential power is not real power. The second reality is when deterrence fails, prompt consensus is pivotal, collective defence must be decisive. The third reality is the enemy has a vote and could choose war. The fourth reality is NATO forces must be ready, deployable and sustainable to be fully combat capable.

Pursuing several urgent priorities will maximize NATO Joint Air Power contributions. NATO Joint Air Power core roles, command of the air, precision strike, Intelligence, Surveillance and Reconnaissance (ISR), strategic mobility and Command and Control (C2) are indispensable to credible deterrence and decisive, collective defence. NATO Joint Air Power gives the Alliance an asymmetric advantage in peacetime and in crisis across the full range of military operations.

The Power Reality: NATO Potential Power Is Not Real Power

Credible deterrence and defence depend on the collective power of the Allies. Several elements contribute to a nation's power. Natural elements include geography, population and resources. Social elements include diplomatic, information, military and economic power known as the 'DIME'. Collective military power requires fully combat capable forces. Leaders use the elements of national power to pursue the most effective strategy to achieve goals and priorities.

Nations join alliances and coalitions when sovereign power is not enough. After WWII, 12 exhausted and war-torn nations created NATO because they

feared an expanding and aggressive Soviet communist influence in Europe. Even at the height of the Cold War, the collective power of NATO deterred the Soviet Union and allowed Allies to flourish in the security guaranteed by Article 5. Over time, the Alliance expanded from 12 to 28 nations willing to accept the terms and responsibilities of NATO membership.

Today, NATO economic power as measured in GPD is an astounding $ 36T ($36,000,000,000,000). Nine Allies are top 20 Gross Domestic Product (GDP) nations.

1	United States	$18.5T	*3.61	NATO
2	China	$11.4T		
3	Japan	$4.7T		NATO Partner
4	Germany	$3.5T	*1.19	NATO
5	United Kingdom	$2.6T	*2.21	NATO
6	France	$2.5T	*1.87	NATO
7	India	$2.3T		
8	Italy	$1.9T	*1.11	NATO
9	Brazil	$1.8T		
10	Canada	$1.5T	*0.99	NATO
11	South Korea	$1.4T		NATO Partner
12	Russia	$1.3T		
13	Australia	$1.3T		NATO Partner
14	Spain	$1.3T	*0.91	NATO
15	Mexico	$1.1T		
16	Indonesia	$0.9T		
17	Netherlands	$0.8T	*1.17	NATO
18	Turkey	$0.8T	*1.56	NATO
19	Switzerland	$0.7T		Neutral
20	Saudi Arabia	$0.7T		

* % GDP for defence spending

Minus the US GDP, the other 27 Allies have a GDP of $ 18T! Three NATO 'Partners Across the Globe' and one neutral country are also top 20 GDP nations. Except for Russia, at # 12, not a single top 20 GDP nation threatens NATO Allies. Even if China threatened the Alliance, their # 2 $ 11.4T GDP is small compared to the combined GDP of NATO and NATO Partners.

Today, NATO military power is impressive! Business Insider recently ranked the world's top 20 strongest militaries; 8 NATO militaries are in the top 20![1]

1	United States	NATO
2	Russia	
3	China	
4	Japan	NATO Partner
5	India	
6	France	NATO
7	South Korea	NATO Partner
8	Italy	NATO
9	United Kingdom	NATO
10	Turkey	NATO
11	Pakistan	NATO Partner
12	Egypt	
13	Taiwan	
14	Israel	
15	Australia	NATO Partner
16	Thailand	
17	Poland	NATO
18	Germany	NATO
19	Indonesia	
20	Canada	NATO

Four NATO 'Partners Across the Globe' are in the top 20. With the exception of a distant # 2 Russia, not a single top 20 military is a direct threat! The Alliance's deployable force of 3.5+ million (plus another 3.7 million+ in reserve) far exceeds Russia's deployable force of 766,000. The combined military strength of 8 Allies and 4 NATO Partners could easily overpower # 3 China if it threatened the Alliance.

Alliance leaders expressed confidence in the ability to deter: 'NATO has the capabilities and resolve to impose costs on an adversary that would be unacceptable and far outweigh the benefits that an adversary could hope to achieve.' Despite this confidence, leaders still want even more capable force and more

defence spending! Alliance economic and military power should be more than enough to secure peace in Europe. However, Alliance economic and military power is POTENTIAL, not REAL power. Large GDP does not generate REAL military power unless Allies increase defence spending and invest wisely. Large, well-equipped, highly rated Alliance militaries do not translate into REAL military power unless forces are fully combat capable and Allies offer forces during the NATO force generation process.

For some Allies, defence spending is not a high priority. Despite commitment to the 2014 Wales Summit Defence Investment Pledge (DIP) two years ago, only 5 of 28 Allies met the 2 % goal and only 10 met the 20 % modernization goal at the time of the Warsaw Summit! Nine Allies are top 20 worldwide GDP nations but only 2 of 9 meet the DIP and 2 actually spend less than 1 %!

In addition to anemic defence spending, some Allies have readiness problems and the Alliance suffers from lackluster force generation. Force generation should be easy when 8 of the top 20 most powerful militaries in the world are NATO militaries! Deployment costs are high and full spectrum training opportunities for deployed forces are few. Some Allies have forces but they are either untrained and/or unready. Military equipment is unavailable and/or unmaintained. A few Allies do not contribute forces because of other, higher priority global missions or lukewarm domestic support for NATO missions. Finally, the forces of some Allies are consumed providing military support to domestic civil authorities to help prevent terrorism or to help control migration in their own country.

The Alliance has capability, capacity and interoperability shortfalls. It would be difficult to generate full spectrum highly capable, deployable, sustainable and interoperable forces if US military enablers are not available. A NATO force with a 'full range of capabilities necessary to deter and defend' could be difficult to generate without US military

capability and capacity. The Alliance is overly reliant and dependent on the US military.

The lack of real Alliance military power could invite aggression. Adversaries may come to believe that NATO could not, or would not, invoke Article 5 for lack of capability or capacity. Today, an aggressive Russia, ISIL/Daesh and Iran are improving military capability and capacity and employing unconventional means to pursue their goals. Only real power can deter these three diverse threats simultaneously.

During the Cold War, the Soviet Union was the existential threat, the very reason for the Alliance in the first place. Allies feared the Soviet Union so they invested in real combat power. Real power deterrence replaced the Soviet incentive to wage war with the incentive to avoid war! Credible deterrence maintained security and stability until the collapse of the Soviet Union. Almost immediately after the collapse, Allies invested less in defence and reprioritized the money to other priorities.

Today, there is disagreement about the current security environment. Allies are sovereign nations with different national views. For some, Russia is an existential threat. For others, ISIL/Daesh is the existential threat. Still others see Iran as an emerging existential threat. Absent a consensus existential threat, some Allies may never be compelled to prioritize defence spending over other priorities.

Given Warsaw aspirations, Allies must increase defence spending and invest wisely! Allies must organize, train and equip militaries with REAL capability and capacity. Allies must fully train and educate their militaries. Allies must provide adequate and experienced Peacetime Establishment (PE) and Crisis Establishment (CE) manning to the NATO Command Structure (NCS) level. NATO could then force generate and execute operations with a force that has real near-peer, full-spectrum combat power. Allies meeting

the DIP would signal strong resolve, demonstrate shared sacrifice, and send a powerful message to future adversaries: NATO is strong, cohesive and willing to invoke Article 5 in defence of an Ally.

The Transition Reality:
When Deterrence Fails, Prompt Consensus Is Pivotal, Collective Defence Must Be Decisive

Deterrence and collective defence are bookends to Warsaw aspirations. Deterrence prevents conflict. Defence protects Allied populations and territories. Between the bookends, leaders want '… freedom of decision and action at any time'. Consensus is the pivot point between deterrence and defence. Consensus pivots Alliance mindset from peacetime to crisis. Consensus pivots the NCS from prudent thinking to detailed planning and Course of Action (COA) development. Consensus pivots Allies from pre-deployment preparation to deployment and employment execution.

While consensus is pivotal, it is difficult and slow. Allies are sovereign nations and put their national interests first. Aligning 28 national views into a single consensus during rising tensions can be lengthy and complex.

The only Article 5 declaration in Alliance history provides significant insights into the consensus process. The day after the 11 September 2001 Al-Qaeda attack on the US, the NATO Secretary General stated, 'if it is determined that this attack was directed from abroad against the United States, it shall be regarded as an action covered by Article 5 of the Washington Treaty'.

It took NATO leaders almost three weeks to invoke Article 5! On 2 October the Secretary General finally confirmed the attack had been directed from abroad and covered by Article 5. He went on to explain it was premature to speculate on what military action would be taken by the Alliance, individually or collectively.

Invoking Article 5 for 9/11 was neither timely nor clear-cut. First, it took almost three weeks to get consensus on who attacked and if the attack was directed from abroad. Second, there was no consensus for a military response. Third, Allied participation in any military response, individually or collectively, was still to be determined. For Allies, words matter and require full debate before they commit their nation to war. Article 5 language is not as clear or directive as many assume. The words and phrases demand the provision of intelligence to support analysis of the crisis. For some Allies, normal intelligence collection and analysis may not be enough. Some Allies may require 'beyond a reasonable doubt" legal evidence complete with forensic analysis, which can take even more time. Only then can Allies resolve their national view into 28 for 28 consensus. Finally, Article 5 gives Allies plenty of options for each crisis that must be negotiated. For instance, Allies could argue over what constitutes an '… armed attack'. The phrase '… such action as it deems necessary …' gives Allies response options with caveats. Overall, the negotiations needed in order to resolve Article 5 wording opens up the possibility for long North Atlantic Council (NAC) deliberations to reach consensus.

The 9/11 attack was an asymmetric attack by a non-state actor using unconventional means. There were no indications and warnings. No one could have predicted the attack. No one could have imagined this type of attack as possible, let alone a reason to invoke Article 5.

The Alliance learned from the experience of invoking Article 5 after 9/11. Unfortunately, so did the enemy! Potential adversaries know consensus is the centre of gravity for NATO action. They also know the Alliance has formidable power. Therefore, potential adversaries will avoid challenging NATO directly. Future attacks will be difficult to assess; ambiguity and uncertainty could delay or may even prevent consensus.

Delays reaching consensus will delay collective defence. Military planning, setting the theatre, reinforcement, deployment and employment of

Alliance forces cannot start in earnest until consensus is achieved. If deterrence fails, the Allies must achieve prompt consensus and then execute decisive collective defence.

The Threat Reality:
The Enemy Has a Vote and Could Choose War

The Alliance may have forgotten that the enemy has a vote because NATO deterrence has been successful. For decades, the enemy did not choose war against NATO because they feared Alliance power. The reality is that deterrence can fail and the enemy could choose war. Deterrence can fail for many reasons. Some potential adversaries could believe NATO does not have the capability or capacity to invoke a vigorous collective defence. A suicidal or psychotic leader may not be deterrable. Some Allies may not have the political will to invoke Article 5 because they believe the unintended consequences are worse, such as inadvertent escalation, instigating an arms race, provoking a crisis or pushing a nuclear-armed adversary to first strike, to name a few. From deterrence through defence, some Allies may want to use more diplomacy, information or economic sanctions during rising tensions instead of military power because they perceive any NATO military response give adversary leadership an excuse to suppress human rights, crush dissent or begin a military build-up.

The threat reality could upset the traditional rules-based world order. In the Warsaw communiqué, leaders noted a wide 'arc' of diverse threats 'that could confront from any direction'. Each threat is different and all use asymmetric means. Russia, a resurgent, powerful nation-state with nuclear weapons used hybrid warfare to annex Crimea and create multiple frozen conflicts all over Europe. ISIL/Daesh, a non-state, radical, Islamic terrorist group seeking to establish a caliphate, uses terror tactics to advance their ideology. Iran, a religiously motivated rouge nation-state supports terror groups worldwide and continues to pursue nuclear warheads for their

already capable ballistic missiles. Unattributed and attributed cyber-attacks are now common and will continue to increase in both frequency and magnitude. Nation-states and non-state actors are using chemical weapons to achieve goals and influence regions. State and non-state actors openly violate international law, such as using 'little green men'[2] and human shields to avoid retribution. Current and future adversaries will pursue even more asymmetric means and create an exponentially more complex security environment. Attribution becomes difficult, ambiguity slows decision-making and uncertainty challenges Alliance consensus. Attribution, ambiguity and uncertainty weaken deterrence and could slow or even prevent the timely consensus needed to invoke Article 5 and mount a collective defence.

Russia's 'Escalate to Deescalate' nuclear strategy is the newest and most dangerous challenge to NATO. A form of nuclear saber rattling, Russian leaders imply with an alarming and ambiguous casual easiness, a willingness to use nuclear weapons in response to a conventional Alliance Article 5 response. This strategy could have a chilling effect on the effort to achieve consensus and could fracture the Alliance. If successful, any future nuclear-armed adversary could employ 'Escalate to Deescalate' nuclear saber rattling against the Alliance or individual Allies.

If the enemy chooses war, Allies should expect ambiguous tactics infused with uncertainty making attribution difficult. These tactics will delay NATO processes, decision-making and could fracture NATO resolve. NATO must understand and evaluate the effect of asymmetric attacks on Article 5 if the enemy chooses war.

Many possible scenarios would challenge invoking Article 5 because of the asymmetric nature of the attack. What if Russia launches a Crimea style hybrid attack of 'little green men' in Lithuania? What if Russia threatens to respond with a tactical nuclear weapon to NATO invoking Article 5 in

response to the 'little green men' hybrid attack in Lithuania? What if there is Russian cyber-attack on European electrical grids or banks? What if Iran openly provides safe haven to terrorists responsible for terror attacks in Europe? What if Iran launches a single ballistic missile against a NATO BMD radar? What if a Surface-to-Air Missile (SAM) out of Kaliningrad shoots down an Ally's airliner in NATO airspace? What about a SAM shooting down an Alliance airlifter during a Very High Readiness Joint Task Force (VJTF) deployment to Poland? What if an ISIL/Daesh affiliated terrorist detonates a dirty bomb (or executes a biological or a chemical attack) in a European city shopping centre?

The highly capable force the Alliance needs will be costly. Allies must invest wisely and the Alliance must explore and find other ways to combat emerging threats with the force at hand. NATO is a nuclear Alliance with considerable strategic deterrence capability. NATO has an operational BMD design at Initial Operating Capability (IOC). NATO has access to 8 of the 20 most powerful conventional militaries in the world. Can the NATO force deter Russia, ISIL/Daesh and Iran simultaneously? Can the force defend against Russia, ISIL/Daesh and Iran simultaneously? Plus, NATO must combat cyber-attacks and ballistic missile attacks (successful, not successful, and intercepted). Each threat is unique and will require a tailored response.

Adversaries are expanding conventional military means to negate the strengths of NATO in peacetime. While annexing Crimea and attacking the Ukraine, Russia also deployed a network of highly capable Anti-Access/Area Denial (A2/AD) environments from the Barents to the Baltic to the Black to the Mediterranean Seas. Russian A2/AD environments are layered; very capable, modern, long-range SAM systems designed to intimidate Allies and could directly challenge Alliance adaptations. A2/AD environments extend into NATO airspace and could threaten civilian aircraft. Russia also deployed significant numbers of modern, long-range, Surface-to-

Surface missile (SSM) system designed to threaten Alliance critical assets. Eliminating A2/AD environments and SSM sites would require deploying well-resourced and synchronized military operations into Russian territory. If not eliminated, A2/AD environments could delay NATO reinforcement and VJTF deployment.

If the enemy chooses war, NATO Joint Air Power will play a major role because the core Air Power roles are indispensable to a decisive collective defence. The speed, flexibility, range and readiness of NATO air forces will be first to respond if the enemy chooses war. NATO Joint Air Power will maximize the effectiveness of and enable the NATO joint force. NATO Joint Air Power effectively integrated within the selected joint COA will provide the best opportunity to mount a robust collective defence.

The Force Reality:
NATO Forces Must Be Ready, Deployable and Sustainable to Be Fully Combat Capable

Articles 32, 33, 44 and 45 of the Warsaw Communiqué call for an extremely capable force that can fulfill the whole range of NATO missions. They set high expectations for the Alliance force. They want a force that can deter, reinforce and defend against any potential full spectrum threat attack from any direction! Additionally, they want the force to be deployable, sustainable, interoperable, heavy, high-end, full range and be at high readiness!

NATO leaders require a fully combat capable force that can win across the entire spectrum of conflict. To be fully combat capable, the force must be ready, deployable and sustainable every single day! It will be expensive. How expensive depends on the answers to the following questions: (1) Ready for what? (2) Deploy to where? (3) Sustain for how long? More money invested wisely, can buy more readiness, more deployability and

more sustainability. If 28 Allies honor the DIP, NATO forces will have increased combat capability because Alliance militaries will offer forces that have increased combat capability.

Allies make spending decisions based on national priorities. Some Allies may not honor the DIP. The Communiqué offered a positive spin on the current state of Alliance defence spending. It noted that Alliance defence spending increased and the majority of Allies halted or reversed declines. Still, only 5 of 28 met the 2% GDP goal, 10 of 28 met the 20% modernization goal. A more blunt assessment could have been: some Allies still have declining or flat defence spending, 23 of 28 did not meet the 2% GDP goal, and 18 of 28 did not meet the 20% modernization goal.

Obviously, the emerging threats are not existential enough to inspire increased defence spending by some Allies. Realistically, expect Alliance combat capability to remain the same or decrease slightly over time.

Currently, NATO Joint Air Power executes high readiness standing missions (Air Policing, BMD and Turkish Air Defence supplementation) with great effectiveness. Additionally, NATO Joint Air Power capability and capacity will increase as Allies fund and bring to IOC already funded critical capabilities. The ACCS and NATO AWACS upgrades will provide better C2. Along with the Romanian Aegis Ashore site, the Polish site will provide more upper layer BMD capabilities. NATO Alliance Ground Surveillance (AGS) and NAEW upgrades will enhance organic ISR collection capacity. Multiple Allies are procuring F-35, F-16 and leasing Gripen, which will increase interoperability and introduce sensor fusion into NATO's war fighting Concept of Operations (CONOPS), Tactics, Techniques and Procedures (TTP).

Modernization improves combat capability but not enough make NATO Joint Air Power the advantage Allies have come to rely upon for decades. The following 30-point plan for improving NATO Joint Air Power along

with increased defence spending will enhance readiness, deployability and sustainability.

30 Point Plan for Improving NATO Joint Air Power

1. Meet the 2014 Wales Summit DIP

The DIP was inspired by Russia annexing Crimea. The goal was to strengthen NATO by increasing defence spending and demonstrate collective resolve by signaling shared sacrifice. The DIP will buy capability, increase capacity and demonstrate the political willingness to meet Warsaw Summit aspirations. All 28 Allies meeting the DIP will enhance deterrence and defence because a strengthened NATO will be ready to meet future security challenges with real power.

2. Establish a Standing, Fully Functional Air Operations Centre (AOC) with a Fully Manned PE Joint Force Air Component (JFAC). At a Minimum, Establish a Fully Manned, Standing ISRD within NATO Allied Air Command HQ

Currently, NATO Allied Air Command operates a 'Core' JFAC utilizing an AOC that stands up 'just in time' in the event of crisis. Currently, NATO Allied Air Command has three permanent 24/7 C2 nodes: a theater-wide BMD C2 cell, an Air Policing Combined AOC for the north and an Air Policing Combined AOC for the south. These C2 nodes are structured and manned to accomplish their assigned mission. They are not capable of providing the full range of C2 required during crisis. If NATO responds to a crisis with the VJTF or enhanced NATO Response Force (NRF), a fully functional Allied Air Command AOC and JFAC will be required to synchronize and integrate the Air Tasking Order (ATO). A permanent, fully functional, fully manned (PE) AOC will be necessary to reduce the risk to mission during the transition from deterrence to defence.

At a minimum, NATO should establish a standing, fully manned Intelligence, Surveillance and Reconnaissance Division (ISRD) at Allied Air Command. The impending IOC declaration of the Allied Ground Surveillance (AGS) system and the recent delegation of Operational Control (OPCON) of NATO Airborne Early Warning (NAEW) aircraft to Allied Air Command will require a more functional, standing ISRD operating 24/7 to better C2 these NATO organic ISR assets. Additionally, the NATO units doing the Processing, Exploitation, and Dissemination (PED) of the intelligence will require a fully functional 24/7 ISRD to coordinate C2 and ISR collection deck requirements decisions for the Alliance. The day-to-day C2 of the ISR and PED missions will better prepare Allied Air Command to utilize additional force generated ISR assets in crisis. This is critical to the Warsaw Summit force expectations because ISR assets are low density/high demand assets that already are a documented NATO shortfall and every effort must be made to completely take advantage of their capabilities.

3. Replace Air Policing with Air Defence as the NATO Standing Peacetime Mission

Today, the Air Policing standing mission protects NATO with a defence design using aircraft, sensors and C2. Every day, 24 hours per day, 7 days a week, 2 Combined Air Operations Centres (CAOCs), 45 Control and Reporting Centres (CRCs), hundreds of radars, and 70 Quick Reaction Alert (QRA) aircraft are on high readiness to protect the integrity of Alliance airspace and to ensure safety in international airspace around Europe's periphery.

Air Policing served the Alliance well for decades; however, future threats could make the Air Policing defence design irrelevant. Russia has rejected the opportunity to reset the relationship with Europe. Russia and other emerging threats have the capability and capacity to

attack with military aircraft (manned and unmanned), cruise missiles, ballistic missiles and hijacked civilian aircraft. Future threats could choose to attack with conventional, chemical, biological and nuclear warheads. The future threat is complex and dangerous.

The Air Policing standing mission cannot deter or defend against future threats. It is time to replace the Air Policing with a comprehensive Air Defence design. Air Defence in the Cold War successfully deterred the Soviet Union. An Air Defence standing mission can better deter potential adversaries in the future!

In addition to aircraft, sensors and C2 capability, a comprehensive Air Defence would require several changes to the defence design. The Alliance should integrate NATO Ground Based Air Defence (GBAD) assets and incorporate Airspace Control Measures (ACM). The Allies should eliminate cross border restrictions for NATO QRA aircraft. Additionally, Allies should eliminate cross control restrictions for NATO C2 units controlling NATO and partner aircraft during QRA and peacetime training. NATO political leadership should approve a complete set of Rules of Engagement (RoE) for QRA pilots to address non-NATO military aircraft airspace violations. Finally, provide a complete set of RoE for QRA pilots to address civil aircraft not complying with International Civil Aviation Organization (ICAO) standards in NATO airspace (RENEGADE) or in international airspace. Together, these changes will maximize the ability to provide robust Air Defence of the Alliance.

Air Defence mindset in peacetime will prepare the Alliance to execute Air Defence in crisis. Defending NATO airspace every day with a comprehensive, effective Air Defence design signals a strong resolve that proves the Alliance is more than ready and willing to defend European airspace every day.

4. If Allies Decide not to Replace Air Policing with Air Defence, Then Develop an Air Policing to Air Defence (AP-to-AD) Transition Plan for Implementation During Times of Rising Tensions

A structured AP-to-AD transition is a necessary alternative to the replacement of Air Policing. Implementing several changes to the standing Air Policing defence design at a pace and timing advantageous to the Alliance will signal resolve during rising tensions and could even diffuse the crisis. The list of changes include integrating GBAD assets, incorporating ACM, deploying NATO CRC units, surging NATO AWACS flights, providing timely and expanded NATO QRA RoE, rescinding cross border and cross control flight restrictions and increasing QRA locations and aircraft. All of these initiatives will signal resolve and could de-escalate a crisis.

5. Develop a Strategic Indication and Warning (I&W) System

Strategy communicates intent; the ways and means that will get the Alliance to the desired end state. A clear strategy provides focus and sets the condition for success. The most effective way to alert Alliance leadership to emerging crisis is a set of strategically informed, operationally focused I&W. A strategic I&W process will warn leadership to weakening deterrence and could identify the beginning of adversary preparation for conflict.

The I&W should be presented to leadership at regular intervals with the purpose of inspiring action or accepting risk. In short, an I&W system would identify the requirement to begin operational level planning and if necessary, execute a COA. An I&W system does not mindlessly lead the Alliance into preplanned courses of action because leaders could disregard the I&W and accept the risk of no action.

I&W should be a recurring formal NATO process or even a standing mission. NATO leaders at all levels should be involved and responsible. The I&W should be developed and NAC approved prior to rising tensions and crisis.

Strategic I&W will benefit NATO Joint Air Power because the system will focus the entire Joint ISR process. The system will inform the most effective use of low density/high demand ISR assets and provide clarity to ISR force generation. The system will inform CONOPS, ISR collection, collection deck development and steer Joint ISR to Full Operational Capability (FOC). The system will inspire process improvements for ISR collection and the PED of NATO ISR.

A formal, recurring strategic Alliance I&W process will reinforce civilian control by emphasizing the NATO strategy approved by political authorities while holding NATO leaders accountable for the strategy. It could minimize the gap between the speed of political and military decision-making. Additionally, Alliance military leadership could better advocate for increased defence spending depending on the current security environment or rising tensions.

Strategic I&W reflect NATO strategy and will bridge strategic intent to operational planning and execution. Enhanced NATO situational awareness will provide more credible deterrence and collective defence.

6. Stand Up a NCS PED Centre with a Fully Trained PE

A NCS PED Centre is necessary to exploit the full capabilities of AGS. AGS will provide significant amounts of raw intelligence data but without organic PED, the majority of the data will go unexploited. Persistent ISR will enhance the situational awareness of NATO leaders. The PED Centre can be the Centre of Excellence that educates future leaders in this important

war fighting function. Finally, the NATO PED Centre can serve as the 'core' unit that will be supplemented and augmented as needed to meet ISR requirements during crisis.

7. Stand Up a NCS Targeting Centre with a Fully Trained PE

Targeting capacity is essential to meet war-fighting requirements and remains an Alliance shortfall. NATO must stand up a NCS Targeting Centre to develop an organic targeting capacity because Allies may not be able to meet the full requirements of the VJTF and enhanced NRF. In peacetime, the NATO Targeting Centre could support exercises to provide necessary training. It can serve as the NATO Centre of Excellence to educate future leaders.

The NATO Targeting Centre will serve as the 'core' element of targeteers that will be supplemented and augmented by other NATO HQ, Allies and Partner nations in crisis.

8. Reevaluate NCS PE and CE for the Optimum Placement of NATO Joint Air Power Experienced Personnel

Make necessary adjustments to ensure adequate air expertise is present throughout the all levels of leadership for both PE and CE. Today, there is not enough air expertise within NATO Joint Commands to influence planning that would make the most effective use of air power to contribute to the selected joint COA.

9. Establish NATO Procedures for 'RENEGADE' Assistance to Allies without Sovereign Air Defence Capability

The hijacking of a civilian airliner (RENEGADE) for the purpose of attacking a NATO Alliance member in a 9/11 style terrorist attack is remote but

possible. Today, the Air Policing defence design does not provide equal protection for defence against a RENEGADE threat.

For non-NATO military aircraft penetrating Alliance airspace, the NATO Commander is responsible for escalation throughout the full Air Policing Procedure:

- identification;
- interception;
- interrogation;
- shadowing;
- intervention;
- warning burst; and
- engagement.

For highjacked civilian aircraft (RENEGADE), the NATO Commander is responsible for only partial escalation of the Air Policing Procedure:

- identification;
- interception;
- interrogation; and
- shadowing.

The NATO Commander transfers responsibility for Intervention, Warning Burst and Engagement to a National Government Agency (NGA). However, some Allies do not have the means to address RENEGADE Intervention, Warning Burst and Engagement because they do not have sovereign air defence capabilities; Albania, Iceland, Luxembourg, Slovenia and Croatia (in the PM). Given the potential of ISIL/Daesh and other terrorist attacks in Europe, this urgent priority will fill a major hole in the Air Policing defence design.

Allies must negotiate agreements to provide 'RENEGADE' protection for those without sovereign air defence capability. Those Allies should then request this NATO capability and then work the legal aspects that would accommodate a NATO QRA to provide Intervention, Warning Burst and Engagement to Allies without sovereign air defence capability.

10. Develop Preplanned Air-Heavy 'Deterrence Options' to Incorporate Into NATO Plans

Expand NATO adaptation options by developing pre-planned air-heavy deterrence options. Air-heavy options could enhance current adaptations and provide NATO a menu of low-cost, less permanent movements of military force to signal resolve. Incorporating the air options into the NATO strategic communication plan could enhance deterrence. Additionally, planned properly, air-heavy deterrence options could also help set the theater to prepare for a robust collective defence.

11. Develop NAC-Approved, Pre-Planned Responses (PPRs) for Conventional Military Employment

Since NATO is a defensive alliance, NATO should reject any criticism of defensive measures as escalatory. To bolster the ability to deter and defend, NATO should consider, develop and approve PPRs to supplement defensive measures executed during times of rising tensions.

As I&W are triggered indicating a rising tensions and potential adversary preparations for conflict, PPRs would signal to adversaries that NATO has every intent to defend the Alliance and by doing so, could deter the adversary.

The concept of PPR options is already NAC accepted within the NATO BMD design. The BMD mission requires PPRs because they are in-dispensable for success because of the speed and nature of the threat.

12. Add NATO Joint Air Power Assets to the Long-Term Rotation Plan (LTRP) for Enhanced NATO Response Force (NRF), Very High Readiness Joint Task Force (VJTF) and the NATO Force Integration Unit (NFIU) Reception Mission

NATO's adaptation is ground centric. NATO Joint Air Power must be incorporated into adaptations in order to provide more credible deterrence and to set the theatre in preparation for collective defence. NATO Joint Air Power should incorporate GBAD assets, deployable NATO CRCs, key air assets and capabilities, air focused logisticians to each NFIU and a realistic VJTF and enhanced NRF exercise programme.

13. Formalize NATO Readiness, Deployability and Sustainability Metrics

Future Alliance credibility depends on ready, deployable and sustainable Allied forces. Therefore, combat capability metrics should be developed by the NCS, approved by the NAC and reviewed at regular intervals by NATO leadership through the NAC. A systematic and transparent combat capability process will assure, develop trust, enhance credibility and inspire confidence among Allies that force generated forces are combat capable.

If it doesn't get measured, it doesn't get done. Measuring readiness, deployability and sustainability will hold Allies accountable for the combat capability of their forces. This combat capability review, incorporated into the strategic communication plan during times of increased tension could enhance deterrence. Additionally, high standards for combat capability will enhance deterrence and defence.

14. Establish an Alliance Conference to Identify Training Opportunities

Routine Alliance training conferences should be held to identify inter-operability-training opportunities among individual Allies training schedules. Additionally, this training conference could identify and review advanced training. Integrating individual training schedules to increase interoperability training normally gained during the exercise programme would maximize NATO combat capability.

Allies should continue to identify training needs and develop training programmes to build combat capability in the air and on the ground. There are numerous training opportunities to promote interoperability on the ground and in the air. For example, during the Cold War, 'Ample Gain' aircraft cross servicing events were routinely accomplished to make sure that Allied aircraft could be 'combat turned' at any NATO base. More routine training such as Dissimilar Air Combat Training (DACT) among Allies was accomplished. DACT missions using NATO C2 nodes for training will enhance the ability to operate together. Pallet buildup training and load training to NATO standards for different Alliance airlifters could facilitate the VJTF movement faster, safer and more effectively.

15. Focus NATO Infrastructure Investment on Airfield Improvements Needed to Support High Tempo Combat Operations

Modern airfields are weapons systems and should be able to support high tempo combat operations. The list of airfield requirements is long and ambitious: fuel, fuel storage, weapons, weapons storage, ramps, parking, full instrumentation, communication, snow removal, deicing, sweepers just to name a few. In the end, runways and taxiways are a good start, but are not enough to support 24/7 high tempo combat operations!

16. Charter a NATO Working Group to Identify and Implement Interoperability Initiatives

The key to NATO Joint Air Power effectiveness is to force generate assets and quickly operate overnight. This requires a focus on interoperability, all day every day! This is very difficult in an alliance of 28 nations. NATO Air Forces operate different equipment and are in various stages of modernization. New technologies are always being introduced to even legacy equipment. Exploiting emerging capabilities with Alliance interoperability in mind as soon as possible will increase the NATO combat effectiveness. Particular focus should be to exploit emerging capabilities already being acquired by Allies. The list of emerging capabilities already being acquired by NATO air forces that must be included for interoperability initiatives include: '4th & 5th' generation interoperability, sensor fusion integration, machine-to-machine information transfer policy and guidance, ACCS optimization and Remotely Piloted Aircraft (RPA) integration. This working group will educate NATO military and political organizations about emerging capabilities and the ramifications to the Alliance.

17. Develop Critical Pooling and Sharing Agreements to Address NATO Capability Shortfalls

Several NATO warfighting shortfalls can be addressed with strategic pooling and sharing agreements among Allies or partners. The agreements allow nations who cannot afford organic capability to participate and gain expertise in advanced capabilities and expensive aircraft. The Heavy Airlift Wing (a mix of 13 Allies and partners operating 3 C-17s at Papa, Hungary) is a successful pooling and sharing agreement that is providing strategic airlift to member nations. Few nations can afford C-17 aircraft, but under a Memorandum of Understanding, partners execute the strategic airlift mission and train personnel to become qualified crewmembers. The

benefits are twofold: the unit delivers real combat power while nations develop Airmen in a critical core mission area.

NATO AWACS and AGS are also examples of the Alliance pooling and sharing agreements that provide critical airborne C2 and ISR capability. Within the agreement, Allies train and educate their Airmen in these key core missions. Often times, pooling and sharing arrangements are inefficient but the benefits far outweigh the inefficiencies and bring real combat power to NATO missions.

The following documented NATO capability shortfalls should be considered as missions that could be addressed by pooling and sharing arrangements: Joint ISR, BMD, cyber defence, special forces aviation, special forces C2, deployable medical treatment facilities, Suppression of Enemy Air Defence (SEAD), Airborne Electronic Attack (AEA), Air-to-Air Refuelling (AAR) and Precision Guided Munitions (PGM) for both air-to-air and strike requirements.

18. Establish an Upper and Lower Layer Organic NATO BMD Interceptor Capability

NATO BMD is a standing mission and at IOC. Currently, BMD sensors, lower and upper layer interceptor systems are US systems under NATO C2. As NATO moves from BMD IOC to FOC, more interceptor capacity must to be available to meet future threats. BMD FOC will demonstrate NATO resolve against this potentially game changing threat. Most Allies cannot afford or cannot invest in a sovereign lower and upper layer interceptor system; however, standing up organic NATO upper and lower layer interceptor units could be the best approach to meet increasing future requirements. Allies who cannot afford this capability would benefit from the opportunity to be part of this emerging mission by serving and resourcing organic NATO upper and lower layer interceptor systems.

19. Charter a Working Group to Better Understand Deterrence Theory and Help Educate All Levels of Leadership in NATO

During the Cold War, Allies invested considerable amounts of time and effort to better understand the deterrence theory and the Soviet Union. Allies had a common understanding of Soviet motivation, perception, and culture. The Alliance currently has 28 different views of emerging security challenges involving a multitude of threats. A renewed effort under a NATO working group would help the Alliance regain deterrence theory understanding but in relation to the diverse nature of the threats documented at the Warsaw Summit. Allies and partners with a common understanding of deterrence theory and the diverse array of threats may shorten the time required to achieve consensus if deterrence fails and collective defence is necessary.

20. Develop and Execute a NATO Full Spectrum 'Deterrence' War Game and Exercise

The significant expansion of Russian A2/AD environments in Europe requires development of a realistic, full- spectrum, deterrence-focused exercise. The war game should fully exercise NATO Dual Capable Aircraft (DCA) and the independent strategic forces of the UK and France. Additionally, NATO must exercise the conventional support required to make DCA large force packaging more effective. The exercise should include two separate events to comprehensively exercise the training audience at every level of the NCS. First, a NAC level tabletop war game should be accomplished to explore the policy and guidance needed to make NATO strategic deterrence credible. This tabletop would also educate leaders on nuclear deterrence theory. Second, a realistic operational and tactical live fly level exercise should be executed to exercise planning and C2 requirements along with the ability of tactical units to meet the required timeline. Once

completed, NATO leaders should be confident that the nuclear enterprise supporting Alliance strategic deterrence is safe, secure and reliable.

21. Develop and Execute a Contingency 'Reinforcement' War Game to Better Understand NATO Readiness, Deployability and Sustainability Capacity

NATO should war game the ability of NATO to reinforce Europe from North America in the event of an Article 5 collective defence scenario. So far, the ability to reinforce NATO Europe has been assumed to be unopposed. It would be prudent to consider the consequences of a contested reinforcement that could delay the arrival of needed resources. The war game will foster a better understanding across all NATO organizations of the challenges involved with reinforcement on the required timeline. The game will better determine the needed weapons stockpiles to reduce the risk of a contested reinforcement.

22. Focus the 'Ambitious NATO Exercise Programme' on More Narrow Training Audiences with More Realistic Scenarios

Exercise with more realistic scenarios designed to focus on the training needs of more narrow training audiences. Currently, the exercise programme aspiration far exceeds the capability of the NCS organizations responsible for NATO training. A more focused, properly scaled exercise programme would provide more effective training. Unfortunately, it would be to a smaller training audience.

23. Evaluate Combat Ready Forces with More Realistic Scenarios

Evaluate NATO combat ready forces more thoroughly using realistic scenarios. Include no-notice evaluations in rigorous 24-hour per day

scenarios. Grading criteria should be comprehensive and standards should be high.

24. Charter a Working Group to Focus on Neutralizing A2/AD Environments

A2/AD environments threaten Europe and could limit the effectiveness of NATO Wales Summit adaptations. This working group will educate Alliance leaders on the complexity and the enormous effort needed to neutralize A2/AD environments. Using the real world Kaliningrad A2/AD environment for a deep analysis, this group will determine the CONOPS, TTPs, type and number of assets/munitions needed to neutralize this modern long-range SAM array. This working group will determine and communicate for NATO leadership the effect of A2/AD environments on the ability of NATO to move the VJTF or enhanced NRF into contested areas. Finally, a reinforcement timeline to get non-European assigned assets into place on time in the right location will be developed by this working group.

The working group will also explore kinetic and non-kinetic multi-domain alternative solutions that could neutralize A2/AD environments.

25. Charter a Working Group to Focus on Critical Asset Air Defence Requirements

Critical assets must be defended to maintain credible deterrence and execute collective defence. This working group will develop and maintain this critical asset list. The critical asset list should include BMD radars, BMD interceptor sites, aerial and surface ports of embarkation. Once a critical asset list is developed, an air defence design can be developed as war fighting requirements. In peacetime, Alliance leadership can advocate for increased defence spending prioritization to meet the air defence requirements identified by this working group.

26. Authorize Planning During Rising Tensions Prior to Achieving Consensus

Detailed NATO planning does not occur until there is consensus. Consensus can be difficult and takes time. Potential adversaries using asymmetric approaches infused with ambiguity and uncertainty will delay consensus even further. NATO is a defensive alliance and the Cold War view that planning is escalatory or provokes conflict hinders the ability of NATO to deter and defend. NATO should decouple consensus and planning in order to better posture the Alliance for a faster, more robust defence once consensus is achieved.

After consensus, the military planning needed to prepare a collective defence planning will take time because the current PE and CE are not big enough to absorb all of the work. The staff must develop, evaluate, and recommend to the NAC several COAs. The C2 nodes must stand up with fully functioning Information Technology (IT). C2 nodes must receive, in process and train augmentation and supplemental manning. Once the C2 nodes are stood up, they must increase proficiency with drills to gain effectiveness. Once the NAC selects the COA, the force must be generated and execution planning must occur. All of this must be done while standing peacetime missions still continue.

Any delay along the way could hinder NATO effectiveness. The delay could hinder the readiness of the fielded force, the ability to deploy the force and weaken the ability to sustain the force. Every day without NATO political consensus is a delay to putting a combat capable force in the field. Every day is an opportunity for potential adversaries to prepare for conflict, delegitimize NATO action with negative strategic communication and introduce even more uncertainty and ambiguity into the crisis.

27. Adjust Concept of Operations (CONOPS) and Tactics, Techniques and Procedures (TTP) Specifically to Each Threat

NATO must be ready to address the diverse threats highlighted in the Warsaw Summit. The nature of these threats are different and include: nation states (with or without nuclear weapons), nation-states with ballistic missiles and pursuing Weapons of Mass Destruction (WMD) capability, and non-state actors launching terrorist attacks in Europe and deployed forces. Potential attacks by state and non-state actors through cyberspace must be explored. Potential attacks by adversaries using hybrid warfare must be addressed. All of these potential attacks require extensive analysis to ensure a timely response. The analysis should focus on the effect of each threat on NATO processes, CONOPS, TTPs and invoking Article 5 responses.

28. Maintain Adequate Weapons Inventories

As defence spending declines, nations commonly reduce weapons inventories needed to sustain combat operations in order to balance the budget. In peacetime, no one notices. In crisis, munitions shortfalls are discovered in real time during ongoing combat operations forcing commanders to find munitions to keep combat ops going or to keep the Alliance or coalition of willing intact. Allied weapons inventories should be monitored because given the high rates of consumption expected during high tempo combat operations, it will be very difficult to resupply the force in a timely manner, particularly with precision-guided munitions

29. Focus on Full Interoperability and Standardization Agreement (STANAG) Compliance

Interoperability and STANAG compliance are important to Alliance effectiveness. Standards must be developed, enforced, evaluated and

inspected to make sure interoperability is assured across the entire spectrum of military activities. If compliance is enforced, the ability of the Alliance to execute combat operations overnight with the NATO generated force will increase exponentially.

30. Increase Training Opportunities for Deployed Military Forces

An ability to accomplish full spectrum training for already deployed forces could increase support to standing NATO operations. The lack of training opportunities in the Baltics for NATO QRA remains an irritation to those Allies who offer aircraft for Air Policing. While NATO air forces have been supportive of reinforced Baltic Air Policing, the effort to reinforce air policing in the south after the annexation of Crimea did not occur due to lack of assets and legal obstacles.

Lack of deployed training opportunities occur for a variety of reasons. Restricted airfield operating hours limit flight operations. The high cost of airfield support functions limit flight operations. Weapons storage sites are limited in scope or operating hours. Restrictive flying hour windows primarily caused by noise abatement efforts limit operations. Lack of training airspace, training ranges and supersonic flight and chaff and flare restrictions prevent full spectrum training. Finally, the availability of adversaries precludes advanced training. Initiatives to alleviate training restrictions will help force generation for reinforced Air Policing.

Deterrence and Collective Defense	Criteria									
	Impact			Cost			Priority			
Option/Opportunity	L	M	H	L	M	H	1	2	3	4
1 Meet the Wales Summit Defence Investment Pledge (DIP)			X			X	X			
2 Establish a standing, fully functional Air Operations Centre (AOC) with a fully manned Peacetime Establishment (PE) Joint Force Air Component (JFAC). At a minimum, establish a fully manned, standing Intelligence, Surveillance and Reconnaissance Division (ISRD) within NATO Allied Air Command headquarters			X		X		X			
3 Replace Air Policing with Air Defence as the NATO standing peacetime mission			X	X			X			
4 If Allies decide not to replace Air Policing with Air Defence, then develop an Air Policing to Air Defence (AP-to-AD) transition plan for implementation during times of rising tensions			X	X			X			
5 Develop a strategic Indication and Warning (I&W) System			X	X			X			
6 Stand up a NATO Command Structure (NCS) Processing, Exploitation, and Dissemination (PED) Centre with a fully trained PE			X		X		X			
7 Stand up a NATO Command Structure (NCS) Targeting Centre with a fully trained PE			X		X		X			
8 Reevaluate NATO Command Structure (NCS) PE and Crisis Establishment (CE) for the optimum placement of NATO Joint Air Power experienced personnel			X	X						X
9 Establish NATO procedures for 'RENEGADE' assistance to Allies without sovereign air defence capability			X	X			X			
10 Develop preplanned air-heavy 'deterrence options' to incorporate into NATO plans			X	X			X			
11 Develop NAC approved Pre-Planned Responses (PPRs) for conventional military employment			X	X						X
12 Add NATO Joint Air Power assets to the Long-Term Rotation Plan (LTRP) for enhanced NRF, VJTF and the NFIU (NATO Force Integration Unit) reception mission			X	X			X			

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Deterrence and Collective Defense		Criteria									
		Impact			Cost			Priority			
	Option/Opportunity	L	M	H	L	M	H	1	2	3	4
13	Formalize NATO readiness, deployability and sustainability metrics			X	X			X			
14	Establish an Alliance conference to identify training opportunities			X	X				X		
15	Focus NATO infrastructure investment on airfield improvements needed to support high tempo combat operations			X			X	X			
16	Charter a NATO working group to identify and implement interoperability initiatives			X	X			X			
17	Develop critical pooling and sharing agreements to address NATO capability shortfalls			X		X		X			
18	Establish an upper and lower layer organic NATO Ballistic Missile Defence (BMD) interceptor capability			X			X	X			
19	Charter a working group to better understand deterrence theory and help educate all levels of leadership in NATO			X	X					X	
20	Develop and execute a NATO full spectrum 'deterrence' war game and exercise			X		X			X		
21	Develop and execute a contingency 'reinforcement' war game to better understand NATO readiness, deployability and sustainability capacity			X		X			X		
22	Focus the 'ambitious NATO exercise programme' on more narrow training audiences with more realistic scenarios			X		X			X		
23	Evaluate combat ready units with more realistic scenarios			X		X				X	
24	Charter a working group to focus on neutralizing Anti-Access/Aerial Denial (A2/AD) environments			X	X			X			
25	Charter a working group to focus on critical asset air defense requirements			X	X			X			
26	Authorize planning during rising tensions prior to achieving consensus			X	X			X			

Deterrence and Collective Defense		Criteria									
		Impact			Cost			Priority			
	Option / Opportunity	L	M	H	L	M	H	1	2	3	4
27	Adjust Concept of Operations (CONOPS) and Tactics, Techniques and Procedures (TTP) specifically to each threat										
28	Maintain adequate weapons inventories			X			X	X			
29	Focus on full interoperability and Standardization Agreement (STANAG) compliance										
30	Increase training opportunities for deployed military forces			X		X		X			

Endnotes

1. Business Insider, 'RANKED: The world's 20 strongest militaries', Jeremy Bender, 21 Apr. 2016.
2. Wikipedia: 'Little green men refers to masked soldiers in unmarked green army uniforms and carrying modern Russian military weapons and equipment that appeared during the Ukrainian crisis of 2014. The term was first used during the annexation of Crimea by the Russian Federation, when those soldiers occupied and blockaded the Simferopol International Airport, most military bases in Crimea and the parliament in Simferopol.'

Joint ISR and Air C2

<div style="text-align:right">**IV**</div>

By Lieutenant General (ret.) Friedrich W. Ploeger, DEU AF

Context and Aim

Since 2014, NATO has seen a dramatic change in its security environment. In Warsaw, NATO's HOSG stated that there is 'an arc of insecurity and instability along NATO's periphery and beyond. The Alliance faces a range of security challenges and threats that originate both from the east and from the south; from state and non-state actors; from military forces and from terrorist, cyber, or hybrid attacks'.[1] The Allies in particular were alarmed by 'Russia's destabilizing actions and policies [to] include: the ongoing illegal and illegitimate annexation of Crimea; … the violation of sovereign borders by force; the deliberate destabilization of eastern Ukraine; large-scale snap exercises contrary to the spirit of the Vienna Document, and the provocative military activities near NATO borders, including in the Baltic and the Baltic Sea regions and the Eastern Mediterranean, it's irresponsible and aggressive nuclear rhetoric, military concept and underlying posture; and its repeated violations of NATO Allied Airspace.'[2] NATO has reacted to this changed security environment by enhancing its deterrence and defence posture, including by adopting a forward presence in eastern parts of the Alliance, e.g. by deploying additional airborne air defence assets as well as NATO Airborne Early Warning and Control (NAEW&C) aircraft for enhanced situational awareness and reassurance, and by forward deploying battalion-size, rotating army elements and their equipment.

Joint Intelligence, Surveillance and Reconnaissance (JISR) is vital for all military operations. While surveillance and reconnaissance can answer the what, when, where, and more often than not, who. The combined elements from various intelligence sources and disciplines provide the answers to how and why.

At the Chicago Summit 2012, NATO launched the 'JISR initiative'[3]. JISR is a high value, complex and wide-reaching capability, constantly providing NATO key decision-makers with a permanent system providing information and intelligence to key decision-makers, helping them to make well-informed and timely decisions.

The **Air C2** process addresses the interaction and the synchronization between the three fundamental phases in joint air operations: assessing/collecting, decision-making and effecting. Looking closer at the core of Air C2, it becomes apparent that (J)ISR is the central process linking and driving the other processes. The following diagram illustrates the processes in air operations planning, showing, schematically, the interaction between the divisions inside an air component and between the air component, sister components, and higher level HQ. The requirement for solid interconnectivity between all elements is clear.

It is widely accepted that all processes should be fully integrated in a Joint Force Air Component (JFAC) structure; it is the guiding principle for Allied Air Command Ramstein's Air C2 concept. In contrast to the USA Air Force which uses a Standing JFAC and Air Operations Centre (AOC) providing Command and Control (C2) to ongoing operations and which is able to additionally incorporate new missions, the NATO Air C2 Concept employs a 'Core JFAC' with a few current operations elements as part of the Allied Air Command HQ-Structure to stand up an integrated JFAC in response to a crisis when directed by the North Atlantic Council (NAC).

Figure 1: Air Operations Planning Process (NATO Standard).

A small cadre of permanent Allied Air Command personnel are augmented and supplemented from other units to form the JFAC structure needed for the operation. It takes time to generate the personnel and the required communications and information systems architecture to 'stand up'.

To execute its peacetime task of Air Policing (preserving the integrity of Alliance airspace) Allied Air Command Ramstein relies on two Combined Air Operations Centres (CAOCs) and their Static Air Defence Centres (SADCs). They perform this mission on behalf of the Commander Allied Air Command who has been delegated this task by SACEUR. The CAOCs' structures include a 'Deployable Air Operations Centre (D-AOC)' element which will, when called upon, augment Allied Air Command's JFAC Combat Plans and Combat Operations Divisions (CPD, COD) to form the core of the embedded AOC.

The second standing task, Ballistic Missile Defence (BMD) to protect NATO populations, territory and forces against the threat posed by the pro-liferation of ballistic missiles emanating from outside the Euro-Atlantic area, is conducted from the BMD Operations Centre at Allied Air Command Ramstein which exercises centralized C2 over assigned units.

Allied Air Command Ramstein thus has to fulfill three basic functions: to produce the advice for the Commander Allied Air Command in his air advisory role to SACEUR, to execute and oversee the peacetime standing tasks as described above and to be prepared to stand-up a JFAC-HQ when directed by the NAC.

The new security environment has already tested NATO Command Structure (NCS), especially the Air C2 structure and JISR capabilities with regard to responsiveness and comprehensiveness. Shortfalls became obvious and require in-depth assessment. The aim of this essay is to analyze NATO's JISR and Air and Space Power C2 Control capability, Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), against the requirements of the changed security situation. Recommendations are developed suggesting ways to mitigate shortfalls in order to re-establish and maintain the agile and flexible C4ISR capability the Alliance needs.

JISR – Prerequisite for Timely Decisions and the Effective Conduct of Operations

Overview

NATO nations provide the Alliance with a variety of Intelligence, Surveillance and Reconnaissance (ISR) capabilities, via maritime, air and space as well as ground systems. JISR is the process comprising the collection, processing, exploitation, fusing, and dissemination of data and

information. In NATO, the JISR capability gap is well-known and was made obvious as early as in Operation ALLIED FORCE, highlighted again in Operation Unified Protector (OUP), and during the crisis in the Ukraine when NATO was surprised by Russian 'Snap exercises'.

JISR in NATO[4] is the synchronization and integration of Operations and Intelligence capabilities and activities, geared to provide timely information to support decision effects. Thus, JISR is a combined Intelligence/ Operations function requiring extensive cross-Community of Interest (COI) coordination and interoperability at many levels. JISR integrates NATO and member/partner Nation's ISR capabilities, policies, procedures and systems in order to provide intelligence support to leaders, commanders and decision-makers – from the strategic to the tactical level. The aim of NATO's JISR initiative[5] is to improve this critical capability by integrating data and information gathered from NATO's Alliance Ground Surveillance (AGS) system and/or NAEW&C aircraft as well as a wide variety of national JISR assets from the space, air, land and maritime domains.

Following the concept of 'need responsibility to share' rather than 'need to know' an integrated JISR network will allow the Alliance to share information uploaded by the linked surveillance assets while at the same time providing assurance and protection of the distributed data and its network. Both surveillance and reconnaissance include visual (from soldiers on the ground) and electronic observation (for example from satellites, unmanned aircraft systems, ground sensors and maritime vessels), which are then analyzed, turning information into intelligence. The Initial Operating Capability (IOC) for JISR, declared in February 2016, represents a significant achievement, enabling better connectivity between NATO and Allies' capabilities. IOC is only the first milestone for the JISR initiative. Further work is needed to sustain these achievements, and expand them beyond the scope of the NATO Response Force (NRF). The ability to exchange accurate data, machine-to-machine in a timely and secure

manner, will define the effectiveness of the system. Policy, however, not technology may hinder our ability to do so.

AGS

The AGS Core Capability will be funded by 15 nations and owned and operated by NATO. It is expected that it will become operational in the 2017/2018 timeframe. The AGS air segment is based on Northrop Grumman's Global Hawk Block 40 airframe equipped with a sophisticated Synthetic Aperture Radar (SAR) capable of providing Ground Moving Target Indicator (GMTI) or SAR imagery, or Imagery Intelligence (IMINT) at considerable stand-off distances and in any weather. It will enable the Alliance to perform persistent surveillance over wide areas with this high-altitude, long-endurance platform. The collected data will then be exploited at the AGS ground segment and disseminated to members of the NATO intelligence community. The AGS unit will be a subordinate element of NATO Allied Air Command at Ramstein (Operational Control) so Allied Air Command's personnel establishment will need additional positions in that regard.

AGS provides the Alliance with an organic ISR collection and exploitation capability supporting peacetime collection requirements, especially those associated with Indication and Warning (I&W) and Intelligence production. Its strategic mission orientation limits its contribution to the overall intelligence picture because it lacks IMINT/Electronic Intelligence (ELINT)/Signals Intelligence (SIGINT) capabilities. Tight political control by the NATO Council over its employment restricts SACEUR's flexibility to quickly adapt to changing collection priorities and missions in an emerging security situation – another consequence of its strategic allocation. Considering the limited tactical capabilities, in particular in the European nations, NATO's JISR gap has been reduced but continues to be significant.

NAEW&C, AWACS

The NAEW&C Force is multinationally financed and a 'Command Force' operated by NATO. It conducts a wide range of missions, such as air picture augmentation, support to Air Policing, counter-terrorism, evacuation operations, initial entry and crisis response. The force is subordinate to SACEUR who delegated Operational Control to NATO's Allied Air Command at Ramstein.

Therefore, this HQ requires additional posts to manage the force. NATO AWACS was originally not designed as an ISR platform. The mid-term modernization programme, however, created a set of capabilities that can contribute to the JISR mission: Its organic sensors such as the long-range air-to-surface surveillance radar, capable of detecting air and maritime targets, and its passive Electronic Support Measures (ESM) sensors complement the Common Operational Picture (COP); its battle management and coordinating capabilities provide direction, management and protection of ISR systems.

In its more traditional role, producing early warning information and aRecognized Air Picture (RAP) for large areas from orbits in NATO's Eastern and Southeastern member states, it contributes to the reassurance of Alliance nations in light of the changed security environment. With its non-traditional ISR capability, AWACS played a crucial role in OUP. The Bilateral Strategic Command (Bi-SC) operational concept gives SACEUR the authority to flexibly employ AWACS within NATO airspace and adapt orbits as he sees fit, e.g. to close gaps in the radar coverage.

NAEW&C's complex mission suite demands a significant amount of training for the mission crews to reach the required level of expertise. It takes more than one year for a new mission crew member to become fully qualified and 'combat ready'. Given the standard tour of duty of three

years in NATO this long training period reduces crew availability for operations to less than two years.

NATO JISR Network –
Tasking, Collecting, Processing, Exploitation/Fusing, Dissemination

The JISR capability in NATO is based on a network that in the end will link NCS HQ at the Strategic Level (SHAPE), Operational Level (JFCs Brunssum and Naples), and Tactical Level (LANDCOM, Allied Air Command, and MARCOM) with the NATO Intelligence Fusion Centre (NIFC, collocated with the USA Joint Intelligence Operations Center Europe – JIOC EUR), the collection units (AGS, NAEW&C, national units) and the 'consumers in the field' (NRF units, units employed in operations).

It will permit the coordinated collection, processing, dissemination and sharing of ISR material gathered by AGS, NAEW&C, as well as many extant and emerging national ISR assets. The JISR-process comprises the steps 'Tasking, Collecting, Exploiting, Disseminating' intelligence information to best support operations. Examples of supported areas include:

- Joint Intelligence Preparation of the Environment (JIPOE);
- Indications and Warning (I&W);
- Situational Awareness;
- Support to Targeting;
- Suppression of Enemy Air Defence (SEAD);
- Force Protection/Base Defence;
- Personnel Recovery;
- Theatre Missile Defence (TMD) Conventional Counter Force;
- Counter Terrorism;
  – Counter Improvised Explosive Device (C-IED) Defeat the Network;
  – Counter Piracy.

Allied Air Command Ramstein as parent HQ for the NATO owned and operated AGS and NAEW&C will be responsible for their tasking following the direction and guidance of SACEUR (ultimately the NAC) and the Collection Managers at the JFC Level. It can be assumed that Allied Air Command will also be the primary 'tasking authority' in any crisis inside the European theatre, employing assigned airborne JISR assets according to the requirements and priorities defined by the responsible joint operational level command element (JFC/JTF, Joint Collection Management Board (JCMB)). This asks for sufficiently trained and experienced personnel in Allied Air Command's ISR-division in order to be able to properly **plan, task, and monitor** the execution of the collection missions.

Processing and **exploitation** of collected data, especially of GMTI/SAR-based imagery, needs a special skill set that only few nations can provide. It develops only with experience, and thus may become the bottle neck in the JISR process because these specialists are not only needed in the AGS Ground Segment but also in NIFC and Allied Air Command as a minimum to support deliberate and dynamic targeting, and especially Time-Sensitive Targeting (TST). TST-Cells will quite often be established and operated at the Air Component on order of the Joint Level.

The NIFC plays a central role in **fusing** and **disseminating** the products running the risk of becoming another bottle neck in the event of a serious crisis inside the European theatre including high intensity kinetic operations. NIFC not only provides fused intelligence information but also the precise target information required for kinetic operations through the JIOC EUR gateway (the 'Combined Targeting Centre – CTC') to the USA intelligence and target data bases. Limiting factors are the processing capacity (of both equipment and personnel) as well as the gateway/network bandwidth capacity, especially when extensive imagery is part of the target information, thus putting into question its capability to support demanding kinetic air operations.

I&W are another critical area. They are key to a timely reaction of the Alliance. Making intelligence information available for the NRF following the 'responsibility to share' principle is a major step forward but the principle should be extended to include all operational areas of the Alliance, especially the standing peacetime tasks of Air Policing and BMD. It should be considered in this context to give SACEUR the immediate and unrestricted authority to rapidly task available ISR-assets to collect relevant strategic information.

Conclusion

NATO JISR is a key enabling capability to achieve information superiority over potential adversaries. ISR is also a key process in air operations planning. However, to accomplish this goal, it is essential that each Alliance nation actively participates, willingly contributes national assets and information and makes available sufficient and experienced personnel for collection, processing, exploitation, and dissemination. Deep-rooted national caveats against information sharing must be resolved in order to overcome today's operational challenges. Overcoming the bottle necks in intelligence processing, especially air targets, and the political restrictions in AGS collection management are considered urgent.

Air C2

General

The Air C2 organization in NATO comprises the following elements: Allied Air Command Ramstein and its subordinate units, the CAOCs at Uedem and Torrejon, and the Deployable Air Command and Control Centre (DACCC) at Poggio Renatico. Unlike the CAOCs, the DACCC consists of a D-AOC, a deployable Control and Reporting Centre (CRC) (DARS) and – in the future – deployable sensors. In executing its **peacetime standing**

task of Air Policing Allied Air Command Ramstein and the CAOCs rely on CRCs in the nations (as part of the NATO Force Structure (NFS) to generate the RAP and to perform aircraft control when alert aircraft are launched to intercept unknown airborne objects.

Air C2 for operations as described in NATO's Level of Ambition (LoA) is performed by the HQs of the NCS or Air C2 elements provided by nations inside the NFS. The CRCs in the nations contribute to the execution of air operations by fulfilling tactical control/air battle management functions as ordered by the operational level HQ.

Most of the NFS JFACs, however, are not readily available. They consist of a core element only – about 10 to 20 percent of the manpower of a 'medium size, standard JFAC' – and, therefore, require massive augmentation and are ready for operations only after a longer lead time. Only the US Air Force maintains standing AOCs with each numbered Air Force (603rd AOC with 3rd Air Force at Ramstein). They can be considered as readily available and fully capable Air C2 capability. NFS JFACs are the NRF Air C2 elements for operations beyond the European theatre, and rotate into higher readiness according to the agreed NRF rotation plan. The NCS Air C2 organization, consequently, is the standard capability that should be readily available for activation in response to a crisis affecting NATO in and around Europe. During the Crimea Crisis in 2014, and in view of the changed security environment, deficits became evident in the following areas: doctrine, responsiveness, capacity (manpower), training and systems interoperability.

Doctrinal Issues

Responsiveness

NATO Integrated Air and Missile Defence System (NATINAMDS) doctrine describes the standing peacetime tasks of Air Policing, BMD, and C2

main functions. Only in the case of a crisis in the European theatre and when a response plan is activated will a Joint Operation Area be established and NATINAMDS migrate from its peacetime function to adopt an Air Defence role. Allied Air Command Ramstein will stand up a JFAC organization supporting the JFC responsible to handle the crisis. There is, however, a mismatch between the readiness requirements for the Very High Readiness Joint Task Force (VJTF) and the reaction time of the Air C2 organization. The discrepancy becomes even worse when the activation of a response plan is not considered in time.

Nations and NATO Commanders will want to see the deployment of the VJTF properly supported by NATO Air Power. It is, therefore, most desirable that a VJTF deployment is carried out concurrently, or better still, preceded by the deployment of air- and ground-based air defence capabilities. This, in turn, calls for building a C2 capability able to direct air defence operations in a Joint Operations Area (JOA). The SADCs or the D-AOCs at the CAOCs are neither designed for nor capable of managing the task. It is also inadvisable to delegate such an intricate mission to a subordinate element. The JFAC that most closely meets the criteria to respond to a crisis inside the European theatre is currently Allied Air Command Ramstein. Its timely response, however, is dependent on a rapid decision by the NAC, which is likely too slow to allow an effective response.

BMD[6]

Doctrine for NATO's BMD mission, executed by Allied Air Command Ramstein, has not yet been fully developed. Theatre Ballistic Missile Defence (TBMD) in expeditionary operations beyond NATO territory does not pose a problem from a C2 perspective.

Situations may, however, arise in which BMD operations (for NATO European territory, population and forces) and TBMD operations (in

a JOA established to handle a crisis in NATO Europe) overlap and will be required to be directed concurrently. C2 solutions have not yet been thoroughly analyzed. C2 relationships and delineation of responsibility between Allied Air Command and the Air Component Command (ACC) acting in the JOA remain unclear. Clarification of doctrine and concept is needed.

Air C2 Capacities

With current personnel ceilings for Air C2 in the NCS, and given the manpower requirements for a JFAC organization that runs 24/7, it was only possible to design a JFAC that is barely able to execute a 'Smaller Joint Operation – Air Heavy'. Critical shortages remained in the ISR Division and in some other specialty areas, e.g. AAR. The 'ISR-capability gap' is also evident in NATO's Air C2. Positioning most of the Intelligence Processing – Exploitation – Dissemination (PED)-functions at NATO's AGS Wing at Sigonella appears unhelpful.

The Warsaw Summit tasked NATO Military Authorities (NMAs) to undertake a functional assessment of the NCS[7]. In this context, work is underway to identify ways to overcome the capacity gap in Air C2 to meet the demands of a 'Major Joint Operation – MJO +' or concurrent operations in two different JOAs inside NATO Europe, commanded by two JFCs. Without increasing the personnel establishment in the NCS the shortfalls can only be resolved by formally combining Allied Air Command Ramstein and a **standing JFAC** of a nation. The only viable solution appears to be to revitalize the relationship between Allied Air Command Ramstein and the USAFE/3rd Air Force AOC collocated on the airbase. They could form a JFAC capable of managing a 'MJO'. The US 3rd Air Force AOC is, however, not earmarked or otherwise available for NATO operations. This is an opportunity to establish a formal relationship and fix it in doctrine.

C2 at the Tactical Level: Capabilities and Capacities

A holistic view of NATO's Air C2 capabilities must include the elements below the Allied Air Command/CAOC level, i.e. the CRCs and the capabilities of NAEW&C which are exercising tactical control of assigned forces. After the end of the Cold War, NATO nations reduced the number of CRCs in conjunction with the reduction of their aircraft fleets to a minimum level compatible with the requirements of safeguarding the integrity of the airspace (the Air Policing mission) and the training of their remaining national air forces.

This was made possible and supported by technical advancements in C2 systems including the ability to network a multitude of radar sensors and radios. However, there were negative consequences: the loss of capability to deal with a major crisis in Europe and to support a larger number of combat aircraft with control services, and a reduction in training – to the bare minimum – of the remaining operators to safely handle more complex air battle situations, as is often shown in larger live air exercises. In nations with smaller or no air forces, aircraft controllers receive barely the minimum live training to maintain the skills required for the air policing mission. Although simulators have become more powerful and have gained importance, simulation alone cannot match everything learned during live training.

Concurrent to restructuring focused primarily on the air policing mission, the drastic reduction and withdrawal of Ground Based Air Defence (GBAD) units from the IADS including the Surface-to-Air Missile (SAM) Allocator positions in the parent CRCs contributed to the CRCs losing their capability to execute tactical control functions and manage the integrated air battle – as was standard during the Cold War. Master Controllers who used to be the 'Air Battle Managers' at the CRC level became more or less the 'supervisors' of aircraft control and RAP production. In some nations they even do not study the principles of 'SAM Control' during their training.

The NAEW&C Component underwent a similar experience: On the one hand, mission crews receive barely enough in NATO European Airspace to maintain their capability status, and, on the other hand, they are strained to the limits by ongoing operations. The complexity of the NAEW&C aircraft's mission necessitates a greater amount of training for the mission crews. The reduction of the fleet and mission crews have exacerbated the situation and have put NAEW&C's capability to meet NATO's LoA at risk.

Training and Exercises – at JFAC Level

A three-level training concept was developed to generate the required qualified personnel: All operations personnel in NATO's Air C2 structure receive their initial functional training at the DACCC in Poggio Renatico. They then conduct training as a team in their home organizations, i.e. in the D-AOCs of the CAOCs/DACCC and at Allied Air Command. Training culminates with exercises in a fully developed JFAC-structure at Ramstein which validates the entire training process and system. In every rotation cycle, a new training and reinforcement relationship has to be established with the nationally provided JFACs in order to get access to a wider pool of personnel able to fill specialists' billets, and certainly for sustainability. Currently, France, Germany, Italy, and the United Kingdom offer national JFACs for Air C2 in the NRF unit roster (the Combined Joint Statement of Requirement (CJSOR)). Spain and Turkey intend to offer similar capabilities to NATO in the near future. To transform the JFAC into a JTF-Air HQ and to fill the joint functions during an 'SJO-Air Heavy' liaison with other command structure HQs and securing their cooperation is an obvious precondition.

NATO's training and exercise schedules and priorities, have started to reflect the variety of challenges which are unique for the single service commands in the new NCS, but still are not commensurate with the new security environment. NATO's exercise scenarios also lack the degree kinetic activities a JFAC has to have to hone the skills in all its divisions to

the wartime level. For several years stabilization missions had been the focus of Alliance exercises.

As revealed with the lessons learned from OUP, those exercises neither tested nor measured the required capabilities of the NCs. Although a new scenario was developed to better reflect an Art. 5 contingency, it is still not giving Allied Air Command the required kinetic challenge, though exercise fidelity has steadily improved since the end of OUP. A major effort is needed to include the elements necessary to fully train Allied Air Command's JFAC Structure in a challenging kinetic scenario, including the ISR division, the joint targeting process, and complex A2AD. Live training events that include a greater number of aircraft to exercise planning and execution of larger live air operations from the AOC level down to the tactical level of the CRCs and NAEW have become a rarity. Opportunities offered by national training events like JAWTEX/Tiger Meets etc. should be investigated and exploited.

Training at the Tactical Level

Training and exercises at the tactical level concentrate on the peacetime standing task of executing the air policing mission and supporting live air exercises. They are mainly CRC centric. Only occasionally do CRCs have the opportunity to support training and exercise activities of SBAD units. Most of the time these units use their own scenario simulation to prepare for a specific mission, e.g. the augmentation of TUR air defence.

Exercises that integrate airborne and GBAD in region or system wide training events are scarce, and are seldom met with the required enthusiasm because the simulated scenarios appear boring. Sometimes they are even considered to be in conflict with policy (GRC – TUR differences about the Aegean airspace), or are perceived unrealistic not matching the current security environment.

Individual and functional training for positions in a CRC are a responsibility of the nations. Only aircraft controllers receive some standardization with regard to control of Quick Reaction Alert (QRA) aircraft as is proven by SACEUR's/Allied Air Command's evaluation programme. Training for master controllers and other key positions, however, is not equally standardized and therefore shows great differences. Opportunities to standardize individual training by sending operators to multinational C&R training facilities are not exploited.

Cyber and Space

Even if they are not a primary subject of this essay, they need to be addressed because they are key elements in any joint air operation. As OUP has demonstrated, both Cyber and Space need to be integrated into the planning as well as into all operations and missions. NATO has acknowledged its importance by developing a coherent cyber policy. The Cyber Defence Pledge[8] calls upon the nations to foster the resilience of their national networks and critical infrastructure. Close bilateral and multinational cyber defence cooperation including information sharing, situational awareness, education, training and exercises play a key role. NATO's operational cyber expertise is concentrated at the strategic level in the CIS Group at SHAPE.

In contrast to the cyber focus the Alliance still has no coherent space policy even though it operates its own space assets. Space is a critical supporting domain as air operations rely heavily on extensive and complex communication networks to ensure mission success. Allied Air Command, however, lacks expertise and does not have direct access to a dedicated cyber nor space awareness capability. Currently, voluntary national contributions help to include cyber and space aspects into the planning and conduct of joint air operations.

Resilience

The drastic reduction in NATO Air C2-entities eliminated all redundancy, making the structure vulnerable to technical outages, other failures, or conventional or cyber-attack. A longer outage of a CAOC, e.g. due to technical reasons or a fire, can only be mitigated by the Allied Air Command HQ itself. A similar outage at Allied Air Command cannot be covered from inside NATO's Air C2-structure. At CRC-level structural robustness was lost because of their drastic reduction, making it difficult to organize back-up solutions.

Connectivity/C2-Systems

Last, but not least, the shortfalls in the C2-systems area must be addressed: ACCS and Air Command Control and Information Services (AirC2IS) are considered to be the CIS backbone for Air C2 both below Allied Air Command level (ACCS) and above (AirC2IS). Both systems, however, are still not operational. Therefore, Air C2 in NATO is conducted with a multitude of C2-systems, making C2 very complicated for both operators and CIS-specialists who maintain the systems. The complex situation is exacerbated by the variety of national systems, which are not entirely interoperable with NATO systems and do not meet required security standards, although they are more often than not the key source of vital information. Information, data exchange and collaboration is hindered or further complicated by National disclosure policies.

Conclusion

NATO's current Air C2 structure appears adequate for its benchmark mission, the SJO-Air Heavy, although it still lacks capability in some critical specialist fields, especially ISR. A sophisticated training, augmentation and reinforcement scheme supports standing up the JFAC. It is, however, not

as responsive as might be required. An early political decision is needed to timely permit standing up the JFAC; a small standing core-JFAC does not exist. There are currently no capability reserves with regard to concurrent operations or a MJO/MJO +. NATO's Air C2 doctrine does not resolve the overlap of peacetime BMD and Air Policing in one part of NATO Europe, and collective defence operations including TBMD in a neighboring JOA.

Air C2 at the tactical level of the CRCs lost robustness and the capability to control the integrated air battle as a consequence of focusing primarily on the air policing mission. All levels of Air C2 in NATO need training in challenging **live** and **simulated** exercises presenting the full spectrum of air activities, including Art. 5 and A2AD. This is not sufficiently supported by NATO's current exercise programme. Space and Cyber are doctrinally and operationally not addressed as needed. Reduction in numbers of C2-entities led to a loss in redundancy and robustness, hardened infrastructure is no longer used. The introduction of a common and integrated Air C2 system is long overdue, interoperability with national systems is a must, and national disclosure policies should not impede operations.

Overcoming Shortfalls – Considerations and Proposals

JISR

Main issues relate to ISR capabilities, capacities, manpower and national disclosure policies.

Capabilities

In order to close the critical gap in JISR capabilities NATO commanders rely on the nations to provide assets to provide assets for all intelligence collection disciplines as required. As assets only exist in small numbers and require a relatively large logistical effort to operate them nations should

consider collaborating and establishing a multinational JISR unit[9] to exploit mutual capabilities and to achieve synergy.

This multinational unit should be made available for NATO and earmarked for NRF operations in the defence of NATO Europe.

Proposal:
• Establish a multinational JISR-unit from existing assets.

Manpower/Capacity

The capacity issues in JISR mainly relate to the availability of sufficiently experienced and trained personnel at critical nodes like the NIFC and NCS entities, among them Allied Air Command. Among these, of special importance is the production capability of target information for air attack operations. The following proposals should be explored:

• Increase the number of posts to exercise C2 of AGS/NAEW&C at Allied Air Command in the context of building up the AGS force and restructuring NAEW&C.
• Nations should consider making specialists available for deployment periods longer than the standard 3 year tour of duty in NATO.
• Partner with nations to establish a greater pool of ISR specialists to supplement/augment in case of a crises requiring more resources.
• Consider establishing an 'Air Targeting Centre'.

Disclosure Policies/Responsiveness

Nations need to review their disclosure policies in order to make available the intelligence information that NATO's operational commanders need – to generate I&W, build up a solid picture of the operational environment and properly task operational forces to achieve the effects needed.

Proposals:

- Widen the scope of the 'responsibility to share' and recognize a 'need-to-know' beyond the direct operational need of the NRF.
- NCS elements in the operational chain of command should have the same direct access to imagery, information and other data as the NIFC.
- Give SACEUR more authority to rapidly task assigned strategic JISR capabilities (AGS).

Air C2

Doctrinal Issues

Responsiveness
Solutions to achieve a higher degree of responsiveness lie in the availability of a standing lean tailored JFAC/AOC capability at Allied Air Command Ramstein. During normal operations it will handle the peace-time tasking of AGS and NAEW&C, control BMD of NATO territory, will oversee the execution of the Air Policing mission by the CAOCs, and monitor other NATO operations in which Allied Air Command is not directly involved. To avoid changing the overall Peacetime Establish-ment (PE) tables for Air C2 in NATO the required posts could be taken from the D-AOC elements of the CAOCs/DACCC. Posts for the peace-time tasking of AGS/NAEW&C could be generated from the former NAEW&C Force Command or the AGS core respectively. Additionally, when a Graduated Response Plan (GRP) is activated and the VJTF is de-ployed this capability can grow to the capacity needed, exercise C2 of air operations in the JOA, and support the responsible Air Defence Commander (ADC)/Airspace Control Authority (ACA). Because the peacetime Air Policing Rules might not match in such a security situation a set of Rules of Engagement (RoE) which are better suiting should be considered.

Proposals:

- Establish a small standing tailored JFAC at Allied Air Command Ramstein (e.g. by reducing D-AOC PEs at the CAOCs/DACCC by a few positions and moving them to Allied Air Command).
- Move positions of former AGS staff at SHAPE and former NAEW&C Force Command to Allied Air Command.
- Adapt Air C2 Concept of Operations (CONOPS) accordingly.

Mission Command

It has been argued that a standard JFAC organization is too large, the processes are manpower intensive and that the highly qualified individuals in the subordinate units are not recognized, mainly because of adherence to the principle of Centralized C2 and Decentralized Execution. The argument is that modern Air C2 should also permit the application of the principle of Mission Command. Responsibility could be delegated to subordinate Commanders because most of current conflicts focus on air support in stabilization operations. Therefore, the intellect and experience commanders at wing and squadron levels could be exploited, rather than having them simply marshalling their forces in accordance with the Air Tasking Order (ATO).

Mission Command is a Prussian idea from the 19th century, 'invented' by von Moltke to overcome the 'Fog of War'. If subordinate commanders knew and understood the Commander's intent, they could, within certain limits, continue to operate in absence of further orders as long as what they did was in accordance with the Commander's intent. If Network Enabling can lead to Shared SA – where subordinate commanders have the same 'big picture' as the JFACC – then the benefits of Mission Command could be realized in the 21st century. In an 'Effects Based Approach to Operations', subordinate commanders would become 'effects champions', responsible to the JFAC (and ultimately the JFC) for effects within their own sphere of influence and expertise.

Mission Command may indeed be a solution for some stabilization operations and reduce manpower requirements at the JFAC level, e.g. in Africa where coordination and prioritization can be exercised at lower levels. We also apply it today when assigning a Mission Commander in some complex air attack missions for the detailed execution planning. But, even in stabilization operations like those executed in Afghanistan, Mission Command quickly reaches its limits because of the dimensions of the theatre and the complex coordination requirements of scarce air resources, enablers, Electronic Warfare (EW) and Air-to-Ground capabilities.

Furthermore, Joint Air Power's capability to deliver strategic and operational effects through tactical action calls for an integrated approach, as was shown in OUP. There remains the requirement for a single focal point for the effective employment of Air C2 across the full spectrum of Air and Space Power Operations. That single point is, and can only ever be, the ACC. Finally, a fully functioning NATO Network Enabled Capability has not yet been achieved.

Mission Command and the JTF-Concept

The JTF-Concept was developed to solve the mismatch between NCS capabilities and NATO's LoA at the joint level. The idea is to use Graduated Response Force (GRF) HQs (Land) as JTF HQs for low-intensity, follow-on stabilization operations, thus freeing up a JFC. It has, however, not been definitely agreed upon how to organize Air C2, such as whether it should be integrated, performed by the Air Operations Coordination Centre (AOCC) (although it has a different mission) or by a dedicated, small Air Component. If the air contribution in such follow-on operations, e.g. the to provide assets for all intelligence collection disciplines as required NATO to provide assets for all intelligence collection disciplines as required (KFOR), consists mainly of rotary wing and fixed wing air transport, some non-organic ISR and probably a few dedicated air attack capabilities for sup-

port in extremis, a small Air Component applying the 'Mission Command' principle under the auspices of Allied Air Command could be a solution.

Proposal:
• Consider introducing the 'Mission Command' structure i.a.w. the development of the JTF concept and NATO's Network Enabled Capability, and the requirements of the specific air operation.

The BMD/TBMD Issue

In case of a crisis in Europe and the establishment of a JOA, including TBMD ops, it is suggested that Allied Air Command always assumes the JFAC mission because it is best suited (capabilities, connectivity, experience) and in order to ease the coordination between BMD and TBMD in the JOA (the Ballistic Missile Defence Operations Centre (BMDOC) and the in-house JFAC-AOC). The NFS JFAC on standby could serve as Allied Air Command's liaison to the JFC-level and to augment the Allied Air Command JFAC. A doctrinal solution should be found earlier rather than later.

Proposal:
• Develop appropriate guidelines (NATINAMDS Concept/the Air C2 CONOPS) to address: Role of Allied Air Command Ramstein in Art. 5 related crises, the issue of BMD/TBMD C2 in concurrent overlapping operations (A principle could be that the Ramstein BMDOC always retains the 'upper layer coordination responsibility' and the JFAC-AOC only commands the 'lower layer' engagement capabilities).

Manpower

Solving the manpower issue continues to be the first priority. The Allied Air Command training concept correctly addresses this challenge. Sustaining an operational JFAC-structure over a longer period or building up a JFAC

capable to C2 air operations in a MJO, however, requires a considerable number of trained Air C2 specialists readily available. Without massively increasing the personnel establishment in NCS Air C2 the only solution lies in maintaining personnel that fulfill the training requirements and having nations agree to make those people available. Therefore, it is paramount that national JFAC personnel are trained to the same standards as the NCS personnel. A further solution to overcome the capacity gap in Air C2 for a MJO/MJO+ could be to partner with the US 3rd Air Force AOC located on Ramstein Airbase.

Proposals:
- Maintain databases of available and qualified Air C2 personnel, including at NFS JFACs.
- Nations should agree to make their Air C2 specialists available.
- Standardize training and evaluation of Air C2 operators.
- Make the US 603rd AOC available for partnering with the Allied Air Command JFAC for MJO/MJO+.

Alliance nations invest highly specialized personnel in multinational staffs and HQs deal with peacetime Air issues, e.g. the European Air Group (EAG), which was founded to assist in the re-integration of the French Air Force into NATO. In any case, nations should consider earmarking these people as available for Air C2 and train them for JFAC-functions. An example is the DEU/NLD Competence Centre for Surface Based Air and Missile Defence (SBAMD) (CC SBAMD) at Ramstein.

Proposal:
- Earmark personnel of multinational staffs (e.g. EAG, JAPCC, CC SBAMD) for augmentation/supplementation and keep them trained.

Because of the importance of ISR as a key enabler and driver, the nations who have considerable expertise in this field should agree to partner with

Allied Air Command and to train and maintain a pool of ISR specialists available for Air C2. Furthermore, for ISR specialists as well as for NAEW&C personnel and some other highly specialized operators, the standard tour of duty should be extended to at least four years. Similarly, space and cyber expertise should be made available.

Proposal:
• Extend standard tour of duty in selected specialist areas to at least four years.

Training at the JFAC Level

Considerations in this area concentrate on realistic, challenging simulated and live exercises which allow the training of the whole system: the JISR-network as well the Air C2 network.

Proposals:
• Nations should consider making their national/multinational exercises available for NATO.
• Develop challenging exercise scenarios for the training of the JISR and Air C2 system.

Tactical Level Considerations

The competency and capability deficit in the CRCs is a shortfall that should be addressed as a matter of priority. Nations who are responsible for the training of their personnel should make every effort to better qualify key personnel (Master Controllers/Air Battle Managers/Fighter Controllers/SAM Allocators) and try to use multinational training opportunities offered by C&R training facilities. Allied Air Command should develop standards for key positions against which they are to be evaluated, and finally, maintain a robust evaluation scheme for Air C2.

Proposals:

- Allied Air Command should develop standards for key CRC positions.
- Develop exercise scenarios that integrate airborne and ground-based air defence in regional or system-wide events.
- Use the multinational training opportunities that are offered.

Cyber and Space

Because of their importance, NATO should consider developing a Space Policy in addition to its Cyber Strategy; the latter should not be limited to defensive operations. If the Air Commander has the responsibility for Air and Space he must also have the expertise and tools to achieve Space Awareness in his organization to be able to fill the role as Air (and Space) Power Advisor for SACEUR/JFC.

He should also know about the impact Cyber activities can have on his operation, whether his C2 systems are compromised and where Air and Space Power capabilities can contribute to the joint fight. A cyber monitoring/awareness capability could provide him with early warning in case of system attacks. The Cyber domain also offers new opportunities to achieve both kinetic and non-kinetic effects of strategic importance. Examples are: the full spectrum of EW, denying access to communication systems, injection of false signals into communication systems, information operations using airborne platforms etc. Relevant NATO doctrine should be analyzed and adapted where necessary to reflect the contribution of these domains.

Proposals:

- Develop a NATO space policy.
- Consider building up a Space Awareness Capability.
- Build up a Cyber Monitoring/Awareness Capability at Allied Air Command.
- Install PE positions at Allied Air Command for space/cyber advisors.

Interoperability of C2 Systems

First of all, ACCS and AirC2IS should be brought into Full Operational Capability (FOC) as soon as possible. Furthermore, all C2-systems must be interoperable and present all information available to decision-makers and planners as required. National JFACs should consider using ACCS/AirC2IS as their standard equipment to advance operator interoperability, reducing the need to get accustomed to a new Human Machine Interface (HMI) when augmenting a NATO JFAC. Technically, interoperability should no longer be an issue, when existing agreed upon standards, are adhered to. NATO's Federated Mission Networks (FMN) is the right approach. The political will of nations to share information (Cross Domain Solutions) should be a design feature in all NATO and national systems. The same is true for Interoperability, it is a key design requirement.

Proposals:
- Speed up the ACCS and AirC2IS projects to bring them to FOC as soon as possible.
- Maintain/establish interoperability between all NATO and national systems.
- Adopt 'need to share' as a design principle for C2 systems.

Foster Resilience

Due consideration should also be given to using hardened facilities no longer occupied, but still available. They also present a basic requirement for meeting NATO's nuclear deterrence mission.

Because of its limitations in infrastructure, workstations and personnel, NATO/Allied Air Command should seek to partner with the US standing 3rd Air Force (603rd) AOC on Ramstein Air Base. An Alliance AOC formed by Allied Air Command Ramstein and the 603rd AOC would give Allied Air

Command better resilience in case of outages or failures, something which was lost as a result of the last NCS Reform.

This construct should be tested and assessed during one of the future US's AUSTERE CHALLENGE Exercises.

Due to the reduction in the number of CRCs and the peacetime Cross Border Constraints it is difficult to organize lateral transfer of control in case of outages. Lifting border constraints would also render NATO's Air Policing and Air Defence more effective and efficient.

At all levels, resilience against cyber-attacks should be fostered by maintaining the highest cyber security standards and preparing mitigation/back-up measures in case of system outages. A cyber awareness/monitoring capability at Allied Air Command level could contribute to better cyber defence and faster and more effective reactions in case of cyber-attacks. It is, anyhow, needed to monitor the Link 16 networks.

Proposals:
- Consider use of existing hardened facilities.
- Partner with US 603rd AOC for resilience and to more rapidly build up an MJO JFAC capability.
- Encourage nations to agree on cross border operations in Air Policing/Air Defence.
- Install a cyber awareness/monitoring capability at Allied Air Command.

Analysis of Impact versus Costs/Priorities – Key Recommendation Areas

Cost/Impact/Prioritization Matrix

Impact: low, medium and high. **Low** means a low effect on the improvement of the capabilities and increasing knowledge and skills. **Medium** implies a significant effect. **High** means a great effect on the capabilities and increasing knowledge and skills.

Cost: **Low:** < 1M €. **Medium:** < 10M €. **High:** > 10M €. In the context of this paper, low and medium costs are defined as affordable. Medium cost assumes a high impact relationship. Besides impact and cost, the JISR/AirC2 proposals must meet the following priority criteria: First, they must have strategic implication, derived from their high or medium impact improving capabilities, knowledge, and skills. Second, the proposals should be joint/combined in nature. Third, the proposals should be actionable.

Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air C2		Criteria									
		Impact			Cost			Priority			
	JISR – Proposals	L	M	H	L	M	H	1	2	3	4
1	Establish a multinational ISR unit			X			X	X			
2a	Increase manpower for C2 of JISR-capabilities			X	X			X			
2b	Extend tour of duty for ISR specialists	X			X				X		
2c	ISR-personnel augmentation/supplementation plan		X		X			X			
2d	Establish a NATO Air Targeting Centre			X			X	X			
3a	Widen scope for 'need to share' in JISR			X	X			X			
3b	I & W: Access to raw data collected			X	X			X			
3c	I & W: Authority to SACEUR to assign JISR collection priorities		X		X				X		

Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air C2	Criteria									
	Impact			Cost			Priority			
Air C2 – Proposals	L	M	H	L	M	H	1	2	3	4
4a Establish a small standing JFAC at Allied Air Command			X	X			X			
4b Move AGS/NAEW&C Positions to Allied Air Command		X		X			X			
4c Adapt Air C2 doctrine to include: 'small standing JFAC', principles for Air C2 in Art. 5 crises, and BMD/TBMD C2 in concurrent ops			X	X			X			
4d Consider 'Mission Command' in stabilization ops	X			X					X	
5a Maintain record of NFS personnel for augmentation; nations to consider firm augm. commitment		X		X				X		
5b Standardize training for Air C2 operators		X		X				X		
5c Consider making 603rd AOC available for NATO Air C2			X		X			X		
5d Consider earmarking personnel of multinational staffs for Air C2	X			X				X		
5e Extend tour of duty for specialists		X		X				X		
6a Use nat./multinat. live exercises		X			X			X		
6b Develop challenging exercise scenarios			X		X		X			
7a Develop standards for key CRC positions		X		X				X		
7b Create integrated exercises for CRCs			X		X		X			
7c Make better use of multinat. training facilities		X		X				X		
8a Develop a space policy		X		X					X	
8b NATO Space situational awareness		X			X				X	
8c Cyber monitoring/awareness cap. at Allied Air Command			X		X		X			
8d PE positions for cyber and space			X	X			X			
9a Speed up completion of ACCS/AirC2IS			X			X	X			
9b Establish/maintain interoperability of C2-systems			X		X		X			
10a Consider use of existing hardened facilities	X					X			X	
10b Partner with 603rd AOC for resilience/capacity		X			X			X		
10c Agree to 'cross border operations'			X	X			X			

Key Recommendation Areas

From the matrix above the following key strategic recommendation areas can be derived:

JISR

- Create a multinational JISR-unit to complement the AGS-based capabilities.
- Increase the availability of sufficiently trained and experienced personnel for all JISR related elements in the NCS/JISR network.
- All NATO nations should truly commit to the principle of 'need to share'.

Air C2

- Nations should make available the required number of sufficiently trained and experienced personnel in all specializations and for all JFAC divisions, including ISR, AAR, Cyber & Space.
- Resolve doctrinal issues by adapting the NATINAMDS Concept/Air C2 CONOPS.
- Develop challenging training and exercises for all Air C2 levels.
- Invest in the rapid completion of the conversion to modern C2 systems (ACCS, AirC2IS) and provide a Cyber Awareness Capability at Allied Air Command.

Conclusions

NATO JISR, a prerequisite for any successful operation, has made some headway from its formerly purely national focus. Building up NATO's first operated JISR capability, the AGS unit at Sigonella, clearly was the turning point. Together with NAEW&C, after its thorough modernization, NATO now disposes of permanently assigned key JISR capabilities. These, however,

must be complemented by additional tactical ELINT/SIGINT/COMINT/ Electro-Optical (EO) and IMINT-capabilities from the nations. Forming a multinational JISR unit could be a solution to narrow the JISR gap. Last but not least, the JISR network, as well as Air C2, is dependent on sufficiently experienced and qualified personnel, currently only available in a few nations.

Modern Air and Space Power, with its capability to deliver kinetic and non-kinetic effects across the operational spectrum, needs responsive, agile and adaptable C2. Following the lessons from OUP, NATO partially corrected the drastic reduction in Air C2 manpower. Thus, Allied Air Command was at least marginally capable to meet the challenges of a Smaller Joint Operation – Air Heavy. Nevertheless, a huge training effort is necessary, and gaps in specialist areas (especially in ISR) need to be filled. If they cannot be filled, NATO's Air C2 structure will continue to be critically dependent on US contributions. A firm commitment of nations and further training are required to generate the manpower pool for Allied Air Command for a MJO or concurrent operations. Partnering with the 603rd AOC on Ramstein Airbase could be an interim solution. The availability of sufficiently skilled and trained personnel remains the key. NATO's training and exercise scenarios, as well as its priorities, should reflect this.

Space and Cyber should both be covered by proper NATO policy and included in doctrine and operational planning. Early warning, if possible, of Cyber events is especially important for Air C2; and a Cyber Situational Awareness/Monitoring Capability is needed. Interoperability issues could be overcome by the next generation of C2 systems, which should, therefore, be introduced quickly. National disclosure policies must enable the exchange of vital information in operations.

The loss of capacity and redundancy can only be mitigated by partnering with nationally-provided capabilities. Intensified cross border cooperation in Air Policing and Air Defence should be made possible wherever politically feasible.

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Even though shortfalls exist in NATO's JISR and Air C2 capabilities, we are confident that the airmen in the Air C2 structure will do their best to achieve success in operations and master any challenge ahead if the Alliance, through the nations, provides the resources. It is the responsibility of Commanders at all levels to provide their personnel with a solid foundation through proper training. Finally, the personal engagement of the Air Commander with his JFAC staff and his subordinate commanders in preparing his organization as well as during operations make the difference!

Endnotes

1. Warsaw Summit Communiqué, 9 Jul. 2016, para 5.
2. Ibid., para 10.
3. Initial Operational Capability in support of the NATO Response Force was declared 26 Feb. 2016.
4. See MC 0582/1 – NATO JISR Concept, May 2013.
5. Warsaw Summit Communiqué, paras 75–77.
6. A thorough assessment of the issues is included in the paper 'Missile Defence' as part of the project.
7. Warsaw Summit Communiqué, para 46.
8. Warsaw Summit Communiqué, para. 71.
9. The JAPCC explored the feasibility of a multinational JISR unit in a study published in Oct. 2015. See: www.japcc.org/portfolio/nato-mnjisru/.

Missile Defence in NATO

V

Towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System

By Lieutenant General (ret.) F. H. Meulman, NLD AF

Widening the Focus

For more than five years, NATO BMD has been high on NATO's list of priorities[1]. NATO Heads of State and Government (HOS/G) have unanimously recognized that the proliferation of ballistic missiles poses an increasing threat to Allied populations, territory and deployed forces. Consequently, at the 2010 Lisbon Conference, NATO nations decided to expand upon the Active Layered Theatre Ballistic Missile Defence (ALTBMD) Programme, started in 2004. To date, NATO has achieved a BMD Initial Operational Capability that offers a more mature and more effective capability to defend populations, territory and forces across southern NATO Europe against a ballistic missile attack. The next steps planned are the declaration of operational capability of the Aegis Ashore site in Poland in 2018 (as part of the US EPAA), and reaching a full operational NATO BMD capability as a next milestone including incorporating existing capabilities with future voluntary contributions offered by Allies.

Despite making these important steps forward in one of NATO's key deterrence and defence capabilities, the scope of it appears to be too

limited. The following reasons are considered as relevant. First, the geographical area covered by NATO's BMD mission and the available capabilities will be limited to the defence of populations, territory and forces across southern Europe and will provide only a limited capability to defend NATO's deployed forces. Many more and diverse exo- and endo-atmospheric BMD and Theatre Ballistic Missile Defence (TBMD) resources are required to provide the full coverage and protection of NATO's entire European territory[2]. Second, (T)BMD is, while essential and integral, only part of the broader perspective of Integrated Air and Missile Defence (IAMD)[3] system. (T)BMD functions within the larger IAMD-domain. Third, the rebalanced security paradigm in Europe forces NATO to face the facts: deterrence and collective defence are once again in the political and military spotlight of NATO member states, which calls for a credible and effective NATO-wide posture of deterrence and collective defence, hence the renewed importance of Article V of the Washington Treaty.

NATO has clearly expressed this last in the 2016 Warsaw Summit Communiqué: 'The changed and evolving security environment demands the ability to meet challenges and threats of any kind and from any direction. The greatest responsibility of the Alliance is to protect and defend our territory and populations against attack, as set out in the Washington Treaty. And so renewed emphasis has been placed on deterrence and collective defence.' This declaration makes it clear that in order to meet this political and military strategic goal the current, limited focus on (T)BMD must be expanded to the broader domain of Joint Air Power. In the context of this document, this means incorporating the full spectrum of SBAMD roles and tasks as a dedicated part of NATO Integrated Air and Missile Defence System (NATINAMDS).

What is needed now is a credible response in the domain of NATO Joint Air Power so that NATO has the capabilities and competencies to meet the air and missile challenges and threats of any kind and from any direction. This

requirement is substantiated by the following concerns: first, with regard to TBMD, Russia's recent engagements toward fulfilling expansionist self-determination as part of their international security policy in Georgia, in the Eastern part of the Ukraine and occupying the Crimea Peninsula, and in Syria; their ambivalent attitude toward the Baltic States; their recent deployment of Iskander missiles into the Kaliningrad Oblast; and the ongoing modernization of its armed forces[4]. Second, with regard to BMD, the perceived missile threat from west Asia against southern NATO Europe. Third, with regard to (T)BMD, the instability along the periphery of southern NATO member states. Fourth, with regard to TBMD, the majority of NATO-led operations in the last few decades demonstrate the execution of only a fraction of the possible roles and tasks that are part of the IAMD spectrum of operations e.g. the emphasis on static BMD operations rather than performing maneuver operations and 'traditional air defence roles and tasks'. As a result, the overall SBAMD/IAMD proficiency for an effective task performance is significantly deteriorated. Finally, the continuous restructuring of NATO member states' defence organizations, as well as continual budget cuts, have resulted in negative adjustments of available resources and training and exercise opportunities. This has negatively influenced NATO's capabilities and competencies to effectively conduct the full range of SBAMD/IAMD operations. These concerns in their entirety, call for a coherent and effective NATINAMDS as a vital component to the implementation of NATO's Joint Air Power Strategy (JAPS), which is currently under development, with ACT in the lead[5]. What is needed, more specifically, is a comprehensive NATO Anti Access/Aerial Denial (A2/AD) capability in the form of a coherent and effective NATINAMDS and the personnel with the refined cognitive skills developed from executing air and missile defence as a priority on a daily basis.

The renewed emphasis on deterrence and collective defence in NATO is justified on the basis of the aforementioned causes. These factors have led to, among other things, reduced stability and security, increased

unpredictability and a changed security environment in Europe. NATO, by its very nature, has the responsibility to prepare for any crisis and/or conflict. At the same time, it is important for NATO to preserve political consensus while the operational effectiveness of its NATINAMDS must improve. Politically, NATO must reconcile the self-induced paradox where, on the one hand it is adapting to the evolving security environment that demands the ability to meet both enduring and emerging threats of any kind and from any direction. While on the other hand, it must conform to its current policy in which missile defence must not be directed against Russia so not to undermine her strategic deterrence capabilities[6]. It is essential that the enhancement of NATINAMDS goes hand in hand with maintaining the US EPAA/Phases I to III). US EPAA does and will provide essential and unique SBAMD/IAMD capabilities, which are necessary for an effective and credible NATINAMDS. Simultaneously, NATO must keep the strategic dialogue with Russia open as much as possible. This dual track of demonstrating political will and military strength on one hand while expressing the desire to keep dialogue open with Russia on the other, might offer room for political solutions and help to revive strategic cooperation.

The planning, tasking and execution of SBAMD/IAMD at the military strategic, operational and tactical levels are interrelated and interdependent. It is especially visible in the interaction amongst the political and military strategic level guidance and command, the operational level planning, tasking and control, and the level of tactical control and execution. In peacetime, NATO focuses on air surveillance and air control (air policing) and on the standing BMD mission. In crisis and/or conflict the focus is on defending against or countering rockets and mortars, air breathing targets (cruise missiles, aircraft and unmanned aerial vehicles), and ballistic missiles. Any operation responding to above mentioned threats can be conducted with an array of SBAMD systems in a layered defence of interconnected sensors, fused with shooters of adequate range and effectiveness[7]. It goes without saying that effective mission execution

is not possible without proper Combat Support and Combat Service Support (e.g. Force Protection, Cyber Security, Space Support, Intelligence, Surveillance and Reconnaissance (ISR) and Logistics).

Aim

The real question is whether NATO currently has a credible and reliable SBAMD System as part of its IAMDS? The answer is 'not quite yet'. There are urgent requirements throughout the NATINAMDS. Therefore, the aim of this paper is to determine the urgent short to medium term SBAMD/IAMD requirements thereby addressing key SBAMD shortfalls at the strategic, operational and tactical levels. It is these shortfalls that prevent NATO from effectively executing SBAMD/IAMDS in the short to medium term. In the scope of this article, it is not possible to cover this subject entirely; this would only be possible by preparing a complete inventory of existing shortfalls and validating the effectiveness at all levels of NATINAMDS.

This paper is intended to highlight urgent short to medium term SBAMD/IAMD priorities which have yet to be disclosed. However, considering these new priorities with existing interoperability problems of legacy systems and current shortfalls with sensors, shooters and the diversity of surface based air defence and (T)BMD systems mentioned in this paper, serves to emphasize the need to take immediate action. In the short to medium term, it calls for focused attention by NATO in order to improve and strengthen NATINAMDS[8].

Urgent SBAMD/IAMD Requirements

Leadership Development

A key area in need of attention and a requirement for all levels is leadership development. Personnel engaged in all levels of SBAMD/IAMD are

deficient to varying degrees in knowledge, competency and skill. The shortcomings are negatively impacting our leaders engaged in NATINAMDS, hampering their ability to deal with policy development and in decision-making; providing guidance and direction; planning and tasking; Command and Control (C2); and executing SBAMD/IAMD roles and tasks. Increased involvement and quality of NATO's IAMD-leadership will lead to greater confidence throughout NATINAMDS in the ability of NATO to successfully conduct the full range of SBAMD/IAMD roles and tasks. Leaders at the political and military strategic level in NATO must take full responsibility. Currently, too much is left to the nations in the form of cooperation initiatives.

The short term, pertinent to the political and military strategic levels in NATO, requires taking the integral responsibility for the IAMD mission by setting readiness and sustainability goals for SBAMD-systems, and providing guidance and direction for the development of policies and plans. It includes assessing the requirements and nuances of the (T)BMD mission and determining the provisions for Indication and Warning (I&W); Pre-Planned Responses (PPRs); Rules of Engagement (RoE); and delegation of authority because of the short flight time of missiles. Political and military strategic leadership should also focus on providing guidance and direction for the development of Standing Plans for IAMD consequence management; passive air and missile defence procedures and requirements; Standing Plans for force protection of BMD resources; and for aligning and standardizing discrepancies in existing policy and doctrine documents, thereby preventing limitations in mission execution and improving understanding and communication among joint services.

At the operational and tactical levels, leadership is about the ability to adequately organize and implement operational and supporting processes, thereby creating the conditions for successful mission execution. It calls for professional task orientation, knowledge and skills to effectively

carry out the responsibilities associated with the execution of the SBAMD roles and tasks. Improving leadership knowledge, skills and competencies is a necessary and continuous process, especially with a view to recovering the wide operational employability of NATINAMDS.

Readiness and sustainability goals must be demonstrated through clear objectives and requirements that will establish a shared sense of urgency; a focused operational mind-set; an increased operational readiness, employability and sustainability of allocated operational SBAMD-units. Achieved, these goals will revamp human resource requirements and education, training, exercising and validation efforts in NATO and requires agreements about the availability of Combat Service and Service Support. In the changed international security environment, this will lead to achieving the required levels of operational readiness and to sustainment of SBAMD-units in peacetime and, therefore enable instant access to deployable SBAMD units and their effects if the situation in NATO so requires[9].

	Readiness 2 days NTM*	Readiness 5/10 days NTM	Readiness 30 days NTM	Sustain 6 months	Sustain 1 year	Sustain 1,5 year
SBAMD						
DEU Bn/4 FU	1 FU	1 FU	2 FU's			x
NLD Bn/3 FU	1 FU	1 FU	1 FU	x		
DEU/NLD Bn*/3 FU					x	
ESP Bn				t.b.d.	t.b.d.	t.b.d.
GRC Bn				t.b.d.	t.b.d.	t.b.d.
USA Bn						> 1,5 y

* Notice to Move (NTM)

In the table on page 153, suggested readiness and sustainability goals are defined for different SBAMD Fire Units (FU). The columns show the potential readiness and sustainment goals. The first two rows show the recommended readiness goals for a Dutch Battalion with three Fire Units and a German Battalion with four Fire Units. The following rows show the proposed sustainment goals for respectively a German Battalion, a Dutch Battalion and a combined German/Dutch unit or task force. Suggested sustainment goals for Spanish and Greek units need to be determined, while the suggested sustainability goal for a US Battalion is 1,5 years or longer.

Although a combined DEU/NLD Bn has three Fire Units, it is the larger pool of available manpower that determines the sustainment period of one year.

ETEE

ETEE across all levels in NATINAMDS will ensure the prerequisite level of knowledge, competence and skill to effectively execute responsibilities in providing guidance and direction and for planning, tasking and executing SBAMD/IAMD roles and tasks. In recent years, because of aforementioned concerns, important areas of SBAMD/IAMD knowledge, skills and experience have significantly faded. This demands a short to medium term restoration of NATO's ETEE efforts in the SBAMD/IAMD-domain. Special attention should be given to minimizing existing foreign disclosure clauses and other barriers to collaboration among allies.

A limited number of SBAMD courses are available through the NATO School in Oberammergau. In the short term, SHAPE, together with ACT, should assess where and how improvement and broadening of SBAMD education, in the form of academic courses, is feasible. In this context, one can imagine, for example, of courses by single system users or from the perspective of a dissimilar SBAMD cluster. In establishing, conducting and

sustaining courses, the Competence Centre for SBAMD (CC SBAMD) at Ramstein Air Force Base in Germany could provide meaningful support to all components in NATINAMDS in the form of knowledge, experience and skills. However, this calls for an immediate completion of the Technical Agreement between NATO and the CC SBAMD; an undertaking that has been delayed for too long.

Exercising at the highest political and military strategic level encompasses the short term priority of conducting annual (T)BMD exercises with the participation of the permanent national representatives[10]. This provides the opportunity for senior leadership to gain a better understanding of this complicated mission and its complex issues. An example of a BMD exercise at this level is Nimble Titan, organized by US STRATCOM Joint Functional Component Command for Integrated Missile defence (JFCC IMD). At the operational and tactical level a coherent set of exercises must be developed, organized and executed in order to improve individual and crew proficiencies at both levels. Allied Air Command initiated, and Combined Air Operations Centre (CAOC) supported, unit level SBAMD/IAMD computer-aided training and exercises must be introduced as part of the programme. Special focus must be given to better integrate legacy NATO SBAMD systems and to optimize their effectiveness. Furthermore, the next focus level is planning and executing integrated exercises of increasing complexity and scale to include joint/combined multi-level, cross domain networked training and exercises. Attention should also be given to the integration of EW and Cyber effects in the SBAMD training and exercise environment. Currently EW and Cyber training is insufficient and vulnerabilities are insufficiently known or not fully understood.

Finally, attention must be given to dissimilar SBAMD cluster exercises, whereby upper and lower layer capabilities will be connected and will establish a dedicated layered defence design. Specific attention must be given to connectivity, integration and coordination e.g. hand-over

procedures and responsibilities, and engagement coordination. Exercise Joint Project Optic Windmill (JPOW), organized by the Netherlands, is a great example of an operational/tactical level TBMD exercise. By adopting a credible and effective multi-layer training and exercise programme, the NATINAMDS as a whole will be more coherent, reliable and resilient.

Critical to achieving an effective training and exercise programme is a greater focus on evaluation and validation. The current system is insufficiently stringent. Operational evaluations are conducted only every five years, if at all, and, if desired, the evaluation criteria can be limited to a single capability. In such a case, it cannot be confirmed if an SBAMD unit is operationally ready to deploy and sustain a mission. We must have a dedicated Tactical evaluation system that frequently assesses and evaluates all SBAMD/IAMD functionalities, to confirm they are effective and can execute and sustain a mission. To this end, the Evaluation Branch at HQ Allied Air Command must be capable of regularly evaluating the operational readiness and mission operations capabilities and competencies of SBAMD units in NATO. This will necessitate greater interaction between Allied Air Command and the SBAMD nations.

Connectivity and Interoperability

While NATO Air C2 is addressed in a separate article, a few words about connectivity and interoperability in the SBAMD-environment is warranted in this paper. Both subjects are of great concern when it comes to restoring the broad operational employability of NATINAMDS. Currently various components in NATINAMDS, the SBAMD-system connectivity and interoperability have shortfalls that must be remedied. First, although a national responsibility, the horizontal connection between SBAMD units and national support elements must be established in order to secure service support when needed. Second, some units have a limited number of link connections (link 1 or link 11 and 16). Legacy analogue landline

connections are disappearing due to obsolescence and must be replaced with modern solutions (voice, PNVX, link 11 etc.). Third, interoperability with existing Control and Reporting Centre (CRC) is degraded and operational collaboration is hampered due to the limited availability of experienced Surface-to-Air Missile (SAM)-allocators at the CRC. NATO should assess the effectiveness of this inter-connection paying particular attention to mobile connectivity for deployed forces and to the external links to the Control and Reporting Centres, as well as to Allied Air Command. Overall, in the short term it is important is to re-assess the interoperability throughout NATINAMDS (including standards, interfaces, protocols, reliability, validating procedures etc.) and re-assess the coverage and effectiveness of the Communication and Information System Point of Presence concept provided by the NATO CIS Group.

Requirements (Options and Recommendations): Impact – Cost – Priorities

The table on page 159 provides a structured overview of the prioritization of the urgent short to medium term SBAMD/IAMD requirements. The main urgent shortfall areas mentioned in this article are numbered and explained starting on page 164. This matrix shows the relationship between impact and cost in determining the priority of each requirement which leads to a priority indication. In the context of this article, impact, cost and priority are defined as follows:

Impact: low, medium and high.

- Low means a low effect on the improvement of the capabilities of SBAMD/IAMD and increasing SBAMD knowledge.
- Medium implies not a great effect, but still significant.
- High means a great effect on the capabilities of SBAMD/IAMD and increasing SBAMD knowledge and skills.

Cost: low, medium and high.

- Low: less than 1M €.
- Medium: 1–10M €.
- High: more than 10M €.

Within the context of this paper low and medium cost are defined as affordable cost. The affordability of medium cost assumes a high impact relationship.

Priority: The priority of the recommendations ranges from 1 to 4.

- Prio 1 means: high impact – low cost and high impact – medium cost. Rationale: medium cost is affordable.
- Prio 2 means: medium impact – low cost and medium impact – medium cost. Rationale: Medium impact is still significant.
- Prio 3 means: medium impact – high cost and high impact – high cost.
- Prio 4 means: low impact – high cost.

Other criteria: Besides impact and cost, the SBAMD/IAMD priorities must meet the following criteria:

- First, have strategic implication, which is related to a high and medium impact on the improvement of SBAMD capabilities and increasing knowledge and skills.
- Second, preferably the solutions must be joint/combined in nature.
- Third, the solutions to the shortfalls should be actionable and achievable.

This leads to the following of urgent short to medium term SBAMD/IAMD requirements and priorities.

Missile Defence in NATO – Towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
1	Leadership responsibility			X	X			X			
2	Readiness/Sustainability goals			X			X			X	
3	Provisons for I&W/PPR			X	X			X			
4a	St Plan conseqequence management			X	X			X			
4b	Passive defence procedures			X	X			X			
4c	Standing Plan BMD protection			X	X			X			
4d	Standard. discrepancies			X	X			X			
5	Organ. ops/log process x			X		X		X			
6a	Improve education			X	X			X			
6b	Effective cooperation		X		X				X		
6c	Compl. Technical Arrangement		X		X				X		
7	Yearly (T) BMD exercises			X	X			X			
8	Set of exerc/evals			X			X			X	
8a	Unit level exercises			X	X			X			
8b	Integrated exercises			X			X			X	
8c	EW, Cyber training			X	X			X			
8d	Dissimilar cluster exercises			X		X		X			
8e	Dev. Eval Branch/Allied Air Command			X		X		X			
9a	Est. horiz. connection			X	X			X			
9b	Up-link connections			X		X		X			
9c	Replace Analogue LL			X			X			X	
9d	Interoperability with CRC's			X	X			X			
9e	Availability SAM-allocator			X	X			X			
9f	Mob.Conn. depl forces			X	X			X			
9g	Interoperability NATINAMDS			X			X			X	

The prioritization matrix reveals a number of interesting findings:

First, almost all requirements, if rectified, will significantly improve NATO's SBAMD/IAMD capabilities and competencies. Second, leadership development and ETEE requirements are competency oriented, while improving connectivity and interoperability are predominant capability orientated. Third, the majority of the recommendations are priority 1 and 2. This is where NATO's should focus its immediate attention. Fourth, quite a significant number of requirements can be addressed without incurring high costs, are part of the daily routine tasks/duties and responsibilities, or simply require the will to make things happen (e.g. development of doctrine, standards and Standing Defence Plans. Leadership development at the political and military strategic levels can be organized at very low cost if the will exists to make it happen. Establishing a broader array of SBAMD courses is feasible without extensive cost, especially if sufficient cooperation can be achieved between like-minded organizations). Fifth, requirement numbers 2, 8 and 9c are actually collections of requirements, for which the combined cost to resolve would be high. This does not preclude selecting specified requirements and their corresponding solutions such that the costs can be held to low or medium. Sixth, although high impact and high cost combined together form priority 3, the high impact alone implies a significant effect on the capabilities of SBAMD/IAMD and toward improving SBAMD knowledge and skill levels. On this basis, if the conditions allow, there is sufficient justification to take appropriate action. Seventh, the cost indicator is an initial, rough categorization that needs further refinement in the follow-up process.

Most probably, the main costs are related to establishing readiness and sustainability; developing and conducting integrated combat training and exercises, especially the more complex multi-level, cross domain networked SBAMD/IAMD exercises; and re-connectivity and interoperability throughout

NATINAMDS. How high the actual cost will be cannot currently be specified, but it is assumed that this remains within acceptable limits. Most important is the impact all these measures will have towards achieving a credible, effective and reliable NATINAMDS as a key pillar of NATO's deterrence and collective defence posture.

Conclusion

One of the Strategic Focus Areas in the Warsaw Summit Communiqué is Missile Defence. The recent changes in the international security situation have led to a renewed emphasis in NATO on deterrence and collective defence. In order to meet the challenges and threats of any kind and from any direction the explicit focus in NATO on (T)BMD must be expanded to include SBAMD as part of NATO Integrated Air and Missile Defence System. This will lead to the establishment of an operationally ready, credible and effective NATINAMDS, a key pillar for the successful execution of NATO's Joint Air Power Strategy.

The majority of the priority requirements listed in this paper are primarily targeted on improving NATO's SBAMD capabilities as part of NATINAMDS. Many of the urgent short to medium term requirements are priority 1 and 2, which means that they refer to a high impact for relatively low cost or a high impact at medium cost (priority 1) or a medium impact at low cost and a medium impact at medium cost (priority 2). Most priority 1 and 2 requirements are directly achievable. Therefore, in the short term, NATO's attention should focus on these requirements and because, once remedied, they will significantly improve the effectiveness and credibility of NATO's SBAMD/IAMD capabilities and competencies in support of NATO's deterrence and collective defence posture.

The most important shortfall area listed in this article are: leadership development, ETEE and connectivity and interoperability. Other critical

requirements (such as additional sensors and shooters, strategic transport, more human resources for sustained operations, force protection, enhanced cyber security etc. …) are acknowledged but outside the scope of this paper since they are undoubtedly already well-known to the corresponding responsible agencies within NATO. However, while they are not mentioned more thoroughly does not make them any less important. When resolved, it is assessed that the requirements listed in this paper will significantly improve the operational effectiveness of NATO's SBAMD/IAMD capability. It is believed that the requirements may be completed in an affordable way in the short to medium term. For these reasons, addressing the SBAMD/IAMD requirements mentioned in this paper must be of a high priority and is an attractive Course of Action (COA) for NATO.

Overall, large steps forward can be made with respect to 'credibility in response' if, in the short term, NATO expedites confirming the proposals and moves quickly to implementing the solutions.

Recommendations

Taking into account the urgent SBAMD priorities mentioned in this paper the following main recommendations apply:

First, broaden the knowledge and experience of NATO leadership at all levels in the SBAMD/IAMD-domain. Strengthening the ability and competencies of leadership will enable them to provide focused direction and guidance, and organize and implement operational and supporting processes, while setting the conditions for successful SBAMD/IAMD mission execution in NATO.

Second, optimize and enhance SBAMD/IAMD-ETEE which will lead to a corps of personnel with greater knowledge, competencies and skills to effectively perform responsibilities at the strategic level, but also in the

planning, tasking and execution of SBAMD roles and tasks at the operational and tactical levels.

Third, set overall conditions and begin the process of overhauling the connectivity and interoperability throughout the NATINAMDS system.

Fourth, remedy the specified requirements with a priority 1 and 2 as a matter of urgency.

Fifth, it is recommended to conduct an integral assessment of existing SBAMD/IAMD shortfalls and a validation of the effectiveness at all levels of NATINAMDS. On the basis of the findings targeted action must be taken in direct cooperation with the SBAMD/IAMD community in NATO.

Attachment A – Overview of Urgent Short to Medium-Term SBAMD/IAMD Requirements

The paper addresses the three main areas of urgent short to medium-term SBAMD/IAMD requirements:

Leadership development, with the need:

• To broaden the knowledge and experience of NATO leadership at all levels in the SBAMD/IAMD-domain in order to strengthen the ability and competencies to provide focused direction and guidance, and organize and implement operational and supporting processes, thereby setting the conditions for effective SBAMD/IAMD mission execution in NATO.

ETEE, with the need:

• To further optimize and enhance SBAMD/IAMD-ETEE which will lead to more knowledge, competencies and skills to effectively perform

responsibilities in the planning, tasking and execution of SBAMD roles and tasks.

Connectivity and interoperability, with the need:

- To set the overall conditions to address connectivity and interoperability shortfalls throughout the SBAMD/IAMD system to achieve a robust and reliable NATINAMDS.

Specified requirements. Each of the three main shortfall areas share a number of specific requirements[11]:

Leadership development. Specified requirements are:

- (1) NATO leadership at the political and military strategic level must acknowledge and accept their part of the responsibility for the SBAMD/IAMD mission. This includes:
  – (2) Setting readiness and sustainability goals for SBAMD-systems.
  – (3) Assessing the requirements and nuances of the BMD/TBMD mission and determining the provisions for I&W; PPRs; RoE; and Delegation of Authority.
- Providing guidance and direction for:
  – (4a) Developing Standing Plans for BMD/TBMD consequence management.
  – (4b) Developing passive defence procedures and requirements.
  – (4c) Developing Standing Plans for force protection of BMD assets.
  – (4d) Aligning and standardizing discrepancies in existing policy and doctrine.
  – At the operational and tactical levels, the requirements for leadership development shortfall focus on the need:
    – (5) To adequately organize and implement operational and supporting processes.

ETEE. The specified requirements in this main area concern the need:

- To revamp NATO's ETEE efforts in the SBAMD/IAMD-domain. This includes:
    - (6a) SHAPE together with ACT assessing in the short term where and how improvement and broadening of SBAMD education in the form of academic courses are feasible (e.g. of courses by single system users or a dissimilar SBAMD cluster).
    - (6b) Setting the conditions for effective cooperation between NATO School SHAPE in Oberammergau and the CC SBAMD at Ramstein Air Force Base in Germany.
    - (6c) Completing in a timely manner the Technical Agreement between NATO and the CC SBAMD.
- At the highest political and military strategic level there is the need:
    - (7) To conduct an annual (T)BMD exercise with the participation of the permanent national representatives[12].
- At the operational and tactical level the specified requirements focus on:
    - (8) Developing, organizing and executing a coherent set of exercises and a system of evaluation and validation in order to improve the individual and crew proficiencies at both levels:
        - (8a) Developing, organizing and executing Allied Air Command initiated and CAOC supported, unit level SBAMD/IAMD computer aided training and exercises.
        - (8b) Planning and execution of integrated exercises in increasing complexity and scale to include joint/combined, multi-level, cross-domain and networked training and exercises. Special attention should be given to minimizing existing foreign disclosure clauses and other barriers to collaboration among Allies.
        - (8c) Integrating EW and Cyber effects in the SBAMD training and exercise environment.
        - (8d) Planning, organizing and executing dissimilar SBAMD cluster

exercises, whereby upper and lower tier capabilities will be connected and will establish a dedicated, layered defence design.

– (8e) Developing the Evaluation Branch at HQ Allied Air Command into a full- fledged Tactical evaluation organization in order to frequently evaluate the operational readiness and mission operations capabilities and competencies of SBAMD units in NATO, and consequently intensifying the collaboration between Allied Air Command and the SBAMD nations.

Connectivity and interoperability. Requirements in this area focus on the need:

- To restore the broad operational employability of NATINAMDS by remedying, the SBAMD-system connectivity and interoperability deficiencies. This includes:
  – (9a) Establishing the horizontal connection between SBAMD units and national support elements and, thereby, setting the conditions for an assured service support when needed.
  – (9b) Optimizing the existing up-link connections (link 1 or link 11 and 16).
  – (9c) Replacing obsolete analogue landline connections (voice, PNVX etc.) with state-of-the art/modern technology.
  – (9d) Optimizing interoperability with existing CRC.
  – (9e) Strengthening the availability of experienced SAM-allocators at CRC-level.
  – (9f) Assessing the effectiveness and focusing on mobile connectivity for deployed forces and the external links to the Control and Reporting Centres that still exist and to Allied Air Command.
  – (9g) Overall, in the near term, assessing the interoperability throughout NATINAMDS (standards, interfaces etc.) and re-assessing the coverage and effectiveness of the Communication and Information System Point of Presence concept provided by the NATO CIS Group.

Endnotes

1. While NATO's BMD focuses on the protection of NATO European populations, territory and forces against the full spectrum of ballistic missile threats, the focus of Theatre Ballistic Missile Defence (TBMD) is directed to the protection of deployed NATO forces and High Value Assets and Areas. Both, BMD and TBMD, require the establishment of a multi-layered synergistic defence architecture.

2. In the remainder of this article called (T)BMD.

3. In the context of this paper IAMD focuses on and is limited to the capabilities and competencies linked to Surface Based Air and Missile Defence (SBAMD).

4. In particular Russian Aerospace Forces and Strategic Rocket Forces.

5. The IAMD Strategy focuses on the end, ways and means that support NATO's Air Cdr in achieving his IAMD campaign goals in support of higher level military- and political-strategic guidelines and objectives.

6. 2016 Warsaw Summit Communiqué § 59.

7. Surface Based Air and Missile Defence comprises all defensive measures originating from the surface – land and maritime – designed to nullify or reduce the effectiveness of hostile air action (to include: BMD, TBMD, Cruise Missiles, Counter Rockets and Mortars (CRAM), Army Organic Air Defence (AOAD), Ground Based Air Defence (GBAD), Maritime Anti air Warfare and defence against Remotely Piloted Aircraft Systems (RPAS). It goes without saying that aircraft, space support and cyber security play an important role in effectively conducting SBAMD operations. Aircraft and space support are outside the scope of this paper.

8. When addressing the shortfalls in SBAMD sensors and shooters NATO is advised to also consider active decoys.

9. This will lead to operationally ready SBAMD forces which, if necessary, can support the Very High Readiness Joint Task Force. When deploying, this Task Force most probably needs dedicated SBAMD for protecting its deployed forces.

10. It is suggested to link this annual high level exercise with the important Steadfast Alliance exercise with the goal to practice this framework while factoring in political and military strategic direction and guidance.

11. The numbers in brackets correspond to the numbering of the requirements (options and recommendations) in the prioritization matrix of this article.

12. It is suggested to link this yearly high level exercise with the important Stead Fast Alliance exercise with the goal to practice in this framework also political and military strategic direction and guidance.

Hybrid Conflict, Hybrid Warfare and Resilience

Urgent Joint Air Power Priorities

VI

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Context and Aim

Over the last decade, NATO has been facing a growing number of increasingly diverse security challenges. The 2016 Warsaw Summit Communiqué is clear in its description of the broad range of threats: 'The Alliance faces a range in security challenges and threats that originate from the east and from the south; from state and non-state actors; from military forces and from terrorist, cyber or hybrid attacks'[1]. It is especially this latter type of threat that has been given a lot of attention in the last few years. Russia's involvement in the recent crisis in the eastern part of the Ukraine and the annexation of the Crimean Peninsula caused NATO to take notice by the effective application of Hybrid Warfare techniques. Furthermore, a number of European capitals were the target of a variety of multi-facetted terrorist attacks conducted by radicalised Muslim fundamentalists or supported by Jihadist militant groups. Finally, many NATO member states have been involved in the fight against Islamic State of Iraq and the Levant (ISIL) or Daesh, a Salafi jihadist militant group that employs both traditional military practices as well as non-traditional techniques, either overtly or covertly. In short, ISIL benefits from its own application of Hybrid Warfare.

If NATO's overall intent is to protect and defend 'our territory and populations against attack'[2], it must be capable of deterring and defending against

hybrid attacks as well. So far, NATO has taken steps to ensure its ability to effectively address the challenges posed by Hybrid Warfare[3]. NATO has adopted a strategy and prepared actionable implementation plans expanding its role in countering Hybrid Warfare. NATO's strategy stresses that NATO and its member states must be able to recognize and attribute hybrid actions, have resilience to resist these actions, be ready to resist and have processes that allow rapid assessment and decision-making and, finally, have the necessary capabilities to be able to respond effectively. It must be clear, however, that the primary responsibility to respond to hybrid threats or attacks rests with the targeted nation, particularly in peacetime. Yet, 'NATO is prepared to assist an ally at any stage of a hybrid campaign' and it goes without saying that 'the Alliance and Allies will be prepared to counter Hybrid Warfare as part of collective defence'[4].

The JAPCC Study 'Joint Air Power 2016 following the Warsaw Summit – Urgent Priorities' focuses on the main areas of concern and interest as expressed by the Heads of State and Government (HOS/G) in the Warsaw Summit Communiqué, one of which is Hybrid Warfare and resilience[5]. This article, as an integral part of the JAPCC Study, approaches this particular area of concern and interest as it pertains to Joint Air Power. A number of questions will be addressed: 'Is NATO Joint Air Power prepared to assist an Ally at any stage of a hybrid campaign?', 'Is NATO Joint Air Power prepared to assist an Ally in a Hybrid Conflict situation and prepared to counter Hybrid Warfare as part of collective defence?', and 'What are the urgent, short to medium term Joint Air Power requirements to effectively cope with hybrid air threats in both situations?' Finally: 'How can NATO Joint Air power support the enhancement of resilience and civil preparedness?' Answering these questions and determining the urgent requirements are the aims of this article.

In his famous work 'On War', Clausewitz stressed that it is of utmost importance that 'the first, the supreme, the most far-reaching act of judgment that the statesman and commander have to make is to establish by that

test the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature'[6]. Almost 200 years after publication in 1831, these words are still applicable, especially when and where it comes to a proper understanding of the definition of Hybrid Conflict, Hybrid Warfare and Hybrid Air Threats.

Hybrid Conflict, Hybrid Warfare and Hybrid Air Threats

So, what is meant by 'Hybrid Conflict, Hybrid Warfare and Hybrid Air Threats'? Paragraph 72 of the Warsaw Summit Communiqué describes Hybrid Warfare as 'a broad complex, and adaptive combination of conventional and non-conventional means, and overt and covert military, paramilitary and civilian measures, are employed in a highly integrated design by state and non-state actors to achieve their objectives'. Although this is a fairly straight forward definition, this basic definition requires elaboration. First, paragraph 72 does not distinguish between Hybrid Conflict and Hybrid Warfare. The difference is regarding the employment of armed forces; covert use of armed forces in the first case versus the overt use of military forces in the latter. Second, paragraph 72 speaks about 'military, paramilitary and civilian measures employed by state and non-state actors'. The questions is: 'Who are these actors?'

First, there are state and non-state organized military or para-military forces who can conduct conventional (military or para-military) actions and tactics that include high end, technologically developed capabilities. Second, the threat can come from state organized or non-state irregular forces who can conduct non-conventional, asymmetric attacks to achieve their objectives. Third, the threat entails non-state terrorist attacks, conducted by individuals or 'lone wolves' up to and including religion inspired fundamentalist terrorist organizations. Fourth, hybrid threats can come from criminals, either individuals or groups. Fifth, hybrid threats can come from state or non-state sponsored attackers within cyberspace.

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Part of NATO's description of Hybrid Warfare in the 2016 Warsaw Summit Communiqué is the phrase 'to achieve their objectives'. It must be understood that these objectives can be wide ranging and actors in the field of Hybrid Warfare tend to be unclear when it comes to describing their goals. In general, hybrid actors pursue overarching strategic objectives. They can range from raising individual levels of frustration or dissatisfaction to achieving fundamental strategic objectives in the form of structural changes e.g. by creating mass insecurity; confusion; destabilization; and disrupting existing social structures and communities in order to overthrow a Government and/or political system and implement a fundamentalist or extreme religious or political regime.

The resources used in Hybrid Conflict and Hybrid Warfare can include:

- modern, state-of-the-art, military capabilities;
- out-of-date, non-sophisticated or aging military means for guerrilla type hit and run tactics;
- simple or unsophisticated means of terrorist attacks (e.g. cars, trucks, air breathing and other aerial platforms);
- digital means to conduct information operations for propaganda, misinformation or manipulation;
- bombs or self-made explosives to conduct attacks, possibly with Weapons of Mass Destruction (WMD) (biological or chemical);
- a broad range of tools for criminal activities.

It must be noted that the resources used in Hybrid Warfare include the same capabilities used by conventional and non-conventional armed forces against another country or non-state actor. However, it's unlikely modern, state-of-the-art, military capabilities will be employed in a Hybrid Conflict situation.

The methods differ according to the objectives and the conditions under which the attacks or the actions take place (in peacetime or in a situation

where Article V of the Washington Treaty is invoked). Hybrid attacks can be very complex in nature using a combination of conventional, non-conventional and other activities; normally very well planned, coordinated and executed in a highly integrated manner; and ranging from simple individual attacks to multiple, multi-facetted, cross domain attacks; lethal and non-lethal. In short, hybrid threats are a multi-facetted problem, where the opponent operates in an unpredictable manner throughout the total spectrum of conflict and applying violence at various levels causing severe problems. Hybrid attacks are normally planned and conducted in a highly integrated fashion by non-deterred persons and from a position of strength. The hybrid opponent prefers the indirect approach: capitalizing on the adversaries vulnerabilities, attacking where least expected and where the impact is most effective[7].

NATO Joint Air Power and Hybrid (Air) Threats

Since this article focuses on Hybrid Conflict, Hybrid Warfare and Hybrid (Air) Threats in connection to Joint Air Power, the question arises 'What Hybrid Air Threats NATO might face and in what way Joint Air Power can be involved in combatting hybrid threats?' Hybrid Air Threats can include:

- high (4th and 5th generation) to low end manned and unmanned (remotedly piloted, automated, or autonomously operating) aerial vehicles/systems, which can be stealthy or low observable and operate at different speeds and altitudes;
- missiles;
- rockets, Artillery and Mortars (RAM);
- drones and other (remotely piloted) Unmanned Aerial Vehicles (UAV), which can be kite based, miniaturized, weaponized or non-weaponized.

The aerial threats which are low and slow flying and small can be summarized under the acronym 'LSS' e.g. balloons, ultra-light aircraft, gliders and unmanned Remotely Piloted Aircraft Systems (RPAS).

Hybrid Air Threats can manifest themselves in the form of airspace violations creating confusion and disruption, Renegade with the intention to perpetrate a terrorist attack, Intelligence, Surveillance and Reconnaissance (ISR) (situational awareness and intelligence preparation of the hybrid battlefield), disruption of space based data and information systems and critical air traffic management infrastructure, and, finally, aerial attack to include spraying of WMD potentially endangering human life and causing a significant damage to infrastructure. A specific type of Hybrid Air Threat is called military swarming. It is a battlefield tactic designed to overwhelm or saturate the defences of the principal target or objective with aerial capabilities (e.g. by the simultaneous deployment of large numbers of drones or other miniaturized RPAS).

Core Air Power roles	Con- ventional Warfare (state and non-state)	Noncon- ventional/ irregular (state and non-state)	Terrorist attack (non-state)	Criminal attack (non-state)	Cyber- space attack (state and non-state)
Air Superiority, DCA* and OCA	X	X	X	X	
Precision Strike (AI, CAS and Strategic ops)	X	X	X		
ISR	X	X	X	X	X
Air Mobility (intra and inter theatre), fixed wing, helicopters	X	X	X	X	
Air C2 (to include interageny synchr/coord)	X	X	X	X	X

*Note: Includes counter swarming measures designed to neutralize or otherwise repel such an attack

With Hybrid Air Threats defined, it is important to explain how Joint Air Power can help combat hybrid threats? The chart above shows the relationship between the Core Air Power roles that NATO Joint Air Power can perform and the key features of the hybrid threat spectrum.

From this chart it is clear that all Core Air Power Roles are relevant to at least three domains of the hybrid threat spectrum. Four out of five Core Air Power roles can be employed across virtually the entire threat spectrum. The overall conclusion is that the Core Air Power roles are relevant for conducting air operations and countering Hybrid Air Threats throughout the hybrid threat spectrum. The questions, however, are: 'Does NATO have the required capabilities and competencies to project Air Power for the purposes of conducting these operations and countering the threats and what are the urgent Joint Air Power priorities?'

Responsibility and Attribution

Before answering these questions it is necessary to address the issues of responsibility and attribution. The First thing that needs to be acknowledged is that defending against Hybrid attacks is not one of NATO's primary responsibilities, although this responsibility increases as the conditions change. In peacetime therefore categorized as Hybrid Conflict, the primary responsibility to respond to hybrid threats or attacks rests with the targeted nation. In this particular case, NATO can play a role, but the focus is on providing assistance in any stage of a counter hybrid threat campaign. In a situation where Article V of the North Atlantic Treaty is invoked (Hybrid Warfare), NATO member states must determine how they want to counter the hybrid attack(s)[8]. In 2016 in Warsaw, the HOS/G stressed 'that the Alliance and Allies will be prepared to counter Hybrid Warfare as part of collective defence'. So the questions now are 'In what way can NATO Joint Air Power assist and are there any urgent Joint Air Power capability and competency requirements for strengthening NATO's preparedness?

A key issue in countering hybrid threats is attribution. Doubt over attribution weakens countries' resolve and decision-making in response to an attack. One of the key directions that emanates from NATO's strategy in countering hybrid threats is that NATO must be able to recognize and attribute hybrid actions. Unless responsibility for the attack is claimed by the actor, assigning blame to an individual, group, state or non-state is extremely difficult. Attribution, therefore, in times of a Hybrid Conflict or crisis situations is a greater problem than during traditional, conventional warfare. The reasons stem from the nature of the threat and the form of hybrid action which includes, predominantly terrorist, criminal and cyberspace attacks. Hybrid Warfare encompasses all domains of the threat spectrum and presents the same problems of attribution of course for terrorist, criminal or cyberspace attacks. However, it is expected that attacks conducted in a conventional or non-conventional warfare situation can be attributed to a group, state or non-state actor with a higher degree of confidence. Conducting air operations against a hybrid opponent can only be conducted if attribution to a state, non-state or group is secured. The baseline, however, is the inherent right of self-defence in case of a direct attack. Attribution is part of a larger collection of legal aspects and challenges of Hybrid Conflict and Warfare. This article is limited in scope to simply noting that the Law of Armed Conflict (LOAC) might not always be appropriate for a particular situation or effect to be achieved. The LOAC is primarily oriented towards kinetic effects, while Hybrid Warfare employs these as well as a broad range of non-kinetic measures and methods. It is for this reason, that we require conceptual clarity regarding the legal aspects of Hybrid Conflict, Hybrid Warfare, and Hybrid Aerial Threats.

What does all this mean for NATO Joint Air Power? In the next paragraphs the following questions will be addressed: 'Is NATO prepared to project Joint Air Power to assist an Ally at any stage of a hybrid campaign?', 'Is NATO prepared to use Joint Air Power to assist an Ally in a Hybrid Conflict situation and to counter Hybrid Warfare as part of collective defence?', and

'What are the urgent, short to medium term Joint Air Power requirements to effectively cope with Hybrid Air Threats in both situations?'

The distinction between the uses of NATO Joint Air Power during peacetime versus a situation where Article V of the North Atlantic Treaty is invoked is important to understand.

NATO Joint Air Power in Peacetime (Hybrid Conflict)

In peacetime, the role of NATO is to assist a member state at any stage of countering a hybrid campaign. In most of the cases, this will likely focus on countering a terrorist, criminal and cyberattack or a combination of these types of attack at the same time. A key issue here is recognition and attribution, of which the latter will be most problematic in a counter hybrid attack campaign. Therefore, it is necessary to prepare for countering more attacks and assist NATO and its Allies in synchronizing, coordinating and executing various lines of operation across multiple ministries, agencies and organizations (multi domain Command and Control (C2))[9]. NATO's roles are, particularly with respect to the projection of Joint Air Power, to take action with the aim to prevent further escalation and signal deterrence; and to assist where possible and where it is most needed e.g. in the field of gathering information and data whereby the situational awareness increases (ISR). NATO Air operations in peacetime will be non-offensive and be supportive in nature. Defensive action, e.g. against a civil or military aircraft with the intent to perpetrate a terrorist attack is a national responsibility, although NATO can assist through the proper execution of its Standing Air Policing mission.

An important aspect in peacetime is preserving the security and integrity of the national airspaces of the member states. NATO's Standing Air Policing mission is carried out under the provision of NATO Integrated Air and Missile Defence System (NATINAMDS) and plays a fundamental role in

airspace security in SACEUR's Area of Responsibility (AOR). The Air Policing mission consists of air surveillance and control, detection and identification of civil or military aircraft in distress or responding to airborne systems that don't follow international flight regulations and/or that approach or infringe on the sovereign airspace of NATO member states. The mission also encompasses Air C2 and launching fast jets for a Quick Reaction Alert (QRA) for interrogation and shadowing. The main aim of NATO's air policing mission is the de-escalation of the problem situation.

Since hybrid air threats can take place in various forms, it is of utmost importance that the Air Policing structure is capable of coping with the full range of these threats, to include a Renegade situation (hybrid air threats used with the intent to perpetrate a terrorist attack). In this respect, the traditional force structure of the Standing Air Policing capabilities in NATO appears to have limitations.

First, in peacetime, the NATO Air Commander's responsibility for responding to a suspected Renegade aircraft includes steps up to and including launching a QRA in order to shadow that aircraft. In the next step in the response, the QRA aircraft are transferred under national authority and the type of follow-on action required rests with the National Governmental Authority (intervention, warning burst and engagement). Following transfer of command authority NATO's role will be to continue regular Air Policing and monitoring the activity for the situational awareness of NATO's Air Commander. Having distinct agencies (NATO and national) with separate responsibilities implies a lack of a consolidated approach that weakens the concept of deterrence and unity of effort. As SACEUR is responsible for securing the sovereignty of the airspace in his Area of Operational Responsibility, providing the NATO Air Defence Commander (ADC) the delegated authority and legal framework to execute the full range of Air Policing responsibilities against military, non-military and civil aircraft, without having to transfer any to national authorities, maintains

continuity of C2 in the execution of the mission and, consequently, secures NATO's credibility as a security provider to its member states. It also assures unity of effort and consistency in executing the full range of Air Policing tasks. Finally, it synchronizes NATO overall Air Policing efforts in those situations where member states have already agreed to execute cross-border Renegade operations for those nations that do not possess their own airborne intervention capabilities. To this end, a high level political-military working group should be tasked to assess the feasibility and consequences of such an integrated Air Policing approach in NATO.

Second, the NATO Standing Air Policing organization does not have the full range of air surveillance and control capabilities in order to effectively detect, track and identify the spectrum of hybrid air threats (including very low, slow and small aerial platforms and swarms of drones, as part of the complete listing of all aircraft and other aerial vehicles in the controlled airspace (the so-called Recognized Air Picture (RAP)). There is a need for enhancing the existing air surveillance and control capabilities e.g. through specific signal processing or multi-sensor fusing and tracking capabilities. It is also necessary to invest in the research and development of counter hybrid threat modelling and simulation systems, to address technological gaps, and for testing and validation of new technologies and technological experimentation in the realm of countering hybrid air threats (e.g. defence against UAVs and other LSS-platforms).

Third, there is a requirement for radar technology with thresholds that will prevent any aerial platform or system from operating under 'the reaction threshold'. Hybrid actors continue to seek aerial threats that can remain under these technological thresholds.

Fourth, NATO's QRA use fast jets for executing the Air Policing mission. Needed, however, are flying interceptors that can effectively deal with both the traditional and the extended range of possible Renegade air

threats? In terms of 'low, slow, small' this means armed helicopters or other armed, low speed interceptors.

Fifth, NATO's Integrated Air and Missile Defence Organization is vulnerable to cyber-attacks. In order to execute an uninterrupted Air Policing mission the related mission capabilities must be cyber secure and have sufficient resilience in case of a cyber-attack. Since cyber-attacks form an integral part of the hybrid threat domain, NATO should further assess the cyber resilience of its Air Policing capabilities and its ACCS.

Currently, NATO is responsible for the Air Policing mission over the Baltic States. A number of NATO member states have agreed to execute the air policing mission over the Baltic States on a rotational basis. In peacetime, NATO's air policing responsibility for civil or military aircraft in distress and aircraft approaching or infringing on a sovereign national airspace does not extend beyond shadowing the aircraft. Handling a Renegade situation is a national task. The problem is that the Baltic States do not have the national capabilities to effectively handle a Renegade situation. It is for this reason that it is advised to assess the political, legal, operational and technical feasibility of establishing effective Renegade arrangements (to include intervention, warning burst and engagement) between the NATO countries that have signed up for temporarily executing the Baltic Air Policing mission and the Baltic States. The legal basis for such an arrangement is a formal treaty.

In terms of NATO's Joint Air Power Strategy, Air Power doctrine and Allied Joint Publications there is a need for properly addressing the mission, roles, tasks and organization of NATO Joint Air Power and its ACCS in a Hybrid Conflict and Hybrid Warfare situation. There is also a requirement for reviewing the MC 362/1 set of Rules of Engagement (RoE) from the perspective of the application of Joint Air Power in Hybrid Conflict and Warfare[10].

In peacetime, NATO is to assist a member state at any stage of a hybrid campaign. From a Joint Air Power perspective, NATO should, therefore, assess the conditions in which it might be willing to employ its Joint Intelligence, Surveillance and Reconnaissance (JISR) and NATO Airborne Early Warning and Control (NAEW&CS) capabilities in support of an Ally countering hybrid attacks in a hybrid conflict situation.

NATO should also assess the requirement for network capabilities and structures to operate NATO Joint Air Power in a joint and interagency (civilian-military) environment. To be an effective network, the participating organizations, agencies and departments should agree on an interoperable system and an interactive method of working. First and foremost, this requires a network or a 'system of systems', that can be used by Allied Air Command for supporting SACEUR's Comprehensive Crisis and Operations Management Centre (CCOMC) and NATO's Civil Emergency Planning activities from an operational-tactical level perspective and that can contribute to NATO's civil emergency activities in case of a hybrid attack. This might be achieved, for example, through sharing information, situational awareness, the operational air picture and specific air advice. In support of this, an Air Advisory Support Team (AAST) could be established in peacetime at the Allied Joint Forces Command level in Brunssum and Naples, where the air expertise in the organization is usually thin. Such an Advisory Team will act as a knowledge and advice centre for the use of Joint Air Power in a situation of a hybrid air attack. Education, training, exercising and validation in peacetime will be an integral part of enhancing the knowledge and skills of this AAST and the leadership at the Joint level in effectively dealing with hybrid attacks in any situation.

NATO Joint Air Power in a Situation Where Article V Is Invoked (Hybrid Warfare)

When article V of the North Atlantic Treaty is invoked, NATO will execute it Essential Core Task of Collective Defence, while at the same time it will

continue to deter the opponent or potential opponents from escalating the crisis. Cooperative security activities will also continue in this phase. The difference between the use of NATO Joint Air Power in peacetime and in the situation where Article V is invoked is that NATO would face the full spectrum of Hybrid Air Threats and all forms of action (to include conventional and non-conventional warfare). NATO's declared intention in this situation is 'that the Alliance will be prepared to counter Hybrid Warfare as part of collective defence'. The main functions for NATO Joint Air Power in a Hybrid Warfare situation are: prepare, deter, defend and support. NATO air policing will transform into a dedicated air defence mission as an integral part of NATINAMDS and NATO's Air C2 organization.

From an air perspective, Allied Air Command will support NATO's operational commander in achieving his goals by planning, tasking and executing high to low end, conventional offensive and defensive air operations in the form a dedicated air campaign. Non-conventional attacks by state or non-state actors might be countered if attribution is possible and the target lends itself to the effective use of NATO Joint air Power. The use of air power against terrorist, criminal or cyber-attacks will be possible under the same conditions and limitations as previously described in the paragraph on NATO Joint Air Power in Peacetime.

NATINAMDS forms the backbone of NATO's integrated structure for effectively dealing with the whole range of hybrid air attacks. Although this is what NATO currently has, there is ample room for improvements in Joint Air Power capabilities and competencies in NATINAMDS. This article will not expand on these shortfalls, except to mention a number of specific Joint Air Power requirements to effectively deal with hybrid air threats in Hybrid Warfare. The JAPCC study, of which this article is a dedicated part, provides a range of focused articles which address the urgent priorities for NATO Joint Air Power in relation to the 2016 main areas of concern and intent of the 2016 Warsaw Summit.

Besides the requirements already listed in the paragraphs on NATO Joint Air Power in peacetime, the specific Joint Air Power requirements for effectively dealing with Hybrid Air Threats in a Hybrid Warfare (Article V) situation are explained below.

First, and above all, the criteria for a hybrid action constituting an act of war and for what constitutes a legitimate military target in such a situation must be established. Joint Air Power doctrine, RoE and responsibilities for dealing with the full spectrum of hybrid threats must be unequivocally clear.

Second, in case of a Hybrid Warfare situation, the AASTs at the Allied Joint Forces Command level should be able to transform into a Hybrid Threat Coordination Cell in order to advise and assist the Joint Forces Commander in Brunssum and Naples. In this phase Joint Air Power will be required to cope with the full range of Hybrid (Air) Threats. Personnel with specific Hybrid Warfare knowledge must be available in the original AASTs at the Joint level for when the Teams transform into Hybrid Threat Coordination Cells. This requires adequate education, training and exercising of the AASTs.

Third, in a complex Hybrid Warfare scenario, NATO must be prepared to reckon with one or more integrated and coordinated attacks covering the full range of hybrid threats. This requires a C2 system that has the capability to remain effective under these conditions, particularly with regard to system restoration, business continuity and cyber resilience.

Resilience

In terms of Hybrid Conflict and Hybrid Warfare, resilience can be defined as the ability to recover from setbacks caused by hybrid threats and to carry on in the face of one or more hybrid opponents. The threat of hybrid

attacks have underlined the need for enhancing resilience and prepared-ness. Not just from a national or governmental, corporate and industrial perspective, but also from a NATO military Command and Force Structure point of view. Resilience and preparedness are two sides of the same coin. Although the primary responsibility to respond to hybrid threats and strengthen resilience and civil preparedness in peacetime rest with each nation, NATO is prepared to assist an Ally at any stage of a hybrid cam-paign and, to this end, support to improving resilience can be beneficial. In a situation where Article V of the North Atlantic Treaty is invoked, the Alliance and Allies will be prepared to counter Hybrid Warfare as part of collective defence. Resilience guidelines were agreed to by the Defence Ministers at their ministerial meeting in June 2016 and NATO has developed Baseline Requirements for National Resilience. In order to strengthen the internal organizational resilience of NATO as a whole, it is important to assess the internal strengths and weaknesses in NATO's resilience, develop internal baseline requirements and develop an action plan to remedy the most important shortfalls.

Proposing how NATO Joint Air power can support the enhancement of resilience and preparedness is an implicit aim of this article. There is a range of urgent, short to medium Joint Air Power requirements that, if resolved, can strengthen NATO's preparedness to assist an Ally at any stage of a hybrid campaign in peacetime and to effectively cope with Hybrid Warfare and hybrid threats.

The intent of NATO's aim is to 'protect their populations and territory against a range of security challenges and threats, from military forces and from terrorist, cyber and hybrid attacks'. The proposed urgent, short to medium term NATO Joint Air Power requirements in this article will support Allied nations in peacetime in their response to hybrid attacks, thereby strengthening the resilient homeland defence and critical infrastructure (e.g. the Air Traffic Management capabilities) and the con-

tinuation of government and other essential services. The urgent, short to medium term NATO Joint Air Power requirements in a situation where Article V is involved are needed to strengthen NATO's capabilities and competencies in executing it most important Core Essential Task i.e. Collective Defence. This also means providing direct and indirect support to NATO member states in effectively countering Hybrid Warfare.

It is very important NATO and its member states seek opportunities to maximize cooperation. Countering hybrid threats requires a multifaceted, multi-agency, inter-ministerial, joint and combined, civilian-military approach. It is critical to establish a networked organization that operates together in peacetime and encompasses, as much as possible, key civilian and military players in the field of security and defence. An important aspect in strengthening partnerships is the collaboration between NATO and the EU. The focus should be on a series of actions in concrete areas, as expressed in the 2016 Warsaw Summit Communiqué, including countering hybrid threats, enhancing resilience, defence capacity building, cyber defence, maritime security and exercises. Time is of the essence. Concrete results should be addressed out of cycle of the regular meetings of Foreign Ministers or Defence Ministers.

Requirements: Impact – Cost – Priority

The preceding paragraphs provided an overview of urgent, short to medium term requirements for NATO Joint Air Power to effectively deal with Hybrid Conflict in peacetime, Hybrid Warfare (Article V invoked), hybrid air threats and requirements for NATO Joint Air Power in enhancing resilience and civil preparedness. A table of prioritized, short to medium term requirements is included on pages 187–188. This table depicts the relationship between the requirements (options and opportunities) and the criteria for determining the overall priority of the requirement i.e. impact and cost. In the context of this article, impact, cost and priority are defined as follows:

Impact: low, medium and high.

Low means a low effect on the possibility for enhancing NATO Joint Air Power capability and competency development in the field of Hybrid Conflict, Hybrid Warfare and resilience. Medium implies not a great effect, but still significant. High means a great effect on further developing NATO Joint Air Power capabilities and competencies.

Cost: low, medium and high.

Low: less than 1M €. Medium: 1–10M €. High: more than 10M €. Within the context of this paper low and medium costs are defined as affordable. The affordability of medium cost assumes a high impact relationship.

Priority: the priority of the recommendations ranges from 1 to 4.

- Prio 1 means: high impact – low cost and high impact – medium cost. Rationale: medium cost is affordable.
- Prio 2 means: medium impact – low cost and medium impact – medium cost. Rationale: Medium impact is still significant.
- Prio 3 means: medium impact – high cost and high impact – high cost.
- Prio 4 means: low impact – high cost.

Besides impact and cost, the requirements identified for NATO Joint Air Power's capabilities and competencies to cope with Hybrid Conflict, Hybrid Warfare and hybrid threats need to meet the following criteria. First, have strategic implication, which is related to a high and medium impact on the capabilities and competencies to deal with Hybrid Conflicts, Hybrid Warfare, hybrid threats and to enhance resilience. Second, the solutions must be joint/combined in nature. Third, the solutions to the shortfalls must be actionable/achievable.

This leads to the following prioritization matrix of Joint Air Power urgent, short to medium term requirements for peacetime and in a situation where Article V is invoked.

Hybrid Warfare and Resilience		Criteria								
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
	NATO Joint Air Power in peacetime										
1	Conceptual clarity of legal aspects in Hybrid Conflict and Hybrid threats			X	X			X			
2	Establish a high level working group to assess the feasibility for the full delegation of authority and a legal framework for integral approach of Air Policing.			X	X			X			
3	Enhance existing air surveillance and control capabilities			X		X		X			
4	R&D, testing, experimentation and evaluation new technologies			X		X		X			
5	Implement distinctive radar technology thresholds			X		X		X			
6	Slow moving flying interceptors			X			X			X	
7	Assess cyber resilience in air policing capabilities and Air C2 system		X		X				X		
8	Assess feasibility Renegade arrangements Baltic States			X	X			X			
9	Update NATO JAPS, AP doctrine and AJP's for Hybrid Conflict and threats			X	X			X			
10	Review MC 362/1 to include Hybrid Conflict and Hybrid Warfare			X	X			X			
11	Assess the conditions to employ JISR and AWACS			X	X			X			
12	Assess network capabilities and structures for joint and interagency environment			X	X			X			
13	Establish AAST at JFCB and JFCN			X	X			X			
14	Education, training, exercising and validation AAST			X	X			X			

Hybrid Warfare and Resilience		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
	NATO Joint Air Power in an Article V situation										
15	Update NATO JAPS, AP doctrine and AJP's for Hybrid Warfare			X	X			X			
16	Transform AAST into a Hybrid Threat Coordination Cell (HTCC)			X	X			X			
17	ETEE for AAST for transforming into a HTCC			X	X			X			
18	Further optimizing NATO's Air C2 capabilities and resilience against cyberspace attacks			X		X		X			
	Resilience										
19	SWOT analysis NATO resilience for countering Hybrid Warfare		X		X				X		

The prioritization matrix reveals a number of interesting points:

First, almost all requirements, if rectified, will significantly improve NATO Joint Air Power's preparedness to assist an Ally or Allies in any stage of a hybrid campaign and to counter Hybrid Warfare as part of collective defence. Second, the majority of the requirements are priority 1 and 2. This is where NATO should focus its immediate attention. Third, a significant number of requirements can be addressed without incurring high costs. Fourth, although high impact and high cost result in a priority 3 classification for Requirement number 6, the high impact alone implies a significant effect on NATO Joint Air Power's effectiveness in dealing with the extended range of possible renegade air threats, in particular the low, slow, and small airborne platforms. For this reason, and if the conditions allow, there is sufficient justification to take appropriate action. In addition, costs can be reduced if existing slow moving flying interceptors can be employed. Fifth, the cost indicator is an initial, rough categorization that requires refinement in the follow-up process.

Conclusions

The 2016 Warsaw Summit Communiqué is clear in its description of the broad range of threats the Alliance faces. 'They originate from the east and from the south, from state and non-state actors, from military forces and from terrorist, cyber or hybrid attacks.' This article focused on the latter aspect. Hybrid attacks can occur in peacetime in the form of terrorist, criminal or cyberspace attacks. The Hybrid Conflict phase, is where hybrid actors refrain from the overt use of armed forces. In this phase, NATO is prepared to assist an Ally at any stage of a hybrid campaign. In a situation where Article V is invoked the Alliance and Allies will be prepared to counter Hybrid Warfare as part of collective defence. In Hybrid Warfare, actors resort to the overt use of conventional or non-conventional armed forces against another country or non-state actor, as well as potentially terrorist, criminal or cyberspace attacks at the same time and in an integrated fashion. These attacks can be complex in nature using a combination of conventional, non-conventional and other activities, normally very well planned, coordinated and executed in a highly integrated design and ranging from simple individual attacks to multiple, multi-facetted, cross domain attacks, lethal and non-lethal. Hybrid Conflict and Hybrid Warfare both present a wide range of Hybrid (Air) Threats.

NATO Joint Air Power is of great importance for countering Hybrid Air Threats throughout the hybrid threat spectrum. This article raised the question 'whether NATO Joint Air Power has the required capabilities and competencies for conducting these operations and countering the threats and what are the urgent Joint Air Power priorities?' The answer is that there is ample room for improvement and for enhancing Joint Air Power capabilities and competencies. This article listed a broad range of urgent, short to medium term requirements for NATO Joint Air Power in peacetime and in an Article V situation. The realization of these requirements will better prepare NATO Joint Air Power and its supporting Air organization to

assist Allies at any stage of a hybrid campaign and to counter Hybrid Warfare as part of collective defence.

The urgent priorities focus on three main areas. First, the need for achieving clarity in NATO's Joint Air Power Strategy, Air Power doctrine, RoE and in the legal aspects and responsibilities for NATO Joint Air Power's effectiveness in countering the full spectrum of hybrid threats. Second, the need for enhancing existing air surveillance and control capabilities and implementing distinctive radar technology thresholds for effectively dealing with the full range of Hybrid Aerial Threats. Third, the need for establishing in the organization of the Allied Joint Forces Commands a well-educated, trained, exercised and validated AAST that will act as a knowledge and advice and assist centre for the effective use of NATO Joint Air Power in a hybrid air attack situation in peacetime (Hybrid Conflict) and can, if necessary, act as a Hybrid Threat Coordination Cell in a situation where Article V is invoked (Hybrid Warfare).

Almost all requirements are priority 1 and 2 and, if rectified, will significantly improve NATO Joint Air Power's preparedness to assist an Ally or Allies in any stage of a hybrid campaign and to counter Hybrid Warfare as part of collective defence. These are where NATO should focus its immediate attention.

Recommendations

Taking into account the urgent Joint Air Power priorities mentioned in this paper the following main recommendations apply:

• First, clarify conceptually NATO's Joint Air Power Strategy and Doctrine, the applicable RoE, and the legal constraints and restraints for NATO Joint Air Power effectiveness in countering the full spectrum of hybrid threats.

- Second, enhance existing air surveillance and control capabilities and implement radar technology thresholds for detecting, tracking and identifying the full range of hybrid aerial threats.
- Third, establish in the organization of Joint Forces Commands a well-educated, trained, exercised and validated AAST that will act as a knowledge and advice and assist centre for the effective use of NATO Joint Air Power in a hybrid air attack situation in peacetime. This AAST to be able to transform into a Hybrid Threat Coordination Cell in a situation where Article V is invoked (Hybrid Warfare situation).
- Fourth, remedy the specified priority 1 and 2 requirements as a matter of urgency.

Endnotes

1. Warsaw Summit Communiqué, 9 Jul. 2016, para 5.
2. Ibid, para 6.
3. A distinction must be made between Hybrid Conflict and Hybrid War. With regard to the first, the parties refrain from the overt use of armed forces against each other (in peacetime), while in the latter situation (Article V of the North Atlantic Treaty invoked) a state or a non-state can also resort to the overt use of armed forces against another country or non-state actor. Source: Understanding hybrid threats, European Parliamentary Research Service Blog, 24 Jun. 2015.
4. Ibid, para 72.
5. In the context of the Study these main areas of concern and interest are called Strategic Focus Areas.
6. Vom Kriege, Neunzehnte Auflage. Ferd. Dümmlers Verlag, Bonn. 1980, p. 212.
7. The centre of gravity of NATO member states assisting an Ally in a Hybrid Conflict situation countering Hybrid Warfare as part of collective defence is political will. To weaken this centre of gravity the hybrid opponent will most probably take a non-conventional, asymmetrical approach where they can avoid engagements where NATO forces have significant advantage. Causing victims (mostly among the innocent) and creating confusion and disruption is perceived as sufficient to weaken the political will of a country and create insecurity in society.
8. Article V of the North Atlantic Treaty: 'Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all.'
9. NATO calls this Comprehensive All Domain Operations (CADO).
10. Rules of engagement (RoE) are rules or directives to military forces (including individuals) that define the circumstances, conditions, degree, and manner in which the use of forces or actions which might be construed as provocative, may be applied. They provide authorization for and/or limits on, among other things, the use of force and the employment of certain specific capabilities.

Alliance and Partnership Cooperation

Bridging Mutual Joint Air Power Interests

By Lieutenant General (ret.) F. H. Meulman, NLD AF

Context

Cooperation is one of the key pillars of NATO's 'Active Engagement, Modern Defence' strategy and was acknowledged as such by the NATO Heads of State and Government (HOS/G) in Lisbon in 2010. The Strategy stipulates, among other things, 'that partners make a concrete and valued contribution to the success of NATO's fundamental tasks'. NATO's intent is to enhance partnerships by establishing a more flexible environment for collaboration and bringing together NATO members and partners that operate within their own diverse and varied frameworks. NATO presents operational partners a role in shaping strategy and decisions for NATO-led missions to which they contribute resources. Consequently, a spirit of cooperation has evolved to the extent that there are now several examples of highly successful cooperative endeavors including operations in Afghanistan and Libya.

At the Wales Summit in 2014, NATO endorsed the Partnership Interoperability Initiative with the intent 'to enhance interoperability and preparedness for future crises management'. This enhanced focus on interoperability led to improved capabilities for operational cooperation through establishing a process for standardizing and validating partner

units and by increasing the opportunities for partners to participate in NATO exercises.

The topic of cooperation also figured prominently at the Warsaw Summit in 2016, with the NATO HOS/G declaring, as promulgated in the Summit Communiqué, that 'the success of NATO partnerships is demonstrated by their strategic contribution to Alliance and international security … (and that NATO) will further develop our partnerships so that they continue to meet the interests of both Allies and partners'. They also affirmed the need for a more 'tailor-made, individual and flexible approach to make NATO partnership cooperation more strategic, coherent and effective'.

The Wales and Warsaw Summits both demonstrate not only the importance, but also the enduring requirement to cultivate an environment of cooperation between NATO and its partners. Enhancing cooperation in the operational domain is an area where the effects are the most tangible and apparent, particularly when NATO is engaged in a crisis and/or conflict situation, as the experiences in Afghanistan and Libya demonstrate.

Cooperation should be viewed from different angles. First and foremost, acknowledging NATO's principled focus on military cooperation between Member States: Alliance cooperation in order to create effective and efficient options and opportunities for operational cooperation and for capability and competency development in the area of Joint Air Power between NATO member states. Second, Partnership cooperation with the intent of establishing a strategic dialogue and building mutual understanding and trust. Third, Partnership cooperation with the intent of NATO supporting a partnership country to establish a secure and stable environment. Fourth, Partnership cooperation with Finland and Sweden, countries that play a crucial role in supporting NATO in accomplishing its essential task of collective defence. Fifth, operational cooperation with partners who are willing and able to cooperate with NATO in an operational environment, side by

side. This paper focuses on two of these forms of cooperation: intra-Alliance military cooperation i.e. between the NATO member states themselves, and military Partnership cooperation between NATO and non-NATO countries. Both these forms are referred to as 'Alliance and Partnership cooperation'.

Aim

This article focuses on Alliance and Partnership cooperation with the aim of proposing urgent short to medium term requirements for enhanced operational cooperation and for capability and competency development in the area of Joint Air Power. The requirements complement the excellent work already taking place in the field of Partnership cooperation among the Military Partnership organizations of Supreme HQ Allied Powers Europe, ACT, Joint Forces Command Brunssum and Allied Air Command Ramstein[1]. The goal for this article is to recommend intensifying operational cooperation with the existing group of Enhanced Partners, but also widening operational cooperation and interoperability with the so-called Gulf Cooperation Council or GCC- partners[2, 3]. The key questions are: 'how can we be stronger together' and 'what are the urgent priorities for enhancing operational Alliance and Partnership cooperation in support NATO's Joint Air Power Strategy?' This article is not so much about shortcomings as it is about creating new and meaningful cooperation requirements (options and opportunities) in the field of Joint Air Power.

In his most recent article 'NATO Air Power, The Last Word', General (retired) Frank Gorenc, USAF and former Commander Allied Air Command, addressed the topic of operational cooperation very succinctly: 'We need a robust NATO, we fight together. You cannot surge trust, you cannot surge relationships. NATO's strength is underpinned by relationships developed day in and day out and the trust that comes with those relationships. A robust NATO requires shared commitment … and interoperability in all things must be pursued and achieved.'[4]

Operationally, NATO Joint Air Power is only as good as the air forces that contribute to it. This also includes the air forces of those non-NATO countries contributing to a NATO operational deployment. NATO is currently developing a Joint Air Power Strategy led by ACT. It is important to develop a coherent strategy that pays particular attention to Alliance and Partnership cooperation. Fundamental questions include: 'What does Alliance and Partnership cooperation mean in the context of NATO's Joint Air Power Strategy?', 'How do we strengthen Alliance and Partnership Joint Air Power cooperation?', 'How do we integrate Joint Air Power partners as early as possible to demonstrate that everybody is in the game?', 'How do we optimize Alliance and Partnership cooperation in the fields of ETEE, thereby setting the conditions to optimize operational cooperation?' In short, how do we create a cooperative spirit, establish trust and achieve operational effectiveness. This leads to the question 'What are new Alliance and Partnership opportunities for operational cooperation and options for capability and competency development in the area of Joint Air Power?' In the following paragraphs new and meaningful options and opportunities for Alliance and Partnership cooperation are proposed.

Requirements for Alliance Cooperation

Alliance cooperation is about bi- or multinational, or collective Joint Air Power cooperation in NATO. The intent is to explore new and meaningful Joint Air Power cooperation options and opportunities that will improve the conditions for an effective operational Joint Air Power in support of NATO's Core Essential Tasks. Options and opportunities are:

Strengthening the NATO Allied Air Command 24/7 Command and Control (C2) Element that, in the context of Indication and Warning (I&W), supports Commander Allied Air Command in providing an accurate and timely situational awareness picture of political and military developments around the immediate periphery of Europe as well as an overview

of current events in the airspace over NATO/Europe. This will be achieved through continuous monitoring, production and delivery of situation reports and alerts to stakeholders in the Allied Air Command organization and to Joint Forces Command Brunssum and SHAPE (the Comprehensive Crisis and Operations Management Centre – CCOMC). This 24/7 C2 Element will be included in Allied Air Command's JFAC organization when activated in times of crisis or conflict. These options can be extended by incorporating into the Allied Air Command C2 Element an Enhanced Partner cooperation cell. This will extend the scope of the C2 Element and provide an opportunity to transform the Enhanced partner countries' representatives to operational liaisons officers for their nations at Allied Air Command in the event of a crisis or conflict.

Expanding the collective involvement in NATO Joint Air Power. There are several ways to implement this option. First, we must recognize that strengthening NATO's Joint Air Power force structure is not only the responsibility of those NATO countries that possess dedicated Joint Air Power capabilities and competencies. Rather, it is also the responsibility of countries that do not have the resources to actively help to strengthen NATO's Joint Air Power posture. The human factor in the Allied Air Command-organization is of strategic importance; there will always be a need for specialized staff. Those nations lacking dedicated air power capabilities must be ready to support the Joint Air Power competency requirements by supplying staff that can be trained for specific tasks. Second, strengthening the involvement in NATO Joint Air Power can also be accomplished with additional financial contributions and spending more in NATO common funded or bi- or multinational Joint Air Power projects. Third, many countries in NATO are in the process of planning to replace legacy Joint Air Power systems. The question is how we streamline these processes in NATO. This can be done by coordinating and synchro-nizing future Joint Air Power acquisition timelines and searching for common and cost-effective solutions. For example, possible options for

cooperation in the field of Surface Based Air and Missile Defence (SBAMD)/ Integrated Air and Missile Defence (IAMD) include:

- Explore the acquisition, by NATO, of an organic, high end interceptor capability (like NATO Airborne Early Warning and NATO Alliance Ground Surveillance (AGS).
- Explore establishing a shared pool of high end interceptors.
- Encourage NATO Allies to acquire low end interceptors.
- Implement interim solutions to integrate legacy Air Defence systems; Increase interoperability, particularly with former Warsaw Pact nations who still operate legacy Air Defence weapon systems.

Using Air Advice and Assist Teams (A3-Team). Besides the Expert Staff and Mobile Training Team visits in the context of existing military Partnership cooperation, we should optimize outreach throughout NATO to include Air Advice and Assist Teams. These teams can assist NATO member states strengthen common involvement in Joint Air Power by synchronizing the planning of legacy Joint Air Power Systems replacement activities. They can explore options for acquisition and sharing the responsibility of pooling resources and can also support NATO member states bridge existing competency gaps by addressing topics such as: general Air Power knowledge (Doctrine, Integration, Connectivity, Principles and Characteristics); the NATO Joint Force Air Component Commanders (JFACC) organization; Air Battle Management; Air – Land integration; Air campaign Planning, etc. Finally, the A3-teams could support Allied Air Command's Evaluation Branch in conducting Tactical Evaluations.

Developing a multinational NATO Air Warfighting Centre on the basis of the Framework Nation Concept. This will allow a NATO Air Warfighting Centre to gradually develop into a practical hub for NATO Joint Air Power Education, Training, Exercising and Evaluation activities. The development of a NATO Air Warfighting Centre will lead to a practice-oriented

organization with a theoretical base and will help to strengthen and pre-serve Joint Air Power competencies and skills and strengthen the qualita-tive application of available Joint Air Power resources. It leaves room for larger and smaller NATO member states to plug into a meaningful Joint Air Power backbone provided by a larger member state acting as the Frame-work Nation. Developing a NATO Air Warfighting Centre also leaves room for developing an attractive and sustainable multinational air training capacity in Europe. The idea of developing a NATO Air Warfighting Centre, for example in Greece, Italy or Spain, would provide the opportunity to better leverage Joint Air Power Education, Training, Exercising and Evalua-tion opportunities at air bases like (in alphabetical order): Decimomannu, Sigonella, Souda, Trapani or Zaragossa etc. The development of a NATO Air Warfighting Centre also creates opportunities to cooperate with or build upon existing national exercises like Frisian Flag, Joint Project Optic Windmill (JPOW) and the Joint Air Warfare Tactical Exercise (JAWTEX) etc. Finally, a NATO Air Warfighting Centre offers possibilities for structured forms of partnership cooperation in the field of Joint Air Power.

Requirements for Partnership Cooperation. Partnership cooperation focuses on operational cooperation in the field of Joint Air Power. It ranges from exchanging information to planning combined exercises and de-ploying Air Power in joint, NATO-led operations. The intent is to enhance practical, new and meaningful Joint Air Power cooperation options and opportunities with the Enhanced and GCC-partners in order to develop a deeper security partnership. It forms the basis for a wider understanding of each other's capabilities and limitations and for effective Joint Air Power collaboration in crises and conflicts. Options and opportunities are:

Joint Air Power – Defence and Security Building Country Packages. In order to develop a deeper security partnership, tailor made individual country Joint Air Power packages must be developed for the Enhanced and GCC- partners. Depending on the purpose, potential and need of the

intended cooperation, the Defence and Security Building Package must be based on multi-year, spiral development of intensive individual Joint Air Power Cooperation initiatives. Working relationships with Enhanced and Gulf partner countries must be synchronized at an appropriate level. This approach allows for a different focus in package elements and collaboration speeds. Elements of such a Joint Air Power Country Package could include:

- Increased information exchange to promote better understanding of NATO's Joint Air Power policies and functions and to improve relations with political, military and civil authorities.
- Leadership development in the field of Joint Air Power.
- More regular Joint Air Power dialogue and intensive practical cooperation based on shared security challenges.
- Creating the conditions for future operational cooperation by exchanging country specific information, including local infrastructure and circumstances.
- Pre-planned arrangements with regard to Host Nation Support (HNS) for example: Fuel, Force Protection (active and passive), Medical, Food, Airport of Debarkation/Sea Port of Debarkation, and Judicial etc.
- Frequency Management arrangements for the use of the frequency spectrum. Which frequency bands are available and under what conditions?

Increased Partnership Cooperation at the Operational Level. Priorities must be assigned to areas where cooperation at the operational level between NATO and its Enhanced- and GCC-partners can be established quickly and then fully developed. This is particularly appropriate for military Partnership cooperation with Finland and Sweden, countries that play a crucial role in supporting NATO in accomplishing its essential task of collective defence. Currently, progress in this area is already being made, but there are political impediments which still hinder the fully desired

military cooperation. Recalling the intent of the Alliance, 'that it will further develop partnerships so that they continue to meet the interests of both Allies and partners' and with the requirement for a more 'tailor-made, individual and flexible approach to make NATO partnership cooperation more strategic, coherent and effective', a primary objective should be setting the conditions to maximize cooperation by lifting existing political obstructions to achieving full Partnership cooperation at the operational level. Coordination must be planned, executed and refined in peacetime, so personnel are well prepared in advance of a conflict. The initial effort must focus on enabling collaborative planning, tasking and execution of combined air operations. To achieve this, the connectivity to permit collaboration, C2 between Enhanced- and GCC-partners and NATO must be established then accompanied with a concerted effort in training and education.

National policies must be factored into the review of operational Partnership cooperation. The varied geographic locations of NATO member nations relative to their Enhanced and GCC-partners dictates that, for conducting joint air operations, close coordination is both more challenging and critical to avoid unnecessary escalation and to maintain flight safety. Depending on national policy restrictions, the scope of coordination could range from strictly safeguarding the integrity of the airspace; through greater education, training and exercises; to, with robust connectivity, executing C2 and conducting the planning, tasking and execution of combined air operations in crisis and/or conflict.

Close coordination requires fully interoperable systems, robust connectivity, cooperative planning processes and a thorough understanding of command and planning processes. The key enabler for coordination is connectivity, which must be fully established between NATO and its Enhanced and GCC-partners, and in advance of conflict when competencies can be honed and refined. Currently, however, political guidance restricts mutual cooperation and collaboration strictly to air operation

deconfliction. Today's complex strategic environment, however, has heightened the level of urgency for timely coordination among partners, which requires greater flexibility and, therefore, new political guidance that permits broader possibilities for operational cooperation.

When planning connectivity between NATO and its partners, it is critical to establish mutually acceptable standards and formats to enable information exchange. Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) systems enabling coordinated execution of combined air operations between NATO and the Enhanced and GCC-partners require the following minimum characteristics:

- interoperable;
- secure (Protects confidentiality, integrity and availability);
- enable real time, or near-real time data exchange (voice and VTC) across the tactical, operational, and strategic levels;
- support tactical data link networks (Link 16 etc.);
- support computer based education and training (CBT) (incl. common virtual training);
- enable Distributed Training, Modeling and Simulation (incl. wargames);
- support situational awareness tools (Recognized Maritime, Land and Air Pictures (RM/L/AP) and a Common Operating Picture (COP);
- support surveillance and early warning information;
- support coordinated (or integrated/common) defence planning and reporting (Air Operation Planning, Air Tasking Order and ACO generation and Targeting).

Development of a Partnership Air Group based on NATO's Framework Nation Concept with a NATO lead nation. The development of a Partnership Air Group with Enhanced or Gulf Partner Countries leads to an information based and practice-oriented Air Group organization that plans

and organizes commonly agreed Joint Air Power activities on a yearly basis. It will help to strengthen cooperative Joint Air Power competencies and skills and optimize the basis for practical cooperation in times of crises and conflicts. It leaves room for interested NATO Member States and Enhanced and Gulf partner countries to plug in and develop stronger forms of Joint Air Power cooperation under the lead of a NATO Framework Nation. Partnership Air Groups complement the Joint Air Power – Defence and Security Building Country Packages approach.

Increase the number of courses available for partner countries. SHAPE, together with ACT, should review and assess the Joint Air Power courses that are accessible to partner countries, specifically: Joint Air Power courses (Doctrine, Integration, Connectivity, Principles, Characteristics); the NATO JFACC organization; Air Battle Management; Air-Land Integration; and Air Campaign Planning.

Strengthen Joint Air Power cooperation with the EU, in particular in the field of SBAMD and IAMD, with a specific focus on those EU/non-NATO countries that, intentionally or otherwise, would be involved in the use of NATO (T)BMD. Topics should include Education; Cooperative Training, Exercises and Evaluation; and Cooperation with partner countries with regard to the development of the Joint Intelligence, Surveillance and Reconnaissance (JISR) capabilities.

Start a NATO Working Group to analyze and assess foreign disclosure problems and propose recommendations to lift barriers to NATO countries and partners.

Extend the Joint Air Power Competence Centre with a Partnership Division with representatives initially from the Enhanced Partner countries. This will lead to a structured and more intensive exchange of information and elaboration of agreed-to Joint Air Power topics.

The advice should be forwarded to the Director JAPCC and the JAPCC Steering Committee Members.

Requirements: Impact – Cost – Priority

The preceding paragraphs provide an overview of urgent short to medium term requirements with the aim of developing enhanced operational Alliance and Partnership cooperation and capability and competency development in the area of Joint Air Power.

A table of prioritized requirements is included on the next page. This table depicts the relationship between the requirements (options and opportunities) and the criteria for determining the overall priority of the requirement i.e. impact and cost. In the context of this article, impact, cost and priority are defined as follows:

Impact: low, medium and high.

Low means a low effect on the possibility for enhancing NATO Joint Air Power capability and competency development in the field of Hybrid Conflict, Hybrid Warfare and resilience. Medium implies not a great effect, but still significant. High means a great effect on further developing NATO Joint Air Power capabilities and competencies.

Cost: low, medium and high.

Low: less than 1M €. Medium: 1–10M €. High: more than 10M €. Within the context of this paper low and medium costs are defined as affordable. The affordability of medium cost assumes a high impact relationship.

Priority: The priority of the recommendations ranges from 1 to 4.

- Prio 1 means: high impact – low cost and high impact – medium cost. Rationale: medium cost is affordable.
- Prio 2 means: medium impact – low cost and medium impact – medium cost. Rationale: Medium impact is still significant.
- Prio 3 means: medium impact – high cost and high impact – high cost.
- Prio 4 means: low impact – high cost.

Besides impact and cost, the requirements identified for NATO Joint Air Power's capabilities and competencies to cope with Hybrid Conflict, Hybrid Warfare and hybrid threats need to meet the following criteria. First, have strategic implication, which is related to a high and medium impact on the capabilities and competencies to deal with Hybrid Conflicts, Hybrid Warfare, hybrid threats and to enhance resilience.

Alliance and Partnership Cooperation; Bridging Mutual Joint Air Power Interests		Criteria								
		Impact			Cost			Priority		
	Requirements	L	M	H	L	M	H	1	2	3	4
	Alliance Cooperation										
1	Allied Air Command 24/7 C2 Element			X		X		X			
2	Strengthening Coll. involvement			X	X			X			
3	Air Advice & Assist Teams			X	X			X			
4	NATO Air Warfighting Centre			X			X			X	
	Partnership Cooperation										
5	Def & Sec Building Country Package			X	X			X			
6	Increased operational Partnership cooperation			X			X			X	
7	Partnership Air Group			X	X			X			
8	Increase of education courses			X	X			X			
9	Strengthening cooperation EU		X		X				X		
10	Working group foreign disclosure		X		X				X		
11	JAPCC Partnership Division			X	X			X			

Second, the solutions must be joint/combined in nature. Third, the solutions to the shortfalls must be actionable/achievable.

This leads to the following prioritization matrix of Alliance and Partnership Joint Air Power requirements.

The prioritization matrix reveals a number of interesting findings:

- First, almost all requirements, if acted upon, will significantly enhance the possibility for Alliance and Partnership cooperation and capability and competency development in the field of Joint Air Power. Nine out of eleven requirements have a high impact and nine high impact requirements can be achieved against affordable (low to medium) cost (priority 1). Two (nrs. 8 and 9) have a medium impact – low cost relation-ship leading to a priority 2 status. Because of the complex nature of the work the immediate effect of these requirements will not be readily apparent nor are they expected to be large, but they will still be signifi-cant. NATO should focus its immediate attention on the priority 1 and 2 requirements.
- Second, quite a significant number of requirements can be addressed without incurring high costs, or simply require the will to make things happen. Establishing a broader array of Joint Air Power courses is feasible without extensive cost, especially if sufficient cooperation can be developed and achieved between like-minded organizations.
- Third, requirement options nr. 2, 4, 5 and 6 include a number of measures which can be carried out gradually. This means costs could be lower. Options 4 and 6: high impact and high cost are categorized as priority 3. High impact implies a great effect on needed capabilities, knowledge and skills. These requirements are so important that, if the conditions allow, consideration should be given to a higher priority.
- Fourth, the cost indicator is an initial, rough categorization that will require refinement in the follow-up process.

Conclusions

Alliance and Partnership cooperation are key pillars of NATO's Strategy. Alliance cooperation is critical to develop effective and efficient options to enable collaboration at the operational level and for capability and competency development in the area of Joint Air Power between NATO member states. Operational cooperation with Enhanced and GCC-partner countries, in particular Finland and Sweden is important because they make a concrete and valued contribution to the success of NATO's fundamental tasks. NATO's intent is to enhance partnerships through flexible formats and NATO is giving operational partners a structural role in shaping strategy and decisions on NATO-led missions to which they contribute. NATO's intent is to enhance Partnership interoperability and preparedness for future crisis management operations leading to improved capabilities for operational cooperation. To that end, NATO currently employs a range of effective partnership tools, including Mobile Training Teams and an Operational Capability Concept – Evaluation and Feedback Programme, which are excellent initiatives and tools, but do not eliminate the need to strengthen operational cooperation, in particular with Enhanced and GCC-partners.

This aim is in line with the outcome of the 2016 Warsaw Summit where the NATO HOS/G declared that 'the success of NATO partnerships is demonstrated by their strategic contribution to Alliance and international security … (and that NATO) will further develop our partnerships so that they continue to meet the interests of both Allies and partners'. They also affirmed the need for a more 'tailor-made, individual and flexible approach to make NATO's partnership cooperation more strategic, coherent and effective'. The requirements listed in this article, in particular for operational Partnership cooperation, support that NATO can achieve this goal if it is willing to allow more political flexibility and provide the direction to achieve greater operational cooperation with the Enhanced and GCC-partners.

The urgent short to medium term requirements listed in this article, if acted upon, will significantly enhance the possibility for Alliance and Partnership cooperation and capability and competency development in the field of Joint Air Power. The majority of the requirements can be achieved at low to medium costs; this is where NATO should focus its immediate attention. By doing so, NATO will enhance Alliance and Partnership cooperation in the operational domain. This is the most important area, the one most tangible and visible, especially in a crisis and/or conflict situation when NATO is involved.

Key Recommendations

Taking into account the urgent short to medium term requirements for enhancing Alliance and military Partnership cooperation mentioned in this paper the following key recommendations apply:

Alliance Cooperation

First, strengthen the NATO Allied Air Command 24/7 C2 Element that supports Commander Allied Air Command in providing an accurate and timely situational awareness picture of political and military developments around the immediate periphery of Europe as well as an overview of current events in the airspace over NATO/Europe.

Second, increase NATO member states' involvement, in particular NATO/European member states, in NATO Joint Air Power.

Third, develop a multinational NATO Air Warfighting Centre on the basis of the Framework Nation Concept. This will allow a NATO Air Warfighting Centre to gradually develop into a practical hub for NATO Joint Air Power Education, Training, Exercising and Evaluation activities.

Fourth, remedy the specified requirements with a priority 1 and 2 as a matter of urgency.

Military Partnership Cooperation

First, develop a deeper security partnership by providing tailor made individual country Joint Air Power packages for the Enhanced and GCC-partners.

Second, increase operational Partnership cooperation. Priorities must be assigned to specific areas where operational cooperation between NATO and its Enhanced and GCC-partners can be initiated quickly and then gradually developed. Special attention should be focused on Finland and Sweden.

Third, Develop Partnership Air Groups based on NATO's Framework Nation Concept with a NATO lead nation that creates an information based and practice-oriented Air Group organization that plans and organizes commonly agreed Joint Air Power activities on a yearly basis.

Fourth, remedy the specified requirements with a priority 1 and 2 as a matter of urgency.

Endnotes

1. One must think of initiatives like the deployment of Mobile Training Teams and the Operational Capability Concept – Evaluation and Feedback Programme.
2. The official name is: Cooperation Council for the Arab States and the Gulf, in short: Gulf Cooperation Council (GCC).
3. Enhanced partners of NATO are: Australia, Finland, Georgia, Jordan and Sweden The GCC countries include Bahrein, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.
4. NATO Air Power. The Last Word. Gen. (ret.) Franc Gorenc (USAF). JAPCC Journal 23, Autumn / Winter 2016, p. 6–14.

Industrial and Technology Cooperation

VIII

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Co-author: Lieutenant General (ret.) P. Preziosa, ITA AF

Preface

Though production and acquisition of armament is a national responsibility, NATO has a long and successful history with respect to cooperation and exchanging information and technological research in the field of armaments. The key forum is the Conference of National Armament Directors (CNAD), its sub-committees of which are responsible for promoting cooperation between countries in the armaments field.

In a changing security environment and in times of financial austerity, the CNAD continues to facilitate dialogue between nations and to promote multinational cooperation in developing, acquiring and operating weapon systems, e.g. in the framework of Smart Defence which aims at filling capability gaps. The NATO Industrial Advisory Group (NIAG) supports the CNAD by offering the opinion of industry on how to enhance the NATO-Industry relationship. In turn, industry profits by getting first-hand information about NATO capability priorities and relevant policies. Other groups under the CNAD are active in fields such as ammunition safety, system life cycle management and codification.

In NATO, Air (and Maritime) capabilities were always central to maintaining the advantage for the Alliance during the Cold War in view of a numerically superior adversary. The CNAD conceived NATO's most successful international programme – the NATO Airborne Early Warning and Control (NAEW&C) programme – and several other multinational programme management and procurement agencies were set up following this example to manage Air Force Programmes such as the TORNADO, the EUROFIGHTER TYPHOON, NATO Alliance Ground Surveillance (AGS) programmes and the ACCS programmes NADGE and ACCS.

Industrial cooperation among Allies is also a common feature in the area of logistics for the supply of spare parts, missiles and ammunition and mass supply items etc. For decades, NATO's Maintenance and Supply Agency (NAMSA) and its follow-on organization, the NATO Supply and Procurement Agency (NSPA), have procured spare parts for aircraft, missile and radar systems, e.g. the F-104 G Starfighter, NIKE, HAWK, GCA-radars etc, mass supply like ammunition and fuel, e.g. for NATO's NAEW&C Fleet, and other items that can be purchased more cost effectively when Allies combine their orders. This includes the support of forces in NATO-led peace support operations in particular.

Aim

Analyzing the evolution of technological and industrial cooperation and the tools NATO has developed to promote these among Allies, this paper aims at identifying potential solutions and options to make cooperation more attractive thereby facilitating the development of urgently needed capabilities. While most of the proposals are of a more general nature applicable to any technical and industrial cooperation among Allies and Partners the paper also tries to identify example areas in which technology research should be concentrated to enhance Air Power related capabilities addressing the challenges of a contested environment. This work should be given appropriate priority.

From Chicago to Warsaw:
Taking Industrial Cooperation into Focus

At the **Chicago Summit** Alliance Heads of State and Government (HOS/G) pledged to improve a wide range of capabilities (the **NATO forces 2020 Goal**) through the NATO Force Planning Process. A fundamental role in acquiring key capabilities is the multinational **Smart Defence** initiative, e.g. for Ballistic Missile Defence (BMD) and the Joint Intelligence, Surveillance and Reconnaissance (JISR) project AGS. The Smart Defence and the EU's **Pooling and Sharing** Initiatives need to be coordinated to ensure they are complementary and mutually reinforcing.

Under the **Connected Forces Initiative (CFI)** Allies intended to regain the full range of capabilities needed to address the full range of Alliance missions, including Collective Defence which appeared to lose momentum after more than a decade of stabilization operations in Afghanistan.

During the **Wales Summit** the Alliance addressed the radical changes in the security environment and the urgent need to take action to improve responsiveness and availability of forces for Collective Defence. These activities were listed in the **Rapid Action Plan (RAP)**. A key initiative which focuses on multinational approaches to or reinforce the capabilities needed in the changed security environment is the **Framework Nation Concept (FNC)** which combines elements of Smart Defence (multinational acquisition of capabilities) with operational concepts and structures. As agreed by Defence Ministers Allied and partner countries work together to maintain and expand current capabilities and to lay the foundation for the development of new capabilities in the medium to long term. The initiative can also be seen as a mechanism for collective training and exercising forces grouped under this concept, e.g. the Multinational Air Forces, as proposed by Germany.

At the **Warsaw Summit** NATO reaffirmed the importance of international industrial cooperation highlighting the following key messages:

- Strong partnerships play a key role in effectively addressing cyber challenges. NATO will continue to deepen cooperation with the EU, including through the implementation of the Technical Arrangement between NATO's Computer Incident Response Capability (NCIRC) and the EU's Computer Emergency Response Team (CERT-EU) which contributes to better prevention and response to cyber-attacks.
- NATO intends to enhance partnerships with other international organizations and partner nations, as well as with industry and academia through the NATO Industry Cyber Partnership (NICP).
- A stronger defence industry across the Alliance is envisaged which includes small and medium sized enterprises. Greater defence industrial and technological cooperation across the Atlantic and within Europe and a robust industrial base in the whole of Europe and North America are essential for the acquisition of the required capabilities.
- To keep its technological edge, it is of particular importance for the Alliance to support innovation with the aim of identifying advanced and emerging technologies, evaluating their applicability in the military domain, and implementing them through innovative solutions.
- NATO welcomes initiatives from both sides of the Atlantic to maintain and advance the military and technological advantage of Allied capabilities through innovation. NATO encourages nations to ensure such initiatives will lead to increased cooperation within the Alliance and among Allies.
- Moreover, the Warsaw Summit Communiqué[1] lists a series of examples and projects where multinational approaches under the Framework Nation/Smart Defence Concept have already increased the efficiency of available forces and resources.

Approaches and Initiatives

The 21 capability shortfalls that NATO needs to solve in order to success-fully conduct its full range of missions are periodically reviewed at the political level. They cover a broad capability range from Countering IED, Improving Air-and Sea-Lift Capabilities, Missile Defence (MD), and Cyber Defence to Stabilization and Reconstruction. Some of the capabilities are pursued in multinational industrial and technological cooperation. Approaches chosen are: **Smart Defence, Framework Nations Concept and Collective Logistic Contracts**.

Military requirements are evolving continuously, demanding capabilities that become increasingly complex and expensive. Multinational co-operation offers a solution to deliver critical capabilities in a cost-effective manner. Some high-end capabilities can be achieved only if countries and national armament industries cooperate. EU and NATO are closely coordinating their work to ensure that Smart Defence and the EU's pooling and sharing initiative stay complementary and mutually reinforcing. Smart Defence can also contribute to maintaining a capable defence industry in Europe by stimulating the widest possible industrial cooperation.

While Smart Defence has proven very beneficial, its scope is limited to defined projects[2], e.g. the Demark-led consortium for precision-guided ammunition . However, national industry often appears reluctant to accept these examples of successful projects as best practices. Outside stakeholders are seen as competitors, rather than as potential partners toward conceiving the best ways to apply the principle of cooperation when trying to fill capability gaps.

The **Framework Nation Concept** adopted following the Wales Summit appears to be more attractive. There are already three key Framework

Nation groups, led by Germany, Italy and United Kingdom. The Framework Nation Concept is broader and more operationally focused than ungoverned cooperation alone, and has the capability of significantly reducing redundancy and maximizing the efficiency of European forces. The system is based on nations voluntarily participating in initiatives led by a framework nation offering to bear the brunt of the effort[4]. The framework nation is also responsible to offer incentives to potential partner nations and industry to join. It offers an opportunity for the nations with greater financial means to directly invest in operational capabilities of participating countries, thus contributing to NATO's overall Collective Defence Capabilities. The concept also contributes to interoperability through standardization. Moreover, by encouraging partners to contribute their share of funding, NATO resources are freed to be dedicated to other priorities. All multinational approaches were developed to significantly reduce duplication and maximize the efficiency of European Forces. It is important to make further progress and produce more tangible results.

Experience gained in allied operations in Kosovo and Afghanistan led to the conclusion that it is more efficient to make best use of existing multinational logistic capabilities through **Collective Logistical Contracts**. Therefore, NATO is examining procedures for the development and management of rapidly usable contracts, in conjunction with attractive compensation methods. Collective Logistics are also applied during redeployment from theatres of operation to optimize the use of multinational capabilities.

Three other initiatives from the Wales Summit should also be mentioned as they have an impact on technological and industrial cooperation:

The Defence Investment Pledge (DIP)

Basically, the DIP emphasizes output and asks Allies to increase their Defence Budgets to reach 2 % of GNP as the goal by 2024. A second element of the pledge asks Allies to raise the percentage of investment to 20 % of the defence budget. Investment priorities should be given to NATO's capability shortfalls. A large number of NATO countries invest well below the 2 % goal. Defence Ministers will continue to review progress of the DIP.

The Partnership Interoperability Platform

The Partnership Interoperability Initiative (PII) should ensure that the connections built between NATO and partner forces over many years of operations will be maintained and strengthened. In this way, partners can contribute to future crisis management, including in NATO-led operations and, where applicable, to the NATO Response Force (NRF). An important element of the initiative follows a format where Allies and partners discuss projects and issues that affect interoperability for future crisis management, such as Command and Control (C2) systems, education, training and exercises, or logistics. The Partnership Interoperability Platform and the Framework Nation Concept are complementary.

Defence Capacity Building

Aim of the Alliance's Defence Capacity Building Initiative is to enable partners assisting NATO to build up their defence and security, e.g. Iraq.

Technological and Industrial Cooperation

Solutions to appropriately respond to the challenges posed by the new security environment can be found both in the areas of **technology** and logistics.

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Technology Area

NATO Activities

Science and technology lay the foundation for the development of capabilities to counter the new threats to NATO, including Hybrid warfare. Required is a complex system of multi-layered and diverse capabilities in a networked system within all domains, able to deliver a multi-dimensional response[5]. For quite some time, NATO nations have been pursuing ways to enhance cooperation and to develop synergies in fields such as battle space awareness, C2, force application and protection and working in a secure cyber environment. Another recent example is the effort of NATO's operational community to acquire response capabilities that minimize or exclude collateral damage.

If forces can respond only in a lethal kinetic manner, civilian as well as military personnel would be endangered and mission failure and/or severe political consequences may result. Based on previous work led by Canada to identify Non-Lethal Capabilities (NLC), Germany is leading an initiative with a view to make forces familiar with a range of NLC, and to promote emerging non-lethal technologies in exercises. Belgium and France are co-leading a project on standards for non-lethal weapons. Good progress was made in three other capability areas but implementation may need to be accelerated[6].

Defence capabilities against hybrid air threats are part of the **Defence Against Terrorism Programme of Work (DAT POW)**. They are grouped into the following areas:

- airport Protection against hybrid aerial attacks;
- protection of Aircraft against MANPADs – already under way with the United Kingdom as lead nation within the NATO Air Force Armaments Group (NAFAG); and

- technologies and concepts for Intelligence, Surveillance, Reconnaissance (ISR) and target acquisition.

What to Ensure, What to Avoid – Incentives, Mechanisms, Levers, and Principles

To stimulate successful multinational, industrial cooperation and to ensure the availability of technological capabilities it is important to identify suitable mechanisms and levers:

- Shortfalls must be clearly explained to selected 'trusted' partners to prevent any misunderstanding of the requirements. The onus is on NATO to ensure there is no ambiguity with respect to the operational concept (or concept of operations) as this forms the basis for Industry's toward developing solutions.
- Some of the most relevant strategic technologies tend to be constrained by national laws. The principle of 'need to share' should be applied and common practice between project partners.
- Ensuring proper coordination between Alliance MoDs, their agencies and the EU Defence Agency (EDA) during the development and the application of special financial instruments.
- Emphasize simplicity and speed of implementation, especially in hybrid warfare related R&D. By reducing bureaucracy the procurement system will be better postured to take advantage of innovative ideas and to bring these the opportunities to maturity.
- Ensure that regulations do not unnecessarily hinder the process. This should allow innovative solutions to mature rather than become lost in the requirements analysis process.
- Procurement processes should be made more transparent, simpler and faster and be attractive to new suppliers, particularly from smaller companies which may have the potential to innovate but are challenged by an overly complex procurement mechanism. New suppliers

from different backgrounds and schools of thought may offer new perspectives and solutions to problems, thus enabling innovative responses to both short- and long-term requirements.

- Analyze standards and identify constraints that could be eliminated. Defence Standards should not unnecessarily constrain the potential range of innovation. Standards can have the potential to be a driver of innovation by defining the space in which innovation should be sought and by offering prospects for the commercialization of ideas. At the same time, standards risk being restrictive, outdated or sometimes conflict with existing standards of nations. Each of these risks could become a major stumbling block, limiting potential market prospects and, thereby, reducing the likelihood of securing investment returns. Standards can also become significant barriers when only large companies have the resources to meet them. Thus, their market dominance is even increased. NATO should analyze the effect the strict enforcement of Defence Standards has on the innovation process and identify those standards that need to be updated to allow for greater innovation.

- Effective standardization and training supports interoperability among Allies and partners. Open standards may strengthen the relationship with the defence and security industry. Interoperability is also a force multiplier that may streamline national efforts.

- Innovation should be measured against the level of maturity achieved. The innovation framework should allow partners to understand the requirement for a new solution.

- Innovative solutions should be available for operations in a reasonable timeframe[7]: Quick wins should be appropriately prioritized.

- Without a clear idea of defence priorities it is very difficult for external actors (particularly non-traditional defence industry partners) to know where and how to interact with NATO.

- Clear priorities are more likely to attract external providers to invest in areas of NATO interest thus increasing the likelihood of profitable returns on their investment.

- Industry should accelerate the R&D of new technologies capable to address hybrid threats. Technologies should focus on the following aspects: Prevention, Deterrence, Denial, Detection, Assessment, Warning, Engagement and Consequence Management.
- Convince industry that they gain from international cooperation and do not loose. Technology should be driving cooperation rather than competition. NATO should be able to present convincing arguments.
- Proper competition can drive innovation. NATO could benefit from competition by increasing the likelihood of cost savings as well as innovation. Lower barriers to enter the market could also help small and medium sized companies to join the competition. However, competition is only one tool among others to promote innovation. At the early stages of development, competition can stimulate the generation of a whole range of excellent ideas, whereas competition at later stages might reduce the incentive for industry to invest more of its own resources. Competition is, therefore, an activity to be managed carefully, balancing the interests of NATO and industry.
- Explore a set of incentives as part of an industrial policy that underlines the importance of research in defence and convinces industry to invest in research programmes and complex technical development.

Logistics

Logistical cooperation is a bridge between forces in operations and industrial production. It is based on requirements, building up stocks and capabilities, and sustaining weapon systems and forces in theater. Each country is responsible to ensure that own forces have the required logistical support through individual or cooperative arrangements.

In January 1996, logisticians recognized new challenges facing the Alliance. In particular, dwindling military resources underlined the need for increased cooperation and multinational logistics support. The new

challenges required the Alliance to logistically sustain non-Article 5 crisis response operations, even at great distances from the supporting national logistical and industrial base, sometimes on non-NATO territory without host nation support. Operations of significant duration also raised sustainability issues, including the logistic force elements required to keep the combat forces supported.

Supply, maintenance, movement and transportation, fuel and petroleum products, infrastructure and medical support are elements provided and functions performed by NATO in NATO-led operations. Thus, contracting has become increasingly important for operations, especially for those conducted out-of-area. NATO coordinates national efforts and encourages multinational activities to fulfill operational needs. At the beginning of any cooperative arrangement a common set of standards is agreed to because standardization allows for more efficient use of resources, enabling NATO and partner countries to work together and prevent duplication.

NATO has been encouraging multinationality and interoperability in logistic support at all levels. NATO performs logistical functions in the form of

- **Cooperative logistics** and
- **Multinational logistics**.

Multinational Logistics includes standing up Multinational Integrated Logistic Units and focuses on improving efficiency and effectiveness by offering multinational responses to operational needs. Relevant concepts include the appointment of a lead-nation, role specialization and multinational integrated logistic support. Cooperation is the principle for the development of policy and doctrine covering the functional areas. National and NATO logistic plans must ensure sufficient resources, both in quantity and in quality, are available at appropriate readiness and

deployability levels to support the forces until resupply is in place. Moreover, to sustain combat power for the duration of the operation, it is necessary to sustain sufficient stocks or have assured access to industrial capabilities including agreements for contractor support. In this context, expertise from the private sector is vital to enable NATO and nations to assess how best to build up an effective capability. The Smart Defence and Framework Nation Concept projects demonstrate where NATO, NATO countries and industry are working together.

Overcoming Shortfalls – Considerations and Proposals

Technology Area

In order to close the gaps in the technology area NATO should establish a prioritized list of capabilities that must be available for new operational concepts. The CNAD should continue to promote cooperation in fields such as space awareness, C2, force application, protection and cyber security, using Smart Defence or better Framework Nation Concept structures to reduce duplications and maximize efficiency.

Because NATO Joint Air Power should also be able to successfully operate in a contested environment (hybrid warfare, A2AD[8], etc.) cooperative Research and Technology of Allies should focus on following concrete capability areas:

- detecting, tracking and engaging 'low-slow-small-stealthy' ('LSSS') objects and 'swarms' of micro/small/medium sized Unmanned Aerial Systems (UAS);
- passive sensors supporting lowest-level flying (to prevent early detection of aircraft);
- electronic Counter Measures-(ECM-)resistant information distribution systems;

- new airborne ECM-/cyber platforms, capable to cover the full range of electronic and cyber threats to airborne systems from stand-off distances;
- all-weather ECM-resistant precision air-to-ground weapons;
- surface-to-air weapons systems capable to defend against steep vertical dive (30°+) cruise missiles;
- non-kinetic weapons and directed energy weapons denying effective use of UAS;
- new technologies integrating detection, identification, and reaction to hybrid threats into current Integrated Air and Missile Defence (IAMD) C2 systems;
- cyber awareness capability for C2-nodes (JFAC, Air Operations Centre (AOC));
- new intelligence tools to process mass data gathered by JISR-assets, including non-traditional ISR platforms;
- active, passive, lethal and non-lethal capabilities.

Moreover, in cooperation with the EU, NATO should offer incentives for industry. NATO should also consider the use of open standards as a feature of further cooperation whenever feasible. NATO should openly encourage industries to accelerate defence technology R&D and encourage countries to reduce bureaucracy in order to be able to implement new capabilities faster.

To increase interoperability it is important to review Standardization Agreements (STANAGs) to reduce constraints that could negatively impact on competition and cooperation. Furthermore, NATO should propose a policy to make the defence business attractive.

In order to support the sharing of strategic technologies for better cooperation NATO should develop a suitable legal framework.

Proposals:
- The Framework Nation Concept should be the favored approach for multinational cooperation.
- NATO should clearly communicate gaps and priorities to the stakeholders.
- In coordination with the EU, CNAD should develop financial instruments and industrial incentives.
- Concentrate cooperative research and technology for Joint Air Power Capabilities (JAPC) in areas vital to successfully operate in a hybrid/contested environment.
- NATO should promote the sharing of strategic technologies to broaden the basis for intensified cooperation. If required, an appropriate legal framework should be developed.
- NATO should revise STANAGs, where necessary, to stimulate industrial cooperation. Open standards should be used whenever feasible.

Logistics Cooperation

Cooperative logistics arrangements in multinational operations allow for more efficient use of resources. The reduction in resources available for defence stresses the need for intensified multinational and industrial cooperation.

In addition to the already existing smart defence agreement of multinational logistical partnership for the provision of fuel, there are other logistical functions e.g. in the areas of general supply, aircraft maintenance, airport infrastructure etc. … that call for multinational cooperation.

Proposals:
- Prepare a list of options for a multinational solution to provide the logistics required to sustain non-Article 5 crisis response operations.

- CNAD should continue promoting logistical cooperation between countries and industry in the framework of Smart Defence or the Framework Nation Concept.
- NATO should develop a policy offering industry better access to logistics support tasks.

Technology and Industrial Cooperation		Criteria									
		Impact			Cost			Priority			
	Option/Opportunity	L	M	H	L	M	H	1	2	3	4
1	Make the Framework Nation Concept the number one approach for multinational cooperation			X	X			X			
2	Establish a list of defense priorities for technical and industrial cooperation			X	X			X			
3	Intensify cooperation with the EU and develop suitable financial instruments and incentives			X	X			X			
4	Orientate and accelerate industrial R&D, including through challenging STANAGs			X	X			X			
5	Review standards with a view to reduce constraints impacting on industrial cooperation			X	X			X			
6	Use open standards whenever feasible			X	X			X			
7	Develop a policy of incentives, attractive for industry			X	X			X			
8	Reduce bureaucracy for faster procurement			X	X			X			
9	Promote the sharing of strategic technologies among partners; develop a legal framework if required			X	X			X			
10	Concentrate cooperative research and technology for Joint Air Power capabilities in areas vital to successfully operate in a hybrid/contested environment		X				X	X			
11	Develop multinational logistic responses to operational needs			X	X			X			
12	Determine the required level of logistic stocks			X	X			X			
13	Develop a policy giving industry better access to logistical support tasks			X	X			X			

Analysis of Impact vs Costs/Priorities – Key Reccommendation Areas

Costs/Impact/Prioritization Matrix

Impact: low, medium and high. Low means a low effect on the improvement of the capabilities and increasing knowledge and skills. Medium implies a significant effect. High means a great effect on the capabilities and increasing knowledge and skills.

Costs: Low :< 1M $. Medium: < 10M $. High: > 10M $. In the context of this paper low and medium costs are defined as affordable. With regard to the affordability of medium costs, the industrial and technology cooperation proposals must meet the following criteria: Firstly, they must have strategic implication, derived from their high or medium impact on the improvement of capabilities, Knowledge, and skills. Secondly, the proposals should be joint/combined in nature. Thirdly, the proposals should be actionable.

Key Recommendation Areas

From the preceding matrix the following strategic recommendations can be derived:

- continue to promote the Framework Nations Concept;
- establish a priority list for technology and industrial cooperation;
- concentrate cooperative research and technology for JAPC in areas vital to successfully operate in a hybrid/contested environment;
- intensify the cooperation with EU and develop suitable financial instruments and incentives; and
- orientate and accelerate technology R&D i. e. through challenging standards and use open standards whenever feasible.

Conclusions

Constructive industrial and technology cooperation is a key factor and important for innovation, acquisition and development of required capabilities. Smart Defence and Framework Nations Concept (FNC) are both good tools to enhance cooperation, but the FNC offers more potential to reduce duplication and maximize efficiency.

NATO should offer a clear picture of its defence priorities and should, in close coordination with the EU, lay out a policy of incentives offering prospects for a worthwhile return on investment to attract industry's interest. Reviewing standards could remove constraints and barriers to more competition. New capabilities should be made available and integrated as fast as possible. NATO should concentrate cooperative research and technology for JAPC in areas vital to successfully operate in a hybrid/contested environment.

NATO is advocating interoperability as a force multiplier. Interoperable solutions can be promoted by effective standardization (including more use of open standards) and by strengthening the relationship with the defence and security industry.

Logistical cooperation is the bridge between deployed forces and the industrial base. Cooperative arrangements for the sustainment of forces in multinational operations allow for more efficient use of resources.

The CNAD will continue to promote cooperation among countries in the armament fields, by identifying the mechanisms and levers to facilitate successful industrial cooperation at international levels and, in doing so, ensure the development of new capabilities.

Endnotes

1. See Warsaw Summit Communiqué, issued by HOS/G, paras 77/78.
2. Examples of EU Pooling and sharing initiatives are the European Air Transport Command (EATC), the European Personnel Recovery Centre (EPRC). Similar operational Smart Defence activities on the NATO side are the Strategic Airlift Interim Solution (SALIS) and the Heavy Airlift Wing (HAW) in Hungary.
3. Warsaw Summit Communiqué, para 78.
4. Good examples are the Multinational Air Forces Initiative, led by Germany or the Deployable Air Activation Modules (DAAM).
5. NATO describes this response as Comprehensive All-domain Operations (CADO).
6. Cyber security, maritime strategy and capability, and counter-hybrid warfare.
7. A typically bad example is the ACCS-Programme.
8. Anti-Access, Area Denial.

Annex A

Composition of the External Expert Team (EET)

The EET consists of renowned experts in the field of security and defence policy and in particular Joint Air Power. The EET is responsible for providing urgent strategic JAP priorities in each of the Warsaw strategic focus areas in order to meet the overall aim as stated in this document.

The composition of the EET is:

Project leader: Lieutenant General J. Wundrak (DEU AF),
                    Executive Director JAPCC

Team leader: Lieutenant General (ret.) F. H. Meulman (NLD AF)

Members in alphabetical order:

Dr. H. Binnendijk (USA – CIV)

General (ret.) F. Gorenc (USA AF)

Lieutenant General (ret.) F. Ploeger (DEU AF)

Lieutenant General (ret.) P. Preziosa (ITA AF)

Project Leader: Lieutenant General J. Wundrak

Lieutenant General Wundrak took over Command of the former German Air Force Air Operations Command Kalkar in April 2012, before it was renamed and restructured into the German Air Operations Command in July 2013. Lieutenant General Wundrak holds a dual-hatted position at Kalkar as he also is the Executive Director of the NATO Joint Air Power Competence Centre.

Lieutenant General Wundrak, born in Buir (Kerpen), North Rhine-West-phalia, joined the Air Force in 1974 and was trained in Ground Defence before joining the ranks as a career pilot. Following numerous postings in the flying community, to include Commander, Air Transport Wing 62 in Wunstorf, he was appointed to Branch Chief, and later, Deputy Chief of Staff at the Federal Ministry of Defence until 2006.

From 2006 to 2008 Lieutenant General Wundrak was assigned as Deputy Director, European Air Group at High Wycombe, UK followed by two tours in operations as Chief of Staff, German EUFOR Contingent and Deputy Chief of Staff, Air ISAF. He was the Deputy Commander German Air Force Command from July 2009 until he assumed command at Kalkar/Uedem.

Lieutenant General Wundrak logged more than 3,000 flight hours in multiple aircraft such as the B-33, B-90, Do 28, Transall C-160 and UH-1D Helicopter. He holds a degree in Electrical Engineering from the Armed Forces University, Munich. He was awarded the German Armed Forces Silver Cross of Honour, the EUFOR Service Medal and the ISAF Service Medal. Lieutenant General Wundrak is married and has two adult children.

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Team Leader: Lieutenant General (ret.) Frederik H. Meulman

Lieutenant General (ret.) F. H. (Frederik) Meulman graduated from the Royal Military Academy in 1979, after which he held a number of positions with the fifth Guided Missile Group in Germany. He attended the Advanced Staff Course (1988–1990), after which he studied Strategy and Air Power at the Air University / College for Aerospace Doctrine, Research and Education at Maxwell Air Force Base in the United States. Subsequently, he was posted to the Netherlands Defense College as a faculty member. Thereafter, he worked alternately in conceptual, operational and policy positions both at the Ministry of Defense (MOD) and the Air Staff. From 1998 to 2000, Colonel Meulman was Commander of the Netherlands Guided Missile Group. In 2000, he returned to the MOD/Defense Staff as Head of the Military-Strategic Affairs Division. In 2001, promoted to Air Commodore, he assumed the position of Deputy Director of the Military Intelligence and Security Service. In 2003, Major General Meulman became Deputy Commander of the Combined Air Operations Centre in Kalkar (CAOC2). From June 2004 to the end of 2006, he was the Deputy Commander of the Royal Netherlands Air Force. From January 2007 until February 2008, Meulman fulfilled the position of Deputy Commander Air at the ISAF Headquarters in Kabul, Afghanistan. March 2008, Major General Meulman was appointed Deputy Chief of Defense and promoted to Lieutenant General. From April 2010 till May 2013, he was the Netherlands Permanent Military Representative to NATO and the EU in Brussels. He retired per 1st of June 2013. General Meulman published a wide variety of articles on strategy, strategy development and in particular joint air power and was the project leader of the JAPPC study on 'Air and Space Power in NATO – Future Vector'.

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Dr. Hans Binnendijk

Hans Binnendijk is a Senior Fellow at the Center for Transatlantic Relations at Johns Hopkins University's School of Advanced International Studies (SAIS), and adjunct political scientist at the RAND Corporation. Until 4 July 2012 he was the Vice President for Research and Applied Learning at the National Defense University and Theodore Roosevelt Chair in National Security Policy.

He previously served twice on the National Security Council, including as Special Assistant to the President for Defense Policy. He has also served in senior positions at the State Department and with the Senate Foreign Relations Committee. He has received numerous awards for his government service, including three Distinguished Public Service Awards and a Superior Service Award, in addition to receiving the Cross of the Order of Merit from the Federal Republic of Germany. In the think tank world he was Director of Studies at London's IISS and Director of George-town University's Institute for the Study of Diplomacy. Binnendijk is author or co-author of more than 200 articles, editorials, and reports. He is a graduate of the University of Pennsylvania. He received his M.A.L.D. and his Ph.D. in international relations from the Fletcher School of Law and Diplomacy, Tufts University.

General (ret.) Frank Gorenc

General (ret.) Frank Gorenc retired from the United States Air Force after 37 years of active duty service. His career culminated as the Commander US Air Forces Europe, Commander US Air Forces Africa, Commander NATO Allied Air Command at Ramstein Air Base, Germany, and Director, Joint Air Power Competence Centre, Kalkar, Germany.

General Gorenc was born in Ljubljana, Slovenia. He was commissioned after graduating from the US AF Academy in 1979. During his career, he commanded units at every level and served in numerous staff positions on the Air Staff, Air Combat Command, the Joint Staff, and US European Command/Supreme Headquarters Allied Powers Europe. He is a command pilot with more than 4,800 flight hours in the F-15C, T-38A, MQ-1B, UH-1N, and C-21.

During his career, he participated in Operations DESERT STORM, PROVIDE COMFORT, SOUTHERN WATCH, NORTHERN WATCH, IRAQI FREEDOM, ENDURING FREEDOM, ODYSSEY DAWN, UNIFIED PROTECTOR and INHERANT RESOLVE. In addition, he commanded three standing NATO operations: Air Policing, BMD, and Augmentation to Turkey missions.

His education includes Bachelor of Science degree in Civil Engineering, a Master of Aeronautical Science and a Master of Science degree in National Security Strategy from the National Defense University. He is a graduate of the Air Force Fighter Weapons Instructor Course and the NATO Tactical Leadership Programme.

Lieutenant General (ret.) Friedrich W. Ploeger

Lieutenant General (ret.) Friedrich Wilhelm Ploeger was born on 25 March 1949 in Emmerich/Germany. He joined the German Air Force in October 1967 and started his career as an Air Weapons Controller/ Fighter Controller in the German Air Force. He retired from active service on 30 June 2013 as Deputy Commander and Acting Commander of NATO AIRCOM, Ramstein, Germany.

His military career includes key staff and high ranking NATO and national positions – among them four joint positions – in the fields of operations, force planning and military policy, i. a. as Director Military Policy and Arms Control and Disarmament in MoD Berlin. He also held command positions at all levels, from squadron to corps/force level.

Lieutenant General Ploeger has been lecturing and holding speeches at a number of conferences on the subjects of Space, Cyberspace, Ballistic Missile Defence, and Air Policing in European NATO countries and in the USA. Since retirement, he is still active as a Senior Mentor and Consultant for the 'Führungsakademie der Bundeswehr', for NATO as well as for the German Air Force. He is Speaker of the 'Senior Advisory Board of the Führungsakademie der Bundeswehr' and the 'Community of former CIS-Officers' of the German Air Force.

He also contributed to books and journals on the subjects of security policy, conceptual and operational issues.

Lieutenant General (ret.) Pasquale Preziosa

Lieutenant General (ret.) Pasquale Preziosa joined the Air Force Academy in Italy in 1971 where he was qualified as fighter combat pilot (1976). He attended: Basic Air staff college (1978), the Flight Safety Course (1980), Tornado Instructor course (1982), Advanced Air staff College (1989), Defense Resources Management Course (1993) the Joint Staff College for Generals IASD (1999).

Among his assignments:
- Squadron Commander of 156° Tornado Sq.;
- Commander of 36th fighter Wing, Gioia del Colle AFB during the Bosnian war;
- Senior National Representative at Tampa for the war in Afghanistan (Enduring Freedom);
- Defense Attaché and Defense Cooperation Attaché, Washington DC (USA);
- Chief of Military Financial resources (Joint Staff);
- Chief of Operational department and Pol. Mil. (Joint Staff);
- Commander of Air Education and Training Command;
- Chief of Cabinet of the Minister of Defense;
- Chief of Italian Air Force, Roma.

He has flown on several different aircraft and helicopters (P148, MB326, G91T, F104, G222, TORNADO, EF 2000, NH500, P180, FALCON 900) and participated to the war in Bosnia. He has been a panelist to the German Marshall Fund (Casablanca), Munich Security Conference, Konrad-Adenauer-Stiftung (Berlin). Gen. Preziosa holds Postgraduate degrees in Aeronautical Science and International and Diplomatic Sciences. He retired on March 2016, he is married to Elisabetta and they have two daughters. He is a professor of Geopolitics and Security of spaces at Cusano University in Rome. He is the president of PRP Channel.com (digital newspaper).

Annex B

Joint Air Power Trends

Strategic

- Allied relations with Russia are in a downward spiral.
- Challenges from the south are becoming more dangerous and are difficult to deter.
- NATO deterrence will further erode without strong US support and increased Allied defence spending.
- Europe appears ever more divided and incapable of deterring Russia in the east without strong US Support.
- Potential adversaries will pursue asymmetric means to negate the strength of NATO.
- Expect expanding Anti-Access/Area Denial (A2/AD) environments in and around Europe.
- NATO will remain a nuclear Alliance.

Operational

- Joint Air Power Core Roles are indispensable to achieving Alliance aspirations.
- Precision-guided weapons will be used.
- The need for situational awareness and collective vigilance will expand requiring NATO capability and capacity for:
  – Processing, Exploitation, and Dissemination (PED)
  – Targeting
  – Emerging technologies will create opportunities for NATO. They will also become a threat to NATO. NATO should explore and accommodate the capacity for:
    – 5th Generation aircraft;

– Electronic Attack;

– Remotely Piloted Aircraft (RPA);

– BMD;

– Cyber Defence;

– Machine-to-machine movement of data;

– Multi-domain operations and C2.

Annex C

Priority Matrices

The Role of NATO Joint Air Power in Deterrence and Collective Defense		Criteria									
		Impact			Cost			Priority			
	Task	L	M	H	L	M	H	1	2	3	
Task 1	Enhance Deterrence Toward the East							X			
	Improve Upon Deployability (40 %) and Sustainability (8 %) Goals			X	X			X			
	More Pilot Training	X				X			X		
	Ready Key Air Bases		X				X		X		
	Enhance Baltic Air Policing			X	X			X			
	Upgrade Existing Fighter Aircraft		X		X					X	
	Increase European Munitions Stocks		X		X				X		
	Maximize Cooperation Through Framework Nations			X	X			X			
	Pre-Authorized Overflight Rights			X	X			X			
	Modernize B-61 (Us)		X				X		X		
	Modernize Dual Capable Aircraft (Europe)		X			X		X			
	Safety and Security of Nuclear Weapons			X	X			X			
	Continue with Ballistic Missile Deployment			X		X		X			
	Develop Better Defenses Against Cruise Missile Attack		X				X	X			
	Develop Better Attribution of Cyber Attacks			X	X			X			
	Develop National Cyber Deterrent Capabilities		X		X				X		
Task 2	Improve Collective Defense in A2AD Environment							X			
	Purchase More Fifth Generation Aircraft		X			X			X		
	Purchase Advanced Stand-Off SEAD Munitions		X			X		X			
	Purchase More Anti-Armor Munitions		X		X					X	
	Improve Digital Links of Fifth Generation Fighters		X		X			X			
	Cooperate on Third Offset Capabilities			X	X			X			
	Conduct ISR in Contested Environment			X		X		X			

The Role of NATO Joint Air Power in Deterrence and Collective Defense		Criteria								
		Impact			Cost			Priority		
	Task	L	M	H	L	M	H	1	2	3
	More Ground Based Forward Deployed Air Defenses		X			X			X	
	Improved ECM Gear for Strike Aircraft			X		X			X	
	Exercise in A2AD Environment			X	X			X		
	Conduct More Scenario Based Discussions in NAC on A2AD Options			X	X			X		
Task 3	Create a More Independent European Air Power Capability X									X
	Set NATO/Europe Air Power goal:one SJO Air Heavy Alone			X			X	X		
	More European ISR		X				X			X
	More European Refuelling		X				X			X
	More European UAVs		X			X			X	
	More European Strategic Lift		X				X			X
	More European SOF aviation		X			X			X	

Deterrence and Collective Defense		Criteria									
		Impact			Cost			Priority			
	Option / Opportunity	L	M	H	L	M	H	1	2	3	4
1	Meet the Wales Summit Defence Investment Pledge (DIP)			X			X	X			
2	Establish a standing, fully functional Air Operations Centre (AOC) with a fully manned Peacetime Establishment (PE) Joint Force Air Component (JFAC). At a minimum, establish a fully manned, standing Intelligence, Surveillance and Reconnaissance Division (ISRD) within NATO Allied Air Command headquarters			X		X		X			
3	Replace Air Policing with Air Defence as the NATO standing peacetime mission			X	X			X			
4	If Allies decide not to replace Air Policing with Air Defence, then develop an Air Policing to Air Defence (AP-to-AD) transition plan for implementation during times of rising tensions			X	X			X			

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Deterrence and Collective Defense		Criteria									
		Impact			Cost			Priority			
	Option / Opportunity	L	M	H	L	M	H	1	2	3	4
5	Develop a strategic Indication and Warning (I&W) System			X	X			X			
6	Stand up a NATO Command Structure (NCS) Processing, Exploitation, and Dissemination (PED) Centre with a fully trained PE			X		X		X			
7	Stand up a NATO Command Structure (NCS) Targeting Centre with a fully trained PE			X		X		X			
8	Reevaluate NATO Command Structure (NCS) PE and Crisis Establishment (CE) for the optimum placement of NATO Joint Air Power experienced personnel			X	X						X
9	Establish NATO procedures for 'RENEGADE' assistance to Allies without sovereign air defence capability			X	X			X			
10	Develop preplanned air-heavy 'deterrence options' to incorporate into NATO plans			X	X			X			
11	Develop NAC approved Pre-Planned Responses (PPRs) for conventional military employment			X	X						X
12	Add NATO Joint Air Power assets to the Long-Term Rotation Plan (LTRP) for enhanced NRF, VJTF and the NATO Force Integration Unit (NFIU) reception mission			X	X			X			
13	Formalize NATO readiness, deployability and sustainability metrics			X	X			X			
14	Establish an Alliance conference to identify training opportunities			X	X				X		
15	Focus NATO infrastructure investment on airfield improvements needed to support high tempo combat operations			X			X	X			
16	Charter a NATO working group to identify and implement interoperability initiatives			X	X			X			
17	Develop critical pooling and sharing agreements to address NATO capability shortfalls			X		X		X			
18	Establish an upper and lower layer organic NATO Ballistic Missile Defence (BMD) interceptor capability			X			X	X			

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No.	Proposal	Impact L	Impact M	Impact H	Cost L	Cost M	Cost H	Priority 1	Priority 2	Priority 3	Priority 4
19	Charter a working group to better understand deterrence theory and help educate all levels of leadership in NATO		X	X						X	
20	Develop and execute a NATO full spectrum 'deterrence' war game and exercise			X		X			X		
21	Develop and execute a contingency 'reinforcement' war game to better understand NATO readiness, deployability and sustainability capacity			X		X			X		
22	Focus the 'ambitious NATO exercise programme' on more narrow training audiences with more realistic scenarios			X		X			X		
23	Evaluate combat ready units with more realistic scenarios			X		X				X	
24	Charter a working group to focus on neutralizing Anti-Access/Aerial Denial (A2/AD) environments		X	X			X				
25	Charter a working group to focus on critical asset air defense requirements		X	X			X				
26	Authorize planning during rising tensions prior to achieving consensus		X	X			X				
27	Adjust Concept of Operations (CONOPS) and Tactics, Techniques and Procedures (TTP) specifically to each threat										
28	Maintain adequate weapons inventories			X			X	X			
29	Focus on full interoperability and Standardization Agreement (STANAG) compliance										
30	Increase training opportunities for deployed military forces			X		X		X			

Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air C2	Criteria										
	Impact			Cost			Priority				
JISR – Proposals	L	M	H	L	M	H	1	2	3	4	
1 Establish a multinational ISR unit			X			X	X				
2a Increase manpower for C2 of JISR-capabilities			X	X			X				
2b Extend tour of duty for ISR specialists	X			X				X			
2c ISR-personnel augmentation/supplementation plan		X		X			X				

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Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air C2		Criteria									
		Impact			Cost			Priority			
	JISR – Proposals	L	M	H	L	M	H	1	2	3	4
2d	Establish a NATO Air Targeting Centre			X			X	X			
3a	Widen scope for 'need to share' in JISR			X	X			X			
3b	I & W: Access to raw data collected			X	X			X			
3c	I & W: Authority to SACEUR to assign JISR collection priorities		X		X				X		
	Air C2 – Proposals										
4a	Establish a small standing JFAC at Allied Air Command			X	X			X			
4b	Move AGS/NAEW&C Positions to Allied Air Command		X		X			X			
4c	Adapt Air C2 doctrine to include: 'small standing JFAC', principles for Air C2 in Art. 5 crises, and BMD/TBMD C2 in concurrent ops			X	X			X			
4d	Consider 'Mission Command' in stabilization ops	X			X					X	
5a	Maintain record of NFS personnel for augmentation; nations to consider firm augm. commitment		X		X				X		
5b	Standardize training for Air C2 operators		X		X				X		
5c	Consider making 603rd AOC available for NATO Air C2			X		X			X		
5d	Consider earmarking personnel of multinational staffs for Air C2	X			X				X		
5e	Extend tour of duty for specialists		X		X				X		
6a	Use nat./multinat. live exercises		X			X			X		
6b	Develop challenging exercise scenarios			X		X		X			
7a	Develop standards for key CRC positions		X		X				X		
7b	Create integrated exercises for CRCs			X		X		X			
7c	Make better use of multinat. training facilities		X		X				X		
8a	Develop a space policy		X		X					X	
8b	NATO Space situational awareness		X			X				X	
8c	Cyber monitoring/awareness cap. at Allied Air Command			X		X		X			

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Joint Intelligence, Surveillance and Reconnaissance (JISR) and Air C2		Criteria									
		Impact			Cost			Priority			
	Air C2 – Proposals	L	M	H	L	M	H	1	2	3	4
8d	PE positions for cyber and space			X	X			X			
9a	Speed up completion of ACCS/AirC2IS			X			X	X			
9b	Establish/maintain interoperability of C2-systems			X		X		X			
10a	Consider use of existing hardened facilities	X					X			X	
10b	Partner with 603rd AOC for resilience/capacity		X			X			X		
10c	Agree to 'cross border operations'			X	X			X			

Missile Defence in NATO – Towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
1	Leadership responsibility			X	X			X			
2	Readiness/Sustainability goals			X			X			X	
3	Provisons for I&W/PPR			X	X			X			
4a	St Plan conseqequence management			X	X			X			
4b	Passive defence procedures			X	X			X			
4c	Standing Plan BMD protection			X	X			X			
4d	Standard. discrepancies			X	X			X			
5	Organ. ops/log process x			X		X		X			
6a	Improve education			X	X			X			
6b	Effective cooperation		X		X				X		
6c	Compl. Technical Arrangement		X		X				X		
7	Yearly (T) BMD exercises			X	X			X			
8	Set of exerc/evals			X			X			X	
8a	Unit level exercises			X	X			X			
8b	Integrated exercises			X			X			X	
8c	EW, Cyber training			X	X			X			
8d	Dissimilar cluster exercises			X		X		X			

Missile Defence in NATO – Towards a Coherent and Effective Surface Based Air and Missile Defence (SBAMD) as a Key Pillar of NATO Integrated Air and Missile Defence System		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
8e	Dev. Eval Branch/Allied Air Command			X		X		X			
9a	Est. horiz. connection			X	X			X			
9b	Up-link connections			X		X		X			
9c	Replace Analogue LL			X			X			X	
9d	Interoperability with CRC's			X	X			X			
9e	Availability SAM-allocator			X	X			X			
9f	Mob.Conn. depl forces			X	X			X			
9g	Interoperability NATINAMDS			X			X			X	

Hybrid Warfare and Resilience		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
	NATO Joint Air Power in peacetime										
1	Conceptual clarity of legal aspects in Hybrid Conflict and Hybrid threats			X	X			X			
2	Establish a high level working group to assess the feasibility for the full delegation of authority and a legal framework for integral approach of Air Policing.			X	X			X			
3	Enhance existing air surveillance and control capabilities			X		X		X			
4	R&D, testing, experimentation and evaluation new technologies			X		X		X			
5	Implement distinctive radar technology thresholds			X		X		X			
6	Slow moving flying interceptors			X			X			X	
7	Assess cyber resilience in air policing capabilities and Air C2 system		X		X				X		
8	Assess feasibility Renegade arrangements Baltic States			X	X			X			
9	Update NATO JAPS, AP doctrine and AJP's for Hybrid Conflict and threats			X	X			X			

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Hybrid Warfare and Resilience		Criteria									
		Impact			Cost			Priority			
	Requirements Resilience	L	M	H	L	M	H	1	2	3	4
10	Review MC 362/1 to include Hybrid Conflict and Hybrid Warfare			X	X			X			
11	Assess the conditions to employ JISR and AWACS			X	X			X			
12	Assess network capabilities and structures for joint and interagency environment			X	X			X			
13	Establish AAST at JFCB and JFCN			X	X			X			
14	Education, training, exercising and validation AAST			X	X			X			
15	Update NATO JAPS, AP doctrine and AJP's for Hybrid Warfare			X	X			X			
16	Transform AAST into a Hybrid Threat Coordination Cell (HTCC)			X	X			X			
17	ETEE for AAST for transforming into a HTCC			X	X			X			
18	Further optimizing NATO's Air C2 capabilities and resilience against cyberspace attacks			X		X		X			
19	SWOT analysis NATO resilience for countering Hybrid Warfare		X		X				X		

Alliance and Partnership Cooperation; Bridging Mutual Joint Air Power Interests		Criteria									
		Impact			Cost			Priority			
	Requirements	L	M	H	L	M	H	1	2	3	4
	Alliance Cooperation										
1	Allied Air Command 24/7 C2 Element			X		X		X			
2	Strengthening Coll. involvement			X	X			X			
3	Air Advice & Assist Teams			X	X			X			
4	NATO Air Warfighting Centre			X			X			X	
	Partnership Cooperation										
5	Def & Sec Building Country Package			X	X			X			
6	Increased operational Partnership cooperation			X			X			X	
7	Partnership Air Group			X	X			X			
8	Increase of education courses			X	X			X			

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Alliance and Partnership Cooperation; Bridging Mutual Joint Air Power Interests		Criteria									
		Impact			Cost			Priority			
Requirements Partnership Cooperation		L	M	H	L	M	H	1	2	3	4
9	Strengthening cooperation EU		X		X				X		
10	Working group foreign disclosure		X		X				X		
11	JAPCC Partnership Division			X	X			X			

Technology and Industrial Cooperation		Criteria									
		Impact			Cost			Priority			
Option/Opportunity		L	M	H	L	M	H	1	2	3	4
1	Make the Framework Nation Concept the number one approach for multinational cooperation			X	X			X			
2	Establish a list of defense priorities for technical and industrial cooperation			X	X			X			
3	Intensify cooperation with the EU and develop suitable financial instruments and incentives			X	X			X			
4	Orientate and accelerate industrial R&D, including through challenging STANAGs			X	X			X			
5	Review standards with a view to reduce constraints impacting on industrial cooperation			X	X			X			
6	Use open standards whenever feasible			X	X			X			
7	Develop a policy of incentives, attractive for industry			X	X			X			
8	Reduce bureaucracy for faster procurement			X	X			X			
9	Promote the sharing of strategic technologies among partners; develop a legal framework if required			X	X			X			
10	Concentrate cooperative research and technology for Joint Air Power capabilities in areas vital to successfully operate in a hybrid/contested environment			X			X	X			
11	Develop multinational logistic responses to operational needs			X	X			X			
12	Determine the required level of logistic stocks			X	X			X			
13	Develop a policy giving industry better access to logistical support tasks			X	X			X			

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Annex D

List of Abbreviations and Acronyms

AAR	Air-to-Air Refuelling
AAST	Air Advisory Support Team
ACA	Airspace Control Authority
ACC	Air Component Command
ACCS	Air Command and Control System
ACM	Airspace Control Measures
ACT	Allied Command Transformation
ADC	Air Defence Commander
AEA	Airborne Electronic Attack
AESA	Active Electronically Scanned Array
AGS	Alliance Ground Surveillance
AirC2IS	Air Command Control and Information Services
ALTBMD	Active Layered Theatre Ballistic Missile Defence
AOC	Air Operations Centre

AOCC	Air Operations Coordination Centre
AOR	Area of Responsibility
AP	Air Power
AP-to-AD	Air Policing To Air Defence
ATO	Air Tasking Order
AWACS	Airborne Warning and Control System
A2/AD	Anti-Access/Area Denial
BCT	Brigade Combat Team
BI-SC	Bilateral Strategic Command
BMD	Ballistic Missile Defence
BMDOC	Ballistic Missile Defence Operations Centre
CAOC	Combined Air Operations Centre
CAP	Combat Air Patrol
CC SBAMD	Competence Centre for SBAMD
CE	Crisis Establishment
CFI	Connected Forces Initiative

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CJSOR   Combined Joint Statement of Requirement

C-IED   Counter Improvised Explosive Device

COA   Course of Action

COD   Combat Operations Division

COI   Community of Interest

COMINT   Communications Intelligence

CONOPS   Concept of Operations

COP   Common Operating Picture

CPD   Combat Plans Division

CRC   Control and Reporting Centre

CTC   Combined Targeting Centre

C2   Command and Control

C4ISR   Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance

DACCC   Deployable Air Command and Control Centre

D-AOC   Deployable Air Operations Centre

DACT   Dissimilar Air Combat Training

DCA   Dual Capable Aircraft

DIP   Defence Investment Pledge

DSB   Defense Science Board (US)

EAG   European Air Group

ECM   Electronic Counter Measures

EET   External Expert Team

ELINT   Electronic Intelligence

EO   Electro-Optical

EPAA   European Phased Adaptive Approach

ESM   Electronic Support Measures

EU   European Union

EW   Electronic Warfare

FMN   Federated Mission Network

FOC   Full Operational Capability

FYDP   Future Years Defense Program

GBAD   Ground Based Air Defence

GBI   Ground-based Interceptors

GDP   Gross Domestic Product

GMTI   Ground Moving Target Indicator

GRF   Graduated Response Force

GRP   Graduated Response Plan

HMI   Human Machine Interface

HOS/G   Heads of State and Government

HQ   Headquarter

IAMD   Integrated Air and Missile Defence

I&W   Indication and Warning

ICAO   International Civil Aviation Organization

ICBM   Intercontinental Ballistic Missile

IMINT   Imagery Intelligence

INF   Intermediate Range Nuclear Forces

IOC   Initial Operating Capability

ISIL   Islamic State of Iraq and the Levant

ISIS   Islamic State in Iraq and Syria

ISR   Intelligence, Surveillance and Reconnaissance

ISRD   Intelligence, Surveillance and Reconnaissance Division

IT   Information Technology

JAPC   Joint Air Power Capabilities

JAPCC   Joint Air Power Competence Centre

JCMB   Joint Collection Management Board

JFAC   Joint Force Air Component

JFACC   Joint Force Air Component Commander

JFC   Joint Force Command

JIPOE   Joint Intelligence Preparation of the Environment

JISR   Joint Intelligence, Surveillance and Reconnaissance

JOA   Joint Operations Area

JPOW   Joint Project Optic Windmill

LTRP   Long-Term Rotation Plan

LoA   Level of Ambition

MJO	Major Joint Operation
NAC	North Atlantic Council
NATINAMDS	NATO Integrated Air and Missile Defence System
NATO	North Atlantic Treaty Alliance
NAEW&C	NATO Airborne Early Warning and Control
NCS	NATO Command Structure
NFIU	NATO Force Integration Unit
NFS	NATO Force Structure
NGA	National Government Agency
NIAG	NATO Industrial Advisory Group
NMA	NATO Military Authority
NIFC	NATO Intelligence Fusion Centre
NRF	NATO Response Force
OUP	Operation Unified Protector
PE	Peacetime Establishment
PED	Processing, Exploitation, and Dissemination

PfP   Partnership for Peace

PGM   Precision Guided Munitions

PPR   Pre-Planned Response

QRA   Quick Reaction Alert

RAP   Recognized Air Picture

Ret.   Retired

RoE   Rules of Engagement

RPA   Remotely Piloted Aircraft

RPAS   Remotely Piloted Aircraft System

SACT   Supreme Allied Commander Transformation

SACEUR   Supreme Allied Command/Commander Europe

SADC   Static Air Defence Centre

SAM   Surface-to-Air Missile

SM-3   Standard Missile 3

SAR   Synthetic Aperture Radar

SBAMD   Surface Based Air and Missile Defence

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SC   Strategic Command

SD   Strategy Division

SDB   Small Diameter Bombs

SEAD   Suppression of Enemy Air Defence

SFA   Strategic Foresight Analysis

SHORAD   Short-Range Air Defence

SIGINT   Signals Intelligence

SJO   Small Joint Operation

SSM   Surface-to-Surface missile

STANAG   Standardization Agreement

TBMD   Theatre Ballistic Missile Defence

TBMD   Theatre BMD

TTIP   Transatlantic Trade and Investment Partnership

TTP   Tactics, Techniques and Procedures

TST   Time-Sensitive Targeting

UAS   Unmanned Aerial System

NATO UNCLASSIFIED – PUBLICLY DISCLOSED

UAV   Unmanned Aerial Vehicles

US   United States

VJTF   Very High Readiness Joint Task Force

WMD   Weapons of Mass Destruction

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Notes

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‘ *Whether it is enhancing deterrence to the East or conducting counter-terrorist operations to the South, NATO increasingly relies on airpower to deliver rapid and precise responses to complex challenges. The Alliance's Joint Air Power Competence Centre has sponsored this excellent white paper produced by outside experts which analyzes NATO airpower and suggests several practical ways to improve an already outstanding capability. NATO leaders should study this volume as the Alliance develops its new airpower strategy.* ’

Jaap de Hoop Scheffer, former NATO Secretary General (2004 – 2009)

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