AIR & SPACE POWER IN NATO

FUTURE VECTOR

PART I

Joint Air Power Competence Centre

Air and Space Power in NATO

Future Vector – Part I

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July 2014

Joint Air Power
Competence Centre

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Foreword

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

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

Therefore I directed the Joint Air Power Competence Centre to conduct the study 'Air and Space Power in NATO – Future Vector' to chart the path forward and guarantee Air and Space Power's contribution to the success of NATO and the security of Member Nations. I would like to reiterate that the Future Vector Study is Joint in nature. The study focuses on Air and Space Power from all domains and includes the capability and competency requirements of all Services.

The crisis in Ukraine quickly highlighted why collective security in Europe is still required. Our Alliance will be required to execute Collective Defence, Crisis Management and Cooperative Security crisis response in a rapidly changing and challenging world. NATO and political decision-makers must continue to act collectively to maintain our asymmetric advantage – Joint Air and Space Power.

I strongly encourage you to read this publication as it offers ideas and potential solutions to enhance NATO's Joint Air and Space Power and guarantees our collective security in the coming decades.

Frank Gorenc
General, USA AF
Director, JAPCC

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Introduction

By Lieutenant General (ret.) Frederik H. Meulman,
Project Leader 'Air and Space Power in NATO – Future Vector Project'

Context of the Study

Joint Air and Space Power is of strategic importance to the Alliance and has been since NATO's inception. Time and again, NATO and its Member States[1] have turned to Air Power as the first military response option. Joint Air and Space Power played an important role in the planning, tasking and execution NATO Crisis Management Operations, especially in the former Socialist Federal Republic of Yugoslavia, Afghanistan and in Libya (Operation UNIFIED PROTECTOR). Furthermore, daily employment of Air Power plays a vital role in ensuring the security of the airspace of NATO Member States and in maintaining a credible deterrence and defence posture.

Air and Space Power continues to demonstrate its unprecedented value through its inherent attributes of speed, reach, flexibility, precision and low risk. These combined characteristics provide NATO and national leaders both political and military, with a tool of unmatched responsiveness, flexibility and usability. In essence, Air and Space Power in NATO provides air superiority; mobility and deployability; intelligence, surveillance and reconnaissance; precision strike; and command and control. Air and Space Power capabilities were and will always be necessary to support joint and combined operations and to create the right circumstances for follow-on action. They support Joint Forces and Strategic Commanders in meeting their objectives, thereby supporting the achievement of politically-strategic aims.

NATO acknowledges that security challenges will not diminish in times of economic austerity or indeed in an increasingly complex international environment. Despite this acknowledged thesis, NATO continues to witness

a drastic reduction in the defence budgets of its Member States and a diminishing of Air Power capabilities at the hands of its Member States. This trend began at the end of the Cold War and continues at an increasing rate. The impending cessation of International Security Assistance Force (ISAF) operations in Afghanistan and the transition of NATO from a combat into an education, train and exercise posture, combined with continued pressure on defence budgets, will put investments in future Air and Space Power capability under yet further heavy and sustained scrutiny.

The seriousness of existing deficiencies in Joint Air and Space Power capabilities and competencies in NATO and in particular amongst the European Member States is in little doubt. This situation has recently been exacerbated by developments in the Ukraine and the subsequent altered relationship between the Alliance and Russia. Furthermore, political-military strategic developments, such as the United States (US) pivot to the Asia/Pacific region and challenges related to the future security environment demonstrate that the World is growing increasingly unstable, not safer. These developments and trends should act as a timely warning that measures must be taken to remedy shortfalls in capability and competencies in the field of Joint Air and Space Power in NATO.

If action is not taken soon, there will be a fair chance that the minimum military Joint Air Power capabilities needed to support NATO's current Level of Ambition (LoA) will further diminish. Without action there is a substantive risk that in future, NATO, and in particular NATO's European

Member States will not have the necessary Joint Air and Space Power capabilities and competencies required to assure access to space effectively mitigate the security challenges defined in NATO's Strategic Concept[2].

It follows from what is above that Air Power in NATO is faced with the paradox that on one hand being the pivotal toolbox for NATO operations,

but on the other hand being confronted with severe resource limitations. In an increasingly unstable World it is argued that NATO and its Member States cannot afford a diminishing Air Power nor restrictions and interruptions in accessing Space Power. Therefore, it is imperative that viable options and realistic solutions be identified to chart the path forward guarantees that Joint Air and Space Power continues to contribute to the security and success of NATO and its Member States. It is for this reason that the Executive Director of the JAPCC has commissioned a Project Team to deliver this Project entitled: 'Air and Space Power in NATO – Future Vector'. The Project will seek to identify viable options and solutions to Air and Space Power challenges so that NATO and national interests can be protected in the short term (out to 2020) and in the longer term (out to 2040).

Core and Advisory Team

A Core Team (CT) of recognized experts in the fields of Security and Defence Policy, with particular expertise in Air and Space Power started work in early 2014[3]. This Core Team took significant note and made good use of the results of the initial JAPCC Study that was conducted in 2013. This Initial Study sought to substantiate the Air Power paradox, to provide an accurate summary of the current situation in the field of Air and Space Power in NATO, and offer an initial assessment of a future security environment. This Initial Study has recently been published by the JAPCC under the title 'Present Paradox – Future Challenge' and will be a key reference document for the Future Vector Project.

The Core Team translated the recommendations of the Initial Study into 16 essays. Some topics of the Initial Study have been omitted due to the fact that they were not considered to be essential to the solution of *'the Problem'*. Equally, some topics have been merged with others and new topics that were not part of the Initial Study have been added to the Compendium because of their perceived importance in attempting to find a solution to *'the Problem'*.

The Core Team took a 'mission oriented approach'. This allowed the Team the freedom and flexibility to develop their essays within the agreed aim and framework of the Project. It also allows for each essay, although an integral and approved part of the Future Vector Project, to be viewed as a stand-alone document with a clear fingerprint of the author.

In addition to the Core Team, an Advisory Team (AT) was established[4]. This Team of senior individuals with working experience at the highest political and military levels of NATO and their nations perform 3 functions:

- Enhance the understanding of the Core Team by providing advice and feedback on the compendium of essays.
- Reach out and advise key leaders (key stakeholders) about the defined problem and ideas, options and solutions.
- Provide advice regarding the next step(s) of the Project to include supporting the development of the Communications Strategy for the Project.

Throughout the 'Future Vector Project' there has been continual interaction between the Core and Advisory Teams as well as the leadership of the JAPCC. This interaction has very much supported the effective delivery of the Project.

Compendium of Essays

This 'Compendium of Essays' represents the results of the 'Air and Space Power in NATO – Future Vector Project'. It is not merely a collection of useful essays but a coherent and focussed set of ideas, concepts and possible solutions that the political and military leadership of NATO may wish to consider in order to guarantee that Joint Air and Space Power continues to be key enablers[5] for the security and success of NATO and its Member States. The 'Compendium of Essays' and its recommendations should not be seen as an end in its own right but should be used to initiate further essential capability and competence development work both in NATO itself and amongst the Member States.

Throughout the Compendium, Air and Space Power is treated from a joint perspective. This means that it is more than 'just air forces'. To add clarity, this Compendium defines Air and Space Power as:
The total aviation and space activity – civilian and military (all services), commercial and private, potential as well as existing.[6]

Furthermore, as Lieutenant General Denis Mercier (FAF) stated:
The airspace is a shared environment. All of the world's forces include airmen who contribute to Air Power development … Understanding airpower's role in all aspects of an operation's execution will facilitate true joint integration, permitting more integrated courses of action. The full integration of air capabilities of different environments and services will enhance joint cooperation.[7]

The Compendium consists of 2 parts, each of 8 essays. Part 1 consists of essays with a political-military strategic focus whilst the essays in part 2 explore topics of a military- and operational-strategic nature. Each part contains an Executive Summary as well as a list of Key Recommendations.

Part I: Essays with a Political-Military Strategic Focus

The first essay deals with 'The Paradox of Air and Space Power and the Need Now More Than Ever For Robust Political Support and Renewed Funding'. It focuses on the necessity for serious debate about the need for continued investment in and sustainment of Joint Air and Space Power capabilities for NATO and the Member States. The essay underlines that the key for budgeters, policy makers, and leaders alike is to ensure that the public and governments understand why it is necessary now and in the future to retain a credible defence both nationally and as an Alliance.

The second political-level essay discusses 'The Impact of Global Trends on Air And Space Power in NATO'. It takes an independent look at the future

global environment based upon a review of multiple trend studies prepared by different nations and organizations. It makes recommendations for NATO/European contributions to NATO Air and Space Power.

The third essay 'History is Continuity in Change, The Role of Joint Air and Space Power in NATO in a Rebalanced Security Paradigm'. This essay deals with the question of what is the meaning of the current contingency in the Ukraine and the changed relationship between NATO and Russia for NATO and its related Air and Space Power.

The fourth essay is titled: 'The Enduring Quest for Capability Development in NATO – Aligning National Interests with Alliance Interests'. It focuses on developing Joint Air and Space Power options in NATO/Europe in particular to mitigate the existing and widening Joint Air Power capability and competency gaps and ensuring the uninterrupted access to space based information and data. It also deals with assured access and availability of shared capabilities.

The fifth essay focuses on 'A New Concept for Air, Space and Cyber Power'. It offers a new, innovative approach based of systematic empowerment of the supported Ally and systematic paralysis of the opponent to improve the link between ends, ways and means.

Essay number six addresses 'The Future Role of Partnerships in Transatlantic Air and Space Power'. It deals with new thoughts and ideas on how to keep the partnership bonds created at all levels via the ISAF mission going. It focuses on the opportunity to take partners to the next level of maturity and delivery, especially in the realm of Joint Air and Space Power in NATO.

The seventh essay is titled 'Beyond Optimization: Innovation and Adaptability for Air and Space Power in NATO – The Role of Industry'. It assesses

the current situation and focuses on turning Industry and other organizations with the appropriate and necessary knowledge into strategic partners. The essay also deals with opportunities for maintaining and optimizing the Alliances current technological superiority in the field of Air and Space Power capabilities.

The eighth and last essay of Part One is about 'The New Burden Sharing Imperative'. It underlines that Burden Sharing has evolved from an optional policy to a required policy in NATO and it addresses two strategic burden sharing issues: NATO's nuclear deterrent posture and NATO's missile defence posture.

Part II: Essays with a Military- and Operational-Strategic Focus

The first essay of this part is about 'Air and Space Power in NATO 2020–2030'. It answers the question: 'What will Air and Space Power in NATO look like in the timeframe 2020–2030 without targeted interventions, taking into account the effects of the current trends of declining budgets and diminishing Air Power capabilities?'

Essay two deals with 'Human resources and training: keeping up preparedness, readiness and effectiveness of Air and Space Power in NATO'. The essay provides innovative ideas for optimizing the training and exercising of Air and Space Power capabilities and competencies as an integral part of NATO's Connected Forces Initiative (CFI). It also addresses Human Resources aspects such as how to ensure career progression perspectives, maintain an appropriate knowledge base and create access to appropriate and sufficiently high-quality education, training and exercises – the maintenance of war fighting skills?

The third essay addresses the topic 'Air and Space Power, the need for Cyber resilience'. This essay is about ensuring that the Air and Space Power

capabilities in NATO remain available when needed – even under the condition of a massive cyber disruption. It focuses on resilience rather than on protection and security.

Essay four is about the 'Air and Space Power future force structure in NATO'. It deals with the quest for the right trade-off between focus, composition and quality of Air and Space Power capabilities in NATO. It also assesses what would be required to meet the shortfalls in NATO and in particular NATO/European capabilities and competencies, in order to effectively undertake a Smaller Joint Operation (SJO) that is Air-heavy.

The fifth essay is dealing with 'Air and Space Command and Control (C2) in NATO'. It assesses the current Air C2 situation in NATO and deals with options for optimizing the Air C2 in NATO focussing on a system of system approach, a greater delegation of operational control to the tactical level, the reinforcement of the principle of Unity of Effort through Mission Command, and better links into a comprehensive, cross government approach.

The sixth essay is about 'Space and Air Power in NATO'. It focuses on 'how' to exploit Space Support to Air Operations in NATO and how to mitigate possible shortfalls. It raises key questions that NATO must address, both in the political-military strategic arena as well as in the realm of Space Operations in support of Air Operations.

Essay number seven focuses on 'Air and Space Power in Counter Insurgency Operations (COIN)'. It focuses on the essence of COIN and Irregular Warfare (IW) and the role of Air and Space Power in it. It also deals with questions like: 'How NATO can advise indigenous governments and help them to develop their own Air and Space Power capabilities?' Also: 'How to invest in the new role of Air and Space Power in Joint Air-Land Integration?'

The last and eighth essay in this series is about 'Anti-Access/Aerial Denial' (A2/AD). It addresses the problem and deals with the conceptual question of how to deal with this problem from a NATO perspective? The key question is: 'What is needed in NATO to ensure assured access to denied airspace and deal with denied environments?' In addition: 'How to optimize and synchronize interoperability with the United States Air Sea Battle Concept?'

These 2 parts of the 'Future Vector Project Compendium' collectively give substance to options, ideas and solutions to mitigate the identified Air and Space Power paradox as much as is possible in order to ensure that Air and Space Power in NATO remains fit for purpose in the future. The outcome of each of the essays is viewed as being essential to achieving the overall aim of the Future Vector Project. Although each of the essays addresses a specific topic, which is directly related to the solution of the problem identified, it is feasible that there is some overlap between essays. Wherever possible such overlap has been minimized but, without prejudicing the independent nature of each essay.

Although the essays vary in viewpoint, a number of themes reverberate emphatically throughout the Compendium and these are:

- The need for political support based on a common sense of urgency to mitigate existing Air and Space Power shortfalls in NATO.
- NATO and in particular NATO/Europe need to agree to achieve a full spectrum of Joint Air Power capabilities and competencies and ensure that the Alliance can maintain uninterrupted access to space. This implies bringing into balance the full spectrum Air Power capabilities of the United States and the other NATO members and addressing the issue of strategic burden sharing.
- The need for innovative and extended ideas and options for collective, bi- and multinational cooperation in developing Joint Air and Space Power capabilities and competencies.

- Maintaining NATO's operational and information dominance throughout the spectrum of operational deployment.
- The need for robust education, training, exercises and validation of Joint Air and Space Power in order to ensure that NATO can effectively conduct the full range of likely NATO missions both now and in the future.
- Optimizing partnerships with non-NATO countries, academia and industry.

Acknowledgement

The realization of this Compendium of essays would not have been possible without the help and support of many. It is thanks to the support and the sense of urgency of the JAPCC/Memorandum of Understanding (MOU) nations that we have been able to deliver this Future Vector Project. The Director and Executive Director of the JAPCC were instrumental in both the launch and progress of the project. Many thanks are due to the members of the JAPCC Staff who were always ready with expert advice or with executive staff support. Sincere thanks also go out to my fellow comrades in the Core Team. Without their forward-leaning attitude and substantive expertise, this Compendium of outstanding essays would not have been possible. The Advisory Team did an excellent job in providing advice and feedback on the respective essays. Their work in reaching out to key stakeholders was and is of great importance for increasing the understanding of the 'Air and Space Power Paradox' and any associated set of possible solutions. Sincere thanks are due to those who, in discussions and interviews, were willing to share their experiences and thoughts with the various authors of the essays. Finally, a sincere thanks to the broad range of key stakeholders in NATO and the nations, who were willing to devote their busy time to the subject of 'Air and Space Power in NATO' and who will hopefully keep the torch of NATO's credibility in the future burning brightly.

Finally

The defined Air and Space Power paradox is real and the impact on the effectiveness and thereby credibility of NATO is too large to ignore. A common sense of urgency and strong political will are necessary if further steps in mitigating the defined Air and Space Power problem in NATO and its Member States are to be taken and are indeed needed if words are to be turned into deeds.

The content of the various essays supports the proposition above. Within the thematic boundaries of the various essays, obviously differing in emphasis, various options and ideas have been put forward. It is not intended as a list of 'do this' or 'do that', but is provided to put forward ideas, options and possible solutions, which in turn will form the basis for further discussion or indeed, possible decision-making at the highest military and political levels at NATO and in the Member States. Decisions are now fundamental if NATO and its Member States are to develop and sustain suitable capabilities and competencies and in order to remain fit-for-purpose for future tasks, which they may in the future be called upon to execute.

So, with respect to the success of NATO in ensuring our common defence and security and in the conviction that the outcome of 'The Future Vector Project' will support the preservation of NATO's effectiveness as the globe's most successful political-military Alliance, we, the Core Team, are proud to present this Compendium of essays.

Endnotes

1. Where the document refers to NATO, this should be read as NATO and its Member States.
2. In general, this refers to the risk of lack of capacity at all Services. However, the capability and competence gaps in NATO are predominantly Air and Space Power related.
3. See Annex A for the Core Team – Biographies.
4. See Annex B for the Advisory Team composition.
5. Air and Space Power can work both independently from and synergistically with the traditional war fighting domains across each Service.
6. This definition of Air Power is from Gen 'Hap' Arnold, USAF. The addition of 'space activity' and 'all services' is the Project Leaders responsibility.
7. Lt Gen D. Mercier, FAF, 'Thinking about Air and Space Power in 2025, five guiding principles'. Air and Space Power Journal, (May–Jun. 2012).

Executive Summary

Context of the Future Vector Project

For more than fifteen years now, NATO has been actively pursuing efforts to improve the operational capabilities and competencies of the Alliance. Today, essential shortfalls still exist and the transatlantic capability gap has become even greater. Although this capability and competency gap in NATO is not new, it has become more apparent with the recent developments in the Ukraine and the changes in the relationship between Russia and NATO.

When it comes to defining the priority deficits, the conclusion must be that it explicitly touches upon a broad and essential range of shortages in Joint Air and Space Power capabilities and competencies in NATO and in particular between the United States and NATO/Europe. To this must be added a number of political-military strategic issues like the pivot of the United States to Asia; the new United States 'win and deny' war fighting strategy; the existing arrangement in NATO that no single Member State should provide more that 50 % of certain critical capabilities; and the fact that current capability development initiatives in NATO most probably will not solve or substantially mitigate the existing and widening capability gaps.

The conclusion of this all is that there is fair chance that crisis or conflict situations arise where the United States, because of domestic political reasons or other strategic interests, are not or not fully able to provide the needed Air and Space Power capabilities and competencies. Therefore in the future, NATO/Europe should possess the full spectrum of Air Power capabilities and competencies and maintain assured access to space based information and data to conduct Crisis Management Operations independently at the periphery of NATO's geographical Area of Operational Responsibility (AOR).

This sense of urgency was well reflected at the 2012 Annual Joint Air Power Competence Centre Conference when a keynote speaker talked about the future role of Air Power in NATO. The main thesis of the lecture was that 'from its beginning NATO has been an Air Power Alliance, which is now at risk. Why? Because of the existing "Air and Space Power Paradox". On the one hand and since its inception, Air and Space Power has been pivotal for NATO's effectiveness and success. On the other hand, there are continuing and drastic reductions in defence budgets and diminishing Air and Space Power capabilities in NATO. Therefore, it was stated that the adage should be *to cooperate and share, or decline*'.

These deliberations and standpoints led to the decision to conduct a comprehensive Air and Space Power study towards 2040. As an intermediate step, the Joint Air Power Competence Centre (JAPCC) delivered a paper titled 'Present Paradox – Future Challenge' in which the Air and Space Power Paradox has been qualified with respect to future challenges. Put simply, the Air and Space Power Paradox is:

The increasing importance of Air and Space Power as the military tools of choice for NATO and political decision-makers to successfully impose their collective will, yet these same decision-makers are seemingly unwilling or unable to act collectively to maintain and evolve this executive tool necessary to effectively intervene.

This JAPCC Study provided a broad range of recommendations for a comprehensive Air and Space Power study towards 2040. Early 2014, this lead to the start of the 'Air and Space Power in NATO – Future Vector Project' with the overall aim:

'To identify viable options and solutions to guarantee that Air and Space Power continue to be key enablers for the security and success of NATO and its Member States.'

Compendium of Essays

The Core Team executing the Future Vector Project decided to deliver a Compendium of essays consisting of two parts. Part One focuses on the political-military aspects of the Air and Space Power problem. Part two will have a dedicated focus on the military- and operational-strategic aspects of the defined problem.

Some might ask themselves, 'how about the other Services?' It is stressed that the Future Vector Project is joint in nature. It focuses on Air and Space Power from all domains and does not exclude the Air and Space Power capability and competency requirements of any of the Services in the defence organizations of the respective Member States.

The presented Part One of the Compendium consists of eight essays covering a broad range of issues, but each emphatically contributing to the mitigation of the Air and Space Power Paradox in NATO. Where possible a reference to cost was made. All essays emanate the need for political and military strategic consideration and decision-making at the highest level.

Key Messages

All essays in Part One of the Compendium deliver key messages:

- *'Transatlantic security issues have been dominated during the past decade by at least five issues, collectively grouped as the 5 Ds: continuous deployments, growing public debt, negative demographic trends, declining defence budgets, and the increasing focus on domestic issues leading to disinterest and even disengagement in foreign affairs and security issues by some governments and publics.'*
- *'Without a sustained and active dialogue among Alliance leaders NATO's collective Air Power capabilities will be drastically reduced and arguably not upgraded which will have an enormous negative impact on the ability of NATO*

and in particular NATO/Europe to provide for the security and economic well-being of its populations, territory, and the greater transatlantic space.'

- *'The capability and competence gap in NATO and in particular NATO/Europe is in essence an Air and Space Power gap. This gap is not new, but has become more manifest with the recent developments in the Ukraine and the changed relationship between NATO and Russia.'*
- *'NATO/Europe must be capable of independently carrying out Crisis Management Operations at the periphery of NATO's geographical Area of Operational Responsibility. The ability to execute these operations is very much dependent on the availability of a set of full spectrum Air and Space Power capabilities and competencies provided by the NATO/European Member States.'*
- *'NATO should develop a unified forward-leaning air minded concept for the application of Air, Space and Cyber Power. The need to define an end-state that is credible, legal and moral as the critical element of every military plan has been the missing ingredient in strategy since Thucydides.'*
- *'The opportunity to take partnerships to the next level of maturity may be best found in terms of what can be done in Joint Air and Space Power.'*
- *'Air and Space Power is crucially dependent on advancing technology.'*
- *'Structured dialogue between the Armed Force and Industry at a very early stage of the requirements definition, design, and procurement process is a prerequisite for a healthy defence technology and industrial base, which in turn, is the prerequisite for technological superior and affordable Air and Space Power.'*
- *'Burden sharing in NATO has evolved from an optional policy to a required policy.'*

New Ground

Besides a focused set of key messages, many of the essays in Part One of the Compendium are breaking new ground. They provide a number of options and initiatives, such as: a Joint Air Power Capability and Competence Building Initiative in NATO; an F-35 European Participating Air Forces

Initiative; a Regional Approach to Air Power in NATO; a NATO/European Missile Defence Initiative; the development of a NATO/European Air Warfare Centre; a new concept based on systematic empowerment and systematic paralysis that challenges current military doctrine; and a fundamentally new relationship between Industry, Industrial Associations and NATO and its Member States. For a complete list of ideas and options, the reader should refer to the recommendations in the various essays.

Finally

The essence of this Compendium Part One is the need for a clear sense of urgency and the need for swift political and military support to discuss and address the key thoughts, ideas and options provided. This is a tough nut to crack, but ignoring the problem is no longer an option. If NATO wants to remain a credible security provider and wants to be able to act throughout the entire spectrum of conflict, its Member States should show the will and support to embark on a set of solutions thereby mitigating especially NATO/Europe's Joint Air and Space Power capability and competency gaps. The first opportunity to show this political intent might be at the upcoming NATO Summit in Cardiff this year. The 'controls' are in your hands!

Key Recommendations

In this Compendium Part One, eight essays contribute to the achievement of the overall objective of the 'Air and Space Power in NATO – Future Vector Project'. The essays together show a broad range of recommendations aiming at the political and military strategic level. This chapter deals with key recommendations, thereby identifying viable options, ideas and solutions to guarantee that Air and Space Power continue to be key enablers for the security and success of NATO and its Member States. The key recommendations are grouped under the respective titles of the essays (refer to the respective essays for a full list of recommendations):

The Paradox of Air and Space Power and the Need More Than Ever for Robust Political Support and Renewed Funding

- Ensure that there is serious debate about future requirements for and investments in Joint Air and Space Power in NATO among US and European leaders.
- Ensure that publics and parliamentarians recognize the value Joint Air and Space Power has brought to the Alliance as well as to individual Member States.
- Understand the stakes of what neglecting Air Power capabilities means for the security and economic livelihood of their nation and the Alliance.
- Develop a core group of engaged transatlantic government, parliamentary, and public opinion leaders who can ensure that Joint Air and Space Power capabilities and competencies, as an element of national power, are afforded proper attention and consideration.

The Impact of Global Trends on Air and Space Power in NATO

- Create a 'get well plan' for NATO/European defence capabilities.
- Create a modular NATO that would allow individual lead nations to use NATO assets in operations.

- Develop a goal by 2020 for NATO/European Member States to have a *full spectrum* set of Joint Air Power capabilities and maintain assured access to space based information and data. This includes:
  - Further developing Air and Space Power in NATO that is capable of dealing with sustained operations in the high-end spectrum of conflict (Article V).
  - Creating a NATO/European Joint Air Power capability that can conduct sustained operations on its own for 180 days in near region, Smaller Joint Operations – Air Heavy (both in a symmetrical and asymmetrical environment).
  - Strengthening the NATO Response Force and its Air Power component.
- Develop a division of labour and responsibilities in NATO with the United States and NATO/Europe determining where to share collectively and equally and where to establish a geographically oriented separation of responsibilities.
- Begin developing programs to establish closer ties to Asian partners, including greater military interoperability and possible NATO exercises in the Indian Ocean.
- Enhance close cooperation between the United States and the other NATO Member States to exercise the United States Air-Sea Battle Concept.
- Design ways for Joint Air and Space Power in NATO to contribute more fully to NATO's comprehensive approach.

'History is Continuity in Change', the Role of Joint Air and Space Power in NATO in a Rebalanced Security Paradigm

- Assess the impact of the current security contingency in south-east Europe and review the validity of NATO's Political Guidance.
- Develop a NATO/European full spectrum set of strategic and operational intelligence and surveillance gathering capabilities and competencies.
- Discuss in NATO the ability to fully share strategic intelligence.

- Ensure that NATO's Joint Air and Space Power capabilities and competencies are adequately educated, trained, exercised and validated for possible deployment throughout the spectrum of crisis and conflict.
- Reaffirm NATO's current nuclear deterrence posture and retain a credible Dual Capable Aircraft (DCA) capability in Europe.
- Launch a 'Joint Air Power capability and competence building initiative' in NATO aimed at training, advising and assisting NATO Member States and partners in further developing Air Power capabilities and competencies.

The Enduring Quest for Capability Development in NATO – Aligning National Interests with Alliance Interests

- Develop a focused plan of action in NATO for better defining shared interests and responsibilities and by 'widening' the concept of sovereignty.
- Develop (in cooperation with the EU) a fully complementary and systematic 'Joint Air and Space Power capability development initiative' supported by a NATO Capability Development Liaison Team.
- Research opportunities for role and task specialization in NATO with the aim of ensuring a more optimal use of scarce national defence budgets.
- Develop extended cooperation in NATO by means of an F-35 NATO/European Participating Air Forces Initiative.
- Develop a regional approach to Air Policing in NATO.
- Start a NATO/European Missile Defence Initiative.
- To develop a NATO/European Joint Air Warfare and Training Centre.
- Reassess mechanisms for a wider use of common funding in NATO (e.g. collective training, exercising, deployment, redeployment and operating cost).
- Develop a NATO/European Joint Helicopter Command.

A New Concept for Air, Space and Cyber Power

- Develop a new concept for the application of Air, Space and Cyber Power based on the theory of systemic empowerment and systemic paralysis.

- Encourage the Civil-Military Cooperation Centre of Excellence (CIMIC COE) to develop unified concepts in which the application of modern Air, Space and Cyber Power is directly linked to security sector reform, 'a better state of peace'.
- Strengthen the Joint Air Power Competence Centre to master Air, Space, and Cyber Power history, theory, strategy and doctrine to cultivate a broad strategic and conceptual knowledge in these domains and use this organization to communicate its narrative to politicians, the media and the military.

The Future Role of Partnerships in Transatlantic Air and Space Power

- Maintain momentum in NATO in order to keep partners engaged, relevant, and prepared for the next challenge NATO might face.

  - Recognize what the Alliance needs in terms of partner capabilities to match or enhance Air and Space Power assets in NATO.
  - Understand what partners want to get out of a relationship with NATO post-2014.
  - Determine what existing structures are available and might be needed to support new partner activities.
  - Prioritize who does what and who oversees these activities.

- Develop less formal and more ad hoc partnership arrangements and make these arrangements more responsive, flexible, and ultimately effective.
- Develop tiered levels of partnerships so that NATO can obtain the most benefit of partners who are most willing, capable and ready to take advantage of such a multi-layered relationship with NATO.
- Produce tangible outcomes such as stronger political bonds, enhanced military cooperation, and greater intelligence sharing.

Beyond Optimization: Innovation and Adaptability for NATO Air and Space Power – The Role of Industry

- Harmonize within NATO the national interests of the Member States with regard to Air and Space Power capabilities and define, together with Industry common objectives and requirements.
- Encourage a high-level discussion with Allied Command Transformation (ACT) and the NATO Collaboration Support Office (CSO) to set the ground for more intense cooperation.
- Pursue a more intensive cooperation with the European Defence Agency (EDA).
- Consider the establishment of a NATO/European Defence Science Board, along the lines of the United States, Defence Science Board.
- Promote more efficient processes, criteria and standards to optimize value for money in defence procurement, while fostering the ability to innovate and adapt over the long term.
- Discuss with industries the possibilities of the latter becoming a better partner with customers and serve as trusted 'architectural consultants'.
- Establish a focused dialogue and cooperation between NATO and Industry in order to design and develop a harmonized requirement for an Unmanned Combat Air Vehicle (UCAV) capability in NATO.

The New Burden Sharing Imperative

- Discuss the necessity and possibility of releasing defence budget restrictions.
- Address a greater NATO/European burden sharing contribution which has now become an imperative, in the following areas:
  - NATO leaving no doubt that the current nuclear deterrent posture will remain effective.
  - A NATO's missile defence posture focusing on the development of a NATO/European upgraded package of Ballistic Missile Defence contributions.


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The Paradox of Air and Space Power

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The Need More Than Ever for Robust Political Support and Renewed Funding

By Daniel P. Fata

Introduction

Europe, Canada, and the United States are about to enter a very interesting period of debate and decision about how they see the Alliance's future and, in particular, what defence capabilities will be needed to provide for the agreed NATO mission. After nearly 20 years of continuous deployment and joint missions within Europe and to some of the most inhospitable environments on the planet, NATO and its Member States are preparing to end combat operations in Afghanistan. With the pending wind down of the International Security Assistance Force mission, it has been the hope of some Allies that NATO, the European Union (EU), and their national militaries would enter an 'operational pause' from having to undertake any new high-cost, high-risk, sustained military engagements. Some even hoped that a 'peace dividend' might actually be possible to reap in which the monies being spent to support defence obligations could be redirected toward domestic or other programs. The realities of today's dynamic and increasingly chaotic world, however as evidenced by the activities in Ukraine, Syria, North Korea, Afghanistan and Mali, among other places, may have

dashed some of the post-2014 hopes and will have a major influencing effect on how the Member States undertake their informal review.

A critical debate among US and European leaders must take place regarding future requirements for and investments in Joint Air and Space Power. Since NATO's inception, Joint Air and Space Power have been of strategic importance to the Alliance. NATO and its Member States[1] have turned to Joint Air and Space Power as their first military response option when events in the world have required the United States and Europe to act. Whether it was for simple deterrence against the Soviet Union or, when necessary, for decisive action in crisis management operations in the former Yugoslavia, Afghanistan, and Libya, the employment of Air and Space Power has played a pivotal role in safeguarding NATO's airspace and in maintaining a credible deterrence and defence posture. In fact, as evidenced in the spring 2014 crisis between Ukraine and Russia, the Alliance's first responsive moves were to provide visible reassuring and deterrent capabilities to Europe's north by bolstering existing NATO Air Policing missions to the Baltics. Russia, too, simultaneously enhanced its visible presence throughout Europe by increasing its Tu-95 'Bear' bomber missions, thus requiring NATO to scramble assigned fighter aircraft to intercept these non-NATO military aircraft.

Separate from land and maritime assets, Air and Space Power continue to demonstrate unprecedented value through their inherent attributes of speed, reach, flexibility, precision and low risk. These combined characteristics provide NATO and national political and military leaders with a tool of unmatched responsiveness, flexibility and usability. Air and Space Power capabilities were and will always be necessary to support joint/combined operations, set conditions and create the right circumstances for follow-on action.

Air forces throughout the US and Europe are aging. Long-standing capability gaps remain unfilled and continue to grow. And, 21st century threats

require new and advanced technologies in order to deter and counter. During the past decade, NATO leaders have acknowledged that security challenges to the Alliance and its Member States will not diminish in times of economic austerity or in an increasingly complex international environment. The dynamism of today's world arguably will require an increased reliance on Air Power and key air assets, such as Intelligence, Surveillance and Reconnaissance (ISR), in order to not only monitor the situation on the ground but also to enforce restraint, deterrence, and, if necessary, to disrupt negative security actions from taking place or continuing to occur. The need to maintain and continue to invest in Air Power will be necessary in the years ahead.

Today's Security Environment and Budget Realities

Inherent in the Member States' debate about what kind of NATO should there be post-2014 – and as a result of Russian actions in Ukraine – is the discussion about what defence capabilities will NATO as a whole and individual Member States need to be able to carry out the original task of providing deterrence and collective defence, its future vision, and entailing missions necessary to perform all that is needed. Military platforms, including naval ships, air force fighter jets, air refueller tankers, and land forces ground vehicles, all of which have been heavily used during the past few decades are all getting older and need to be either modernized or replaced. This will require massive investments of resources.

Transatlantic security issues have been dominated during the past decade by at least five issues, collectively grouped as the '5 Ds': continuous deployments, growing public debt, negative demographic trends, declining defence budgets, and the increasing focus on domestic issues leading to disinterest and even disengagement in foreign affairs and security issues by some governments and publics. As the discussion over resetting and restocking military equipment for US and European forces post-Afghanistan

begins, the Allied leaders will need to contend with over-stretched national financial coffers and publics who are tired of international security issues. Many taxpayers are expecting more focus on domestic political and economic issues at the expense of international ones. Even more likely in some circles, publics want to have their governments ignore international issues all together and let others assume responsibility for maintaining the post-Cold War international order.

NATO as a whole and, thus the Member States which comprise NATO, continue to witness drastic reductions in defence budgets and a diminishing of Air and Space Power capabilities. This trend began at the end of the Cold War and continues at an increasing rate. The figures are stark: since 2001 total European defence spending has fallen by roughly 15 % from approximately 260 billion Euros to 220 billion. The majority of European defence spending has been on personnel, which accounts on average 50 % of budgets, followed by operations and maintenance and equipment. The United States is now under a similar pressure as a result of sequestration cuts and other budget reductions. Most Member States do not meet the agreed minimum 2 % of Gross Domestic Product (GDP) on defence spending, which in itself is arguably an imprecise indicator of a country's commitment to its own national defence. However, when looking across the capability sets that individual Member States possess throughout the Alliance can bring to the 'fight' (which is an indicator of how much GDP they are spending on national defence), the differences are stark.

The Effect of Diminishing Budgets on Future Air Power Debate

Even before the crisis in Ukraine started, one of the most critical transatlantic discussions to take place involves engaging in a renewed investment in Air Power capabilities such as next generation fighter jet aircraft, strategic lift (such as C-17s and A400Ms), intra-theater lift, air-to-air refuellers, precision strike, missile defence, and ISR including manned and unmanned aircraft. Air

and Space Power capabilities take time to develop and significant amount of monies to maintain. While efforts are being made to upgrade some fighter fleets in the US, Canada, and Europe, this effort comes with a hefty price tag, one that taxpayers are struggling to come to terms with as a priority – and one that has brought some unhelpful media attention and government comments which has called into question the overall intention of Alliance Member States to maintain a robust Air Power capability in the coming decades.

There is a fair chance that the stress on national defence budgets will put investments in future Air and Space Power under heavy scrutiny, and thus will diminish the minimum military Air and Space Power capabilities needed to support NATO's Level of Ambition, thereby limiting the capabilities to achieve strategic, operational and tactical effects and success in the light of the challenges that NATO faces in the years and decades to come. Thus, this will likely require individual Allies and members to either heavily invest in more independent Air Power capabilities or become even more heavily dependent on those few nations which make the decision to retain such capabilities, neither of which is an ideal nor sustainable option for the Alliance as a whole if the Alliance Members collectively are not seized with addressing this problem.

For years, those familiar with NATO defence planning have known that, technically, the Alliance does not have any capability shortfalls as long as the US participates in a given mission. The years of 'shoe banging' by US Defence Secretaries Rumsfeld and Gates regarding inequalities among Members in terms of burden-sharing and bringing capabilities to the fight, particularly with aerial assets such as ISR and helicopters, for the Afghanistan operations created many tensions within NATO with relatively few long-term fixes. The recent NATO air campaign in Libya further highlights where collective shortfalls existed which could not be filled without the assistance of the United States. These included limited ISR, air refuelling, and Suppression of Enemy Air Defence (SEAD) capabilities.

Three years after the end of the Libya mission and with numerous defence white papers and strategic reviews having been produced, the outlook for Europe's Air Power capabilities remains worrisome. There are still major capability gaps to be addressed (and invested in) including ISR, air-to-air refuelling, UAVs, intra-theater airlift, and missile defence. As the Libyan campaign demonstrated, some of these capability shortfalls were allowed to go unacknowledged. Owing to budget limitations these gaps will not be filled. As a result there are no longer any European countries with 'full spectrum' capability, although there are a number with 'broad spectrum' capabilities. And with the release of the new US defense budget for FY 2015, the United States may be able to retain 'full spectrum' capability, but it will likely see these depth per capability in this spectrum which will, in itself, create a new set of problems for the Alliance in terms of whether Washington will be willing to make certain, scarce capabilities available for non-US use.

The Benefits of Air and Space Power

In simple terms, Air and Space Power should be seen as being able to assist in at least four roles, all of which should not be understated or overlooked: sovereignty protection, force projection, threat elimination, technological innovation, and economic improvement.

Sovereignty protection. The most critical rationale for a nation to maintain a robust and usable Air Power capability is that it provides for the defence of the country's population. Citizens expect their government and military to provide for the security of the territory in which they live in. Air Power is vital to ensuring the nation's population feels secure.

Force projection. The ability of a nation to be to defend against threats far from its borders as well as deter potential aggressors at great distances has become increasingly important in recent decades. Air Power, along with Sea Power, provides visible means by which to project force.

Threat elimination. When the tools of diplomacy and deterrence have either failed or failed to deter an aggressor from a determined path of disrupting the security situation in a certain geography or against a group of peoples, Air Power has the ability to eliminate the threat(s) with great lethality, precision, speed, and with minimal risk to the nation or coalition of nations engaged in the operation.

Technological innovation and economic improvement. In order to maintain a robust Air Power capability, a great deal of cutting edge technology and engineering need to be employed. Arguably the advances in military warfare and force projection during the wars of the 20th century combined with the space race to the moon in the 1960s created the conditions that led to technological innovations in wireless communication, improvements in long haul commercial airline travel, composite materials, etc. – all of which have not only improved the capabilities of Air Power assets, but also have had a massive effect on improving the quality of population's economic and personal well-being around the world.

The Paradox

The benefits of Joint Air and Space Power seem understandable and significant when presented in isolation. When mixed into greater debates with competing defence spending not to mention domestic spending priorities, the likelihood of the need for Air Power reinvestment rising to the top is slim without impassioned and reasoned arguments from key stakeholders. In some Member States, there continues to be a debate over whether a national air force is even needed given the cost to maintain such a capability and the fact that many other Member States have far larger air forces which may be able to cover the airspace needs of multiple allies.

As a result of all these independent elements and trends all happening at once, NATO and its Member States are faced with the paradox that is, on

the one hand being the pivotal toolbox for operations, but on the other hand being confronted with severe reductions. NATO and its Member States cannot afford a diminishing Air Power and restrictions or interruptions in accessing Space Power. It would not be an understatement to argue there is a sincere risk that NATO as an institution will not have the right and sufficient future Air Power and access to Space Power capabilities, to cope with the security challenges as depicted in NATO's Strategic Concept for the actual and following decades till 2040. Moreover, NATO Member States, who have an obligation to provide for their own territorial integrity and who also often agree to participate in national missions outside of their border as well as participate in multinational operations as needed by the EU, UN, or other organizations, may well need to limit their ambitions and involvement if the trends in Air Power recapitalization continue to be negative. Therefore, it is essential to identify viable options and solutions to chart the path forward to guarantee that Air and Space Power continue to contribute to the security and success of NATO and its Member States.

The key for budgeters, policy makers, and leaders is ensuring publics and parliaments know what having a strong national and Alliance defence capability requires along with understanding the risk of not investing in defence or for presuming other nations will step up and fill the vacuum left by those that won't invest. The goal for gaining this understanding should not be just to make the most informed decisions when it comes to resetting, restocking, and investing in defence capabilities but also to be able to convince the taxpayers that these decisions are in the interests of the Member States and the Alliance.

What Needs to Happen: Making the Case

At the end of the day, there is an increased quality of life when a nation's population feels its borders, sea-lanes, and airspace are secured. Having robust Air Power capabilities is one assured way in which a nation can defend

its own sovereignty, project power abroad, assist allies and partners in need, eliminate threats, and enforce the peace. It is not clear these factors are well understood by those who are responsible for funding the budgets of NATO militaries. A narrative and dialogue with key policy makers and opinion leaders must be undertaken soon so that all responsible parties can be reminded of what an important and necessary element Air Power is for the physical and economic security of a nation and for the ability of NATO to remain an agile, flexible, and when needed, decisive tool to deter aggressors. The risks to NATO's collective security as well as to the transatlantic way of life and economic livelihood could be in jeopardy if a serious, informed, and threat-based conversation is not undertaken within the next few years.

A proper and thorough debate and discussion on the enduring needs for robust, capable, and broad-spectrum Air Power capabilities throughout the Alliance will likely only take place if at least four conditions are met:

- There is joint discussion and relative agreement about threats facing the Alliance and individual Member States and the role Air Power will or can play in addressing/mitigating these threats.
- Conviction that Air Power has been critical to maintaining Alliance security and has been used decisively when needed in order to deter and defeat those who challenged Allied interests.
- Compelling arguments to convince skeptical and conflicted finance ministers and budgeters that the value of maintaining an Air Power capability and investing in future next generation capabilities is vital to the security of the nation and the Alliance.
- 'Fencing off' long-term funding and resources in order to ensure specific Air Power capabilities are realized and are not subjected to ever-changing domestic political whims and election debates.

Given the reality and pervasiveness of the 5 Ds, it will take sustained effort by a determined core group of government leaders, policy makers, parliamentarians, public sector supporter, and industry in order to ensure

there is serious debate on the need for sustained Air Power capabilities for Member States as well as the Alliance as a whole. It will take a minority in order to educate and guide the majority. More than any other element, leadership will be required in order to overcome resistance among parliaments and the public about the need to invest properly and responsibly into Air Power at the possible expense of investing heavily into other systems or other non-defence programs. No one nations' investment needs to be outsized and inappropriately large; small but focused investments into needed Air Power capabilities will see a long-term and exponential return to the Member State and the Alliance.

NATO's Air Power capabilities post-Afghanistan might have received a temporary reprieve from being further cut as a result of Russia's actions in Ukraine and the ensuing debate about the need to halt further Russian aggression into other parts of Eastern Europe by demonstrating unified NATO Member State resolve. The reality, however, is that the collective attention span of transatlantic leaders and publics will only last as long as it takes for the next major crisis to emerge or election to be held. Investments in Air Power capabilities have to be able to endure outside of a crisis mentality. Without a sustained and active dialogue among Alliance leaders, NATO's collective Air Power capabilities will be drastically reduced and arguably outdated, which will have an enormous negative impact on the ability of the United States, Canada, and Europe to provide for the security and economic well-being of its populations, territory, and the greater transatlantic space. Key to the debate will be ensuring parliamentarians understand the stakes of what neglecting Air Power capabilities mean for the security and economic livelihood of their nation and the Alliance.

Endnotes

1. Where the document refers to NATO, this should be read as NATO and its Member States.

The Impact of Global Trends on Air and Space Power in NATO[1]

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By Dr. Hans Binnendijk

Overview

The Joint Air Power Competence Centre in Kalkar, Germany published the results of an important Air and Space Power study under the title 'Present Paradox – Future Challenge' in April 2014. This study assesses an array of global future security environment trends and draws six sub conclusions about the future operating environment for Air and Space Power in NATO. This essay first takes an independent look at the future global environment based upon a review of multiple trend studies prepared by different nations and organizations.[2] Next, it evaluates the six sub conclusions of the 'Present Paradox – Future Challenge' study based on the findings of these other studies. Finally, it carries the discussion of the future strategic environment beyond the JAPCC sub conclusions and makes some recommendations for European contributions to Air and Space Power in NATO.

The six JAPCC sub conclusions about the future operating environment are summarized as follows:

1. The investments in Air and Space Power that Russia, China, and India have made over the past decade, and are continuing to make, combined with decreasing budgets and lower investment in the West, point to a likely shift of relative military capabilities from NATO to Russia, China, and India.

2. Climate change could alter the strategic environment by necessitating more frequent responses to natural disasters and relief missions.
3. The fight to control and influence the domains of Space and Cyberspace is increasing; the emerging powers are closing the technology gap.
4. Air and Space Power can be applied across the entire spectrum of operations and gives NATO an advantage over adversaries; but close cooperation with research organizations, scientific institutions and industry will be needed to maintain NATO's technological lead.
5. Advanced air defence systems are proliferating and becoming available to non-peer competitor states; if this is not addressed, then the Alliance's strategic advantage in Air Power could be significantly eroded.
6. The future battlespace will be increasingly congested, complex, multi-dimensional, non-linear, uncertain and lethal; conflicts will occur on a variety of fronts and asymmetric warfare will be the tactic of choice for those who want to exploit state vulnerabilities.

Since these sub conclusions are a critical cornerstone of the JAPCC study, it is important to make sure they are accurate. A review of major trends independently derived from these studies tends to confirm the general validity of these six JAPCC study conclusions.

Eight Global Trends Relevant to Air Power

Trend #1: European Complacency

Europe during the past decade has been peaceful and secure from major conflict; this has led to a degree of national security complacency in Europe that discounts an array of new challenges.

This trend tends to confirm at least partially sub conclusion #1 of the JAPCC study. European Defence spending has been in steep decline for a decade.

The history of Europe is a history of warfare and division. After the breakup of the Soviet Union, NATO played a central role in developing a new more stable Europe. It brought peace to the Balkans and brought twelve new Member States into the Alliance. These two NATO policies created an unprecedented situation in Europe: a Europe nearly whole, free and at peace. This fortunate situation has an unfortunate consequence; Europe has become relatively complacent about the remaining and emerging security challenges. The European Union's common foreign and security policy remains underdeveloped.

Several trend studies conclude that traditional US allies and partners are becoming relatively weaker and turning inward.[3] The United States National Intelligence Council's (NIC) Global Trends 2030 projects that EU nations will lose their current second place 'power position' in the next few years, based on its traditional four-component power forecast (including GDP, population, military spending and technology).[4]

The result is a dominant focus in Europe on the current economic crisis, complacency and a fatigue about security issues, and a decline in Defence capabilities, which together could have a profoundly negative effect on Alliance cohesion.[5]

Europe's sovereign debt crisis is creating deep divisions within the Euro zone. Germany and other northern nations are bankrolling southern nations, requiring austerity as a condition of support. Unemployment in some southern European nations is at record levels. For example unemployment in Greece reached 27.6% in July.[6] A recent German Marshall Fund poll concluded that Europeans expressed growing dissatisfaction with the European Union and the Euro, and that there is a growing divide in Europe between successful and still troubled economies.[7] There is growing radical populism in countries like Greece (Golden Dawn), France (National Front), Italy (Five Star Movement) and Hungary (the Jobbik party).

While the immediate threat to the Euro zone seems to have abated in late 2013, these economic pressures will be the major focus of European attention for years to come.

There is also considerable European public fatigue with combat operations in the Middle East (generally 60–80 % of those polled opposing continuation of ISAF combat operations), though the German Marshall Fund's recent poll did reveal that 53 % of Europeans would support a continued European contribution to post 2014 training missions in Afghanistan. During the Libya campaign, all NATO Member States supported the intervention, 14 took part in various ways, but only eight conducted military operations. The most dramatic example of this fatigue took place in the British parliament when even members of Prime Minister Cameron's own party refused to sanction a military strike on Syria in response to chemical use against civilians. These trends are complicated by an aging population that could also have a negative impact on economic production and willingness to pursue a global security policy.[8] This complacency is not universal in Europe; France in particular has been willing to use force to stabilize the situation in Mali and the Central African Republic.

European defence spending has been cut by approximately 15 % over the past decade, mostly without adequate coordination with other NATO Member States.[9] Only three European members of NATO meet the 2 % of GDP defence spending guideline agreed by the alliance. There appears to be no near term reversal of this trend. This is why former Secretary of Defense Robert Gates said NATO's future might be 'dim if not dismal' and why President Obama spoke about complacency in his Berlin speech.[10] Now former Secretary of State Madeleine Albright has publicly warned that the US may be 'running out of patience'.[11] The Smart Defence concept initiated by NATO's Secretary General has some 30 projects associated with it, but most are still on the drawing board and none will significantly fill critical

capabilities gaps. It raises questions about European willingness to invest in long-term defence, including Air and Space Power.

European Air Power has become the 'poster child' for what concerns the United States about European defence capabilities. During the Libya operation, it was shortages in air delivered weapons and lack of European refuelling aircraft and ISR assets that drew American attention. During the Mali operation, it was the need for strategic and theatre airlift. Europe can help to minimize the burden sharing debate by rectifying these Air Power shortages.

Recommendations

This degree of European complacency carries two risks: 1) A new burden sharing debate will divide the alliance when unity is required in the face of annexation of Crimea and; 2) The Alliance may not be militarily prepared for future operations.

NATO must make a major effort to create a 'get well plan' for European Defence capabilities. These should include a summit pledge by heads of state to increase Defence spending as soon as GDP growth improves, perhaps to the 2 % of GDP goal. Some are considering a transatlantic division of labour in which the United States and European Member States would agree the role each might play in the six phases of combat operations.

NATO should also include an effort to create a 'modular NATO' that would allow individual lead nations to use NATO assets in operations, thus formalizing the 'Mali model' in which France operates with support from several NATO Member States.

Germany has champion a new concept for 'framework nations' which would have a lead nation work with a cluster of smaller nations to deliver capabilities more efficiently. The United Kingdom has proposed a similar,

more operationally focused, Joint Expeditionary Force, which it plans to establish soon along with several smaller nations. Both ideas would increase the efficiency of acquiring, organizing, and projecting European Air Power. Both should be endorsed at the summit.

Trend #2: An Aggressive Russia

This positive security assessment for Europe is changing because Russia has annexed Crimea, has instigated near-civil war in Ukraine, has intimidated many of its other neighbours, and is seeking closer ties with other authoritarian states.

This trend also partially supports sub conclusion #1 in the JAPCC study. Although we are not witnessing the recreation of Soviet military power, President Putin clearly intends to strengthen Russia's military capability, leverage it, and develop new security relationships where he can. A stronger security relationship between Russia and China remains a distinct possibility.

The United States National Intelligence Council's Global Trends study indicates that Russia's power index is constant over time but Russia's anti-western drift creates isolation and mistrust.[12] Russia's future direction is uncertain. Today's leaders in the Kremlin seek to regain their lost strength by confronting the West rather than joining it. That is particularly clear in Putin's effort to force Armenia, Moldova and Ukraine to join the Eurasian Union rather than the European Union. Russia has used military force to annex Georgia and the prospect for Russian military involvement in the rest of Ukraine exists.

President Putin carries an array of grievances regarding the West, including NATO enlargement, abrogation of the ABM treaty, regime change operations and so-called interference in Russia's internal affairs. In response Russia has followed a policy of domestic repression, foreign intimidation and its own pivot to Asia. Putin is seeking new partnerships with China

and other emerging powers as he turns his back to Europe. In the longer run, Russia could become politically unstable due to a shrinking population, immigration, and extensive dependency on energy exports.[13]

Russia's Defence budget, now at $71 billion annually, is on the rise as Europe's is in decline. NATO forces are not postured for forward Defence (and should not be) and are at a geographic disadvantage along the Russian border. The Russian Air Force is modernizing and may order 350 new combat aircraft by 2020. Russia will retain the second largest air force in the world after the US during the next decade. Russian Space Power is gradually recovering. The US and Russia will probably maintain parity in deployed strategic nuclear warheads as part of the new START agreement, though Russia has a ten-fold advantage in European based non-strategic nuclear weapons.

The United States and NATO have responded to the annexation of Crimea with modest rotational forward deployment of ground forces, naval exercises in the Baltic Sea and rotational naval deployment in the Black Sea, and strengthening of Baltic Air Policing. More steps are under consideration. Two rounds of economic sanctions against Russia have been implemented and a third is in place should Russia continue in its current direction.

NATO military conflict with Russia remains unlikely. But the risk is not zero given President Putin's aggressive behaviour. NATO's recent STEADFAST JAZZ exercise – using an Article 5 scenario – and expanded NATO air policing missions over the Baltic States, suggest that risk.

Recommendation

This growing Russian challenge suggests that significant NATO combat Air Power will continue to be required to deal with Article 5 scenarios. European air policing requirements will likely grow. Furthermore, the

nuclear delivery mission now assigned to Europe is likely to continue to be needed absent a tactical nuclear arms reduction deal with Russia, which seems unlikely.

Trend #3: Relative American Decline

Most trend studies indicate that the United States is in relative decline, raising questions about the direction of US Defense spending and Defense strategy.

This trend also reinforces sub conclusion #1 of the JAPCC study. The United States Defense budget will drop from over $700 billion to about $500 billion annually in just a few years. That Defence budget reduction is the consequence of ending two wars in the Middle East. And yet the cut is equal to perhaps two thirds of the overall European Defence budget.

The NIC Global Trends 2030 assesses that the US will hold just under 20 % of total global power by 2030, a decline from about 25 % today.[14] This is less the result of American decline and more the result of the rise of others. By that year, no one country will be a hegemonic power. Europe and Asia have both relied heavily on the United States to set norms and maintain peace in their regions. US relative decline raises questions among some allies about its continuing global role.[15] Specifically, some allies are concerned about a weakened US role as norm setter and enforcer.

For the first time, the NIC included in its periodic Global Trends report a section on the changing geostrategic position of the United States as a potential 'game changer'. Other trends studies raise similar questions. Global Trends says that the US relative decline vis-à-vis rising powers is inevitable and that whether the US can work with its partners to reinvent the international system is among the most important variables facing the international system.[16]

After a decade of war in Iraq and Afghanistan and a global recession, the United States is showing fatigue and reassessing its global posture and Defence requirements. The resistance in the US Congress to authorizing a modest military strike against Syria is but the latest example. The Obama Administration's rebalancing or 'pivot to Asia' is in part a manifestation of that fatigue with Middle East wars and the subsequent reassessment of the importance of Asia.

The US Defence budget is in rapid decline. The 2012 US Defence budget was about $712 billion, including supplemental appropriations for Iraq and Afghanistan. With these supplemental gone, with the 2011 reductions under the Budget Control Act, and with further cuts relating to the sequestration agreement, the Defence budget could be cut to about $500 billion by 2014 for a reduction in three years that is equal to about two thirds of the overall European Defence budget.[17] The post 2014 US Defence budget will still remain viable, roughly twice the projected European and Chinese Defence budgets. Many of these cuts are offset by reduced operating costs in the Greater Middle East. Nonetheless, these cuts are sudden and deep and have forced a reassessment of national challenges and priorities.

The 2012 Defence Department's Strategic Guidance directed that US force structure be rebalanced from a current ratio of 50/50 for Europe and Asia to 40/60 respectively. The most visible result for Europe was the removal of two of the four remaining Brigade Combat Teams; the longer term fate of the remaining two is unclear. But the new force structure ratio will affect US Air Power in Europe. The US carrier presence in the Mediterranean Sea might also be reduced.

The new US Quadrennial Defence Review advances the notion of moving from a two-war 'win-win' strategy to a 'win-deny' strategy. This, plus the pivot, has a significant impact on European Defence capability requirements if

the first of two potential conflicts occurs in Asia. It means Europe will need to play a larger role in any second conflict involving NATO in the European neighbourhood since the US force will for some risky period of time be engaged primarily in Asia. European forces will be needed to assure an earlier win.

Recommendations

To compensate for this trend, Europe will need to strengthen its own military level of ambition. European members of the alliance should develop a goal to have a 'full spectrum air force' including strike aircraft, defence suppression, air-to-air refuelling, C4ISR, and strategic lift. The bill for European Air Power will increase significantly during the next decade.

This trend further suggests the need for a new global division of labour in which: 1) Both the US and Europe remain fully committed to Article 5 missions in Europe; 2) Europe should have greater responsibility for non-Article 5 security in the Balkans and along NATO's south-eastern borders; 3) Europe takes the lead with US support in North Africa; 4) The US and Europe share equally in Middle East security but without long term commitment to nation building, and; 5) The US leads in Asian security but with modest military contributions from Europe and greater European soft power engagement.

Trend #4: Shifting Power

Economic and military power is shifting from the transatlantic nations to the East and South.

Trend four tends to support sub conclusions #1, #3 and #5 of the JAPCC study. China's global interests are growing and it will seek ways to protect them. China's Defence budget may be more than half that of the US

by 2015. Its Space and Cyber capabilities are rapidly growing. Within a decade, its anti-access area denial capabilities will have a profound impact on America's ability to operate in the South and East China Sea in time of conflict.

Global Trends 2030 projects that by 2030, Asia will have surpassed North America and Europe combined in terms of global power, based on GDP, population size, military spending, and investment in technology.[18] Some trend studies conclude that this will result in an accelerating de-Westernization of the world.[19] These projections are, of course, based in part on assumptions about continued economic growth rates that may not materialize.[20]

China's power index alone as measured by the NIC surpasses Europe's in the next few decades and surpasses the US before 2045. China's actual Defence budget was estimated by the US Defence Department to be at about $150 billion in 2009[21], double the 2007 amount, while Jane's Defence Forecasts in 2012 estimated that the Chinese Defence budget might rise to $238 billion by 2015, or half of the US Defence budget. The People's Liberation Army Air Force is in rapid transformation from a territorial Defence force to one able to project power well beyond its shores. China was the third nation to independently send humans into space and they plan to have a permanent Chinese space station by 2020. China has demonstrated the will to use cyber weapons for commercial and military espionage; they also have the technical capability to use cyber tools as 'Weapons of Mass Disruption'.

During the next few decades, China will become the largest consumer of oil, coal, and steel – much of it imported. Territorial, fishing and seabed disputes could lead to further incidents and interstate conflict, involving countries to which the US has given security commitments. This may create greater risk of incidents at sea along the Asian coast and the need

for a significant US Navy presence.[22] Between 44 and 55 % of all new global shipbuilding will be Chinese.[23] China aggressively supports its maritime claims against most of its neighbours (including US Allies) with its insistence on its traditional so-called nine dash line and settlement of these disputes on a bilateral basis where they have maximum negotiating leverage. Chinese dependence on sea-lanes will increase significantly, especially from the Persian Gulf and Latin America.

China also controls about 80 % of the world's current supply of 17 rare earth minerals, many of which are needed for aircraft manufacturing. It is now setting export controls on those minerals.

To protect its maritime interests, China is developing an anti-access area denial capability that in ten years may make it difficult for any navy or air force to operate near China's shores. China may also seek overseas bases to protect its interests.[24] China's pursuit of energy security is expected to transform China into a major extra-regional power in the Middle East.[25] These trends will make US-Chinese relations critical to future global security environment.[26]

Japan shows signs of emerging from two dormant decades, but it may be held back in the longer term by demographics of aging.[27] Global Trends 2030 still shows Japan as a declining major power.[28] Nonetheless, Japan has been a 'trilateral partner' with Europe and the United States for decades and must remain at the centre of any transatlantic pivot to Asia. South Korea, Indonesia and Australia are emerging democratic powers. Vietnam and the Philippines are seeking closer security ties to the United States. The United States has and will maintain defence treaties with Japan, South Korea, Australia, Thailand, and the Philippines.

Global Trends 2030 concludes that there are 17 countries in Asia, most of them in Southeast Asia, which have a domestic governance gap. Their eco-

nomies are growing faster than their ability to adjust their governments from autocracy to democracy. Countries in this category tend to be unstable.[29]

The complex strategic mix in Asia has the potential for severe political confrontation and possible great power conflict. China is the rising global power challenging the existing superpower and history demonstrates that wars result from this dynamic. China sees the US pivot to Asia as part of a broader effort at containment, something the United States denies.

North Korea is an enigmatic and dangerous country with nuclear weapons. Defence budgets are increasing everywhere in Asia and in 2012 total Defence spending in Asia exceeded total Defence spending in Europe.[30] Ocean geography will be redefined in the future with a focus on the Indian Oceans and South China Sea. These are areas with disputed territory and projected higher volumes of traffic.[31]

There are inadequate institutions and norms of behaviour in Asia compared to those that have developed in Europe. In addition, the reconciliation between old enemies that has taken place in Europe has not taken place in Asia to the same degree. These trends will make it difficult to manage the complex strategic mix described above. Global Trends 2030 concludes that an increasingly multi-polar Asia lacks a well-anchored regional security framework and could constitute one of the largest global security concerns.[32]

The risk of major military confrontation between the US and China remains low. The risk of conflict involving North Korea is somewhat greater. But as noted, these risks will draw US forces to the Asian region to help deter and reassure allies.

The shift of power to Asia combined with the relative security of Europe and the desire to disengage at least partially from the Middle East has lead

to the US policy of rebalancing or pivoting to Asia. As a result, US overseas force structure will shift from the current 50/50 ratio to a 60/40 ratio favouring Asia.

Recommendations

The US pivot to Asia will have multiple consequences for Europe and European Air and Space Power. First, Europe will need to make greater military contributions to alliance operations in North Africa and the Middle East. The 'Libya model' and 'Mali model' of operations may be the future. This means that European lead nations will play a dominant role in operations, many of which will be air operations. Second, NATO will probably begin developing programs to develop closer ties to Asian partners, including greater military interoperability and possible NATO exercises in the Indian Ocean. Third, if the United States is ever involved in significant air combat operations in Asia, it is likely to leave few air assets in Europe to augment European Air Power. Fourth, should the United States be attacked in Asia, it might trigger an Article 5 commitment. The Unites States might, under those circumstances, expect some military contribution from European allies; Air Power is a likely candidate.

Trend #5: Malthusian Future

Demographic trends, resource requirements, and global warming are neo-Malthusian in nature and suggest even greater future stress in the Greater Middle East.

Trend five tends to support sub conclusions #2 and #6 of the JAPCC study. Climate change combined with massive urbanization and growing global resource requirements will create greater chances for both humanitarian catastrophes and for major conflict.

Three global factors will converge in the next decade and a half to create additional pressures on already stressed populations in the Greater Middle East and parts of Asia. Those new pressures will create continued political instability and make it difficult for transatlantic partners to neglect the Middle East as they pivot to Asia.

The first neo-Malthusian trend is demographic. As the global population grows from 7.1 billion to about 8.3 billion during this period, the percentage of global population living in urban areas will grow from roughly 50 % to about 60 %.[33] Much of this urban growth will take place in the Greater Middle East and in Asia (China, Southeast Asia) where most megacities now exist. Youth unemployment in urban areas is already a major cause of political extremism. Asia will see a higher degree of population aging as compared with the Middle East, which trend analysis believe will constrain extremism in Asia but not in the Middle East.

The second neo-Malthusian trend relates to resource requirements. Growing global food (+ 35 %), water (+ 40 %) and energy (+ 50 %) requirements between now and 2030 may not be met, especially in the developing world where population growth will be greatest. Unmet requirements and resource competition could trigger discontent and violence.[34] Growing power in Asia may mean that the Middle East will bear the greatest burden of this competition for resources.

The third neo-Malthusian trend is global warming. Asia is increasingly the principal source of the growth in greenhouse gases that cause global warming. Changing weather pattern would cause a combination of flooding in some areas as oceans rise and drought in other areas. North Africa, South Asia and Middle East would be hit hard with drought.[35] Coastal mega cities will be more prone to flooding, especially in South Asia and Southeast Asia. Environmental security will be a greater concern. Natural

disasters might cause governments to collapse.[36] More humanitarian crises and disaster relief missions can be expected.[37]

The long-term future of the Arab world may hang in the balance as these trends impact the region. Sunni-Shi'a rivalries are already spilling over national boundaries as conflicts there are becoming regional. These three global trends provide a potential perfect Malthusian storm, which may accentuate this already spreading conflict. Already Secretary of State John Kerry is focusing most of his attention on Middle East issues, prompting critics to ask whether the pivot to Asia is for real.

This trend also suggests that European Air Power will be needed in the future for an array of potential missions in Europe's neighbourhood. Conflict resolution operations like those in Libya, Mali, and the Central African Republic are likely to reappear fairly consistently. Air Power to lift troops or support ground operations will be needed. This may be in the context of NATO operations or NATO Member States may be asked to support a lead nation. In addition, the demand for humanitarian assistance and disaster relief operations is likely to increase, including for strategic lift and in theatre lift.

There is an additional mission for European Air Power associated with this trend. NATO is likely to embark on a Defence and Security Sector Reform program for several potentially unstable countries in Europe's neighbourhood. Strengthening the air force capabilities of these partners will require a significant contribution from European Air Forces.

Recommendation

European nations will be faced over the next decade or two to cope with additional disruption in its neighbourhood caused by demographic pressure, climatic disruption, and resource shortages. History shows that Air

Power is needed both for peacekeeping and humanitarian relief purposes. Europe may need to take the lead in these operations and needs to prepare to do so.

Trend #6: Impact of Technology

Technology may become the great equalizer. Globalization driven by information technology will continue to compress time and space with greater risk of strategic surprises.

Trend six tends to support sub conclusion #3 and #6 of the JAPCC study.

Information technology will continue to improve dramatically if not at the pace of Moore's law.[38] Barriers to entry for most technologies are getting lower. Governments may be at an increasing disadvantage as individuals gain global access. Dependence on the internet will continue to increase. But the underlying technology is vulnerable to attack with massive disruptive impact.

The 'futures' literature draws several conclusions based on continued globalization and developments in technology.

- Complexity among international actors combined with trends in information flows gives rise to a greater prospect of strategic surprise. Most trend studies highlight the increasing importance of game changers, disruptive forces, 'wild cards' or 'black swans.'[39]
- The increase in velocity and mass of information will decrease the time available for decision making, providing less opportunity for consultation and greater risk of uncoordinated action.[40]
- There will be an explosion of trade in goods, services, and ideas.[41] Freer movement of goods, information, ideas can strengthen demand for greater political participation but risks dangers of populism.[42]

- Closer proximity could mean more common values or it could amplify religious, ethnic and tribal differences.[43]
- Rapid development in bio- and nanotechnology could be used asymmetrically to the disadvantage of NATO.
- Artificial intelligence will play an increasingly large role.[44]
- New manufacturing techniques such as additive manufacturing (3D printing) have the potential to change global work patterns and to proliferate technological capabilities.[45]

Recommendations

European Air Forces will be required to respond to the greater risk of surprise events that require quick response.

In response to missile and Weapons of Mass Destruction (WMD) proliferation, Europe will need to demonstrate a European commitment to Ballistic Missile Defence (BMD) to demonstrate that the US European Phased Adaptive Approach has a European counterpart.

Another consequence for Air and Space Power is the need to retain the lead in new technologies including artificial intelligence and additive manufacturing.

Trend #7: Inadequate Rule of Law

New areas of potential inter-state conflict are appearing, primarily in the global commons where norms and the rule of law are inadequate.

Trend seven tends to support sub conclusions #3 and #6 of the JAPCC study. Inadequate norms and rule of law in the global commons (maritime, arctic, cyber, and space) could create a more complex, non-linear and asymmetrical battlespace.

Agreed norms and the rule of law are fundamental to avoiding conflict in the international system. As the importance of the global commons has grown, the ability to develop or adapt norms has not kept up. There are four areas, all of which affect the transatlantic partners, which require clearer rules of the road.

The first is contending claims of sovereignty in the ocean area between Vietnam and Japan. According to ACT's Strategic Foresight Analysis, energy security will be a major source of maritime disputes, within both 'blue' and 'brown' water environments. Exploitation of the seabed's resources will likely increase the number of disagreements with the potential for conflict and subsequent degradation of trade and investment in those regions. International maritime organizations will be taxed trying to deal with disputes.[46] The most dangerous set of maritime disputes are between China and its maritime neighbours. China has claimed vast maritime territory under its nine dash line claim and seeks to settle these claims through bilateral negotiations with each party, giving China a negotiating advantage in each case. Meanwhile incidents at sea continue to create the risk of escalation. Europe has a stake in avoiding conflict over these claims and maintaining open sea lanes.

Second, Arctic warming is taking place at twice the rate of the rest of the planet. If this continues, trans-Arctic shipping may soon be open for several months a year. The melting ice cap also may open up significant undiscovered oil and gas reserves. If disputes in the Arctic over territory, fishing and mineral rights are not settled, incidents may occur and escalate.[47] The eight member Arctic Council and the Law of the Seas Treaty provide mechanisms to solve disputes, but they may be inadequate. Five of the eight Arctic Council members are also members of NATO; China has permanent observer status.

Third, cyber-attacks are becoming more frequent and with greater consequences. International law and norms exist but they are inadequate for

the rapidly expanding set of questionable cyber activities.[48] It is also complex because of the vast array of possible attacks, including hacking for pleasure or profit, cyber espionage, denial of service attacks for political intimidation, attacks of a nation's infrastructure, and attacks on military establishments. Developing clearer norms to prevent cyber-attack and potential escalation is in the interest of the transatlantic partners and of Asia.

Fourth, advances in technology and development of commercial delivery systems have allowed more nations and non-state actors' access to space with the subsequent ability to disrupt space capabilities.[49] Space has become more 'congested, contested, and competitive'. The 1967 Outer Space Treaty, now ratified by 102 parties, does prohibit placing nuclear weapons in space but it does not extend to conventional weapons or anti-satellite weapons. In addition, with new entrants to space, space clutter is an increasing problem. There are an estimated 22,000 objects in orbit larger than four inches and a tipping point may have been reached which would affect the United States, Europe and Asia alike.[50] The United States has been working with the European Union and other nations to develop an International Code of Conduct for Outer Space Activities, based in part on the 2008 EU Code of Conduct.[51] As more and more nations and private groups launch space satellites, internationally agreed norms will be needed.

Recommendations

Potential conflict over disputed norms in the global commons will create some additional missions for which European Air Power must prepare. Aside from Asia, which was discussed earlier, perhaps the most dramatic will be in the Arctic relating to search and rescue. If territorial claim disputes in the Arctic persist, one can imagine air-policing operations over that area.

NATO must retain full access to space assets to assure adequate ISR as a basis for most NATO missions.

With regard to cyber security, maintaining the integrity of the NATO command and control network to project Air Power will become increasingly difficult and important.

Trend # 8: Complex Conflict

The scope of armed conflict is changing and the NATO alliance needs to adjust further.

This general set of trends tends to support sub conclusions #3, #4, #5 and #6 of the JAPCC study.

Many trend studies tend to concentrate on the future nature of warfare. Below are the most important trends they have identified. They suggest that despite the low level of violence today, the probability and consequences of aggression are increasing.[52] Armed conflict will remain a major element of the strategic landscape but that it will become even more complex. To deal with this prospect, the transatlantic alliance will need to be increasingly engaged, agile, and comprehensive in its efforts to maintain security in its region and beyond. The major global trends in future conflict are highlighted below.

- The NIC points to a rising risk of small-scale interstate conflict in Middle East, Caucuses, South Asia, and East Asia.[53] There will be a greater risk of spill over from regional conflict.[54]
- Organized terrorist groups with international reach are franchising and are turning to organized crime. They will probably have more firepower (Precision-Guided Munitions (PGMs), biological weapons, radiological devices).[55]

- The greatest concern for American Defence planners is what they call 'anti-access area denial' which is the result of the growing ability of states like China and Iran to use long-range precision munitions and submarines to deny other navies and air forces access to their littoral.[56]
- Future conflict will present 'hybrid warfare' challenges in which the lines between various types of conflict will be blurred[57] with a mix of traditional and irregular war, terrorism, and a greater emphasis on the battle over the narrative. These conflicts will require what NATO calls the 'comprehensive approach', which includes both military and civilian assets.
- In the future, nations may face more creative, sophisticated, and injurious asymmetric attacks[58] with a greater risk of use of weapons of mass destruction, including radiological devices, and of cyber warfare.[59]
- Failed and fragile states will provide safe havens for non-state actors.[60] Any use of force against non-state actors such as terrorist and transnational criminal organizations inside another sovereign state may challenge the international legitimacy of taking action without that state's permission.[61]
- An increase in the use of private military security companies could have diverse, sometimes unpredictable, and even undesirable effects on the security landscape.[62]
- Control of space could be critical in the opening days of large conventional war.[63]
- Missile attacks and missile defences will also become a feature of modern warfare.[64]
- Militaries will increasingly have a role to play in homeland defence, including emergency and humanitarian operations.[65]

Recommendations

Each of these sub-trends present challenges for NATO and European Air Power. The most important may be anti-access area denial capabilities of potential adversaries and US efforts to develop concepts like Air-Sea Battle[66]

to deal with this problem. Should the United States military develop such a new strategy, European Member States would presumably need to be able to operate within the context of that strategy in support of potential NATO operations. And the United States would need to work with its European allies to integrate them into this new operational strategy. This will create new requirements for cooperation between air and naval operations and for greater close cooperation with US forces to exercise this new strategy.

The second important consequence is that European Air and Space Power will be needed to face a global array of challenges across the spectrum of conflict.

And third, Air and Space Power will need to design ways to contribute more fully to NATO's comprehensive approach. Close collaboration between the JAPCC and NATO's CIMIC Centre of Excellence could act as a catalyst.

Conclusions

The eight global trends discussed in this essay were generated independently of the JAPCC study. In general they tend to validate the conclusions drawn in Chapter Four of that study.

Air and Space Power in NATO is facing a potentially severe reduction in investment for the future. That is true in the US and in Europe. At the same time, the US is rebalancing its forces towards Asia. The combination of these two trends may create a situation in which the US will increasingly rely on European defence capabilities just at the time when those capabilities will be in decline. The result could be unfulfilled expectations in the United States and tension within the Alliance.

Air Power in Europe will be needed to execute potential Article 5 missions. Having that capability has a strong deterrent effect. NATO Air Power

remains dominant today compared to a combination of Russian and Chinese Air Power. But that may well change over the course of the next decade or two.

In addition as technology enhances the prospect of future strategic surprises and thus the need for rapid reaction, NATO decision makers are likely to turn increasingly to Air Power for global reach.

Principal Recommendations

Trends discussed in this essay suggest that NATO will face a full spectrum of challenges in the future. The US will remain a European power and Alliance leader, but it also has extended commitments in Asia. European air forces must therefore develop and maintain a full spectrum of capabilities to include:

1. maintaining uninterrupted access to space assets, data, and information;
2. preparing for a broader role which allows it to deal with insecurity in its neighbourhood;
3. deploying significantly larger combat air patrols;
4. developing the capability for independent strike missions;
5. providing enablers for those strike missions;
6. hosting and participating fully in nuclear and conventional deterrence;
7. providing lift and logistics for crisis management and humanitarian operations;
8. participating effectively in full spectrum of conflict, including counter-insurgency and hybrid war;
9. contributing to missile and cyber defence;
10. providing security sector assistance for less capable partners.

Given Europe's tightening Defence budgets, priorities will need to be set.

Endnotes

1. See A Transatlantic Pivot to Asia: Towards New Trilateral Partnerships (SAIS Centre for Transatlantic Relations, 2014) edited by Hans Binnendijk for a series of global trends that will shape the strategic environment in 2020–2030. This essay draws directly from that chapter. It chooses eight trends that apply to future Air and Space Power in Europe. This trend analysis also draws on work done by the author for the Center for Naval Analysis.
2. The studies reviewed are: US National Intelligence Council, Global Trends 2030: Alternative Worlds (Washington, D.C.: US Government Printing Office, 2012); Delégation aux Affaires Stratégiques. Strategic Horizons. (Paris: French Defense Ministry, 2013): http://www.defense.gouv.fr/das/reflexion-strategique/prospective-de-defense/articles-prospective/strategic-horizons; Canadian Department of National Defence, The Future Security Environment 2008–2030. Part 1: Current and Emerging Trends (Ottawa, 2009). UK Ministry of Defence, Strategic Trends Programme: Global Strategic Trends – Out to 2040, Fourth edition (London: 2010), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33717/GST4_v9_Feb10.pdf; US Joint Forces Command, Joint Operating Environment 2010 (Norfolk, Virginia: Government Printing Office, 2010); European Union Institute for Security Studies, Global Trends 2030 – Citizens in an Interconnected and Polycentric World (Condé-sur-Noireau, France: Corlet Imprimeur, 2012); Global Marine Trends 2030 (London: Lloyd's Register, QinetiQ, and University of Strathclyde Glasgow, 2013); North Atlantic Treaty Organization. Multiple Futures Project: Navigating towards 2030, 2009; Barry Pavel and Magnus Nordenman, 'Global Trends and the Future of NATO: Alliance Security in an Era of Global Competition', (Washington, D.C.: Atlantic Council, 31 Oct. 2013), accessed 6 Dec. 2013, http://www.atlanticcouncil.org/images/publications/Global_Trends_and_the_Future_of_NATO.pdf; Allied Command Transformation, Strategic Foresight Analysis, 8 Apr. 2013; Daniel Hamilton and Kurt Volker, eds., Transatlantic 2020: A Tale of Four Futures (Washington, D.C.: Center for Transatlantic Relations, 2012).
3. National Intelligence Council, p. 17, p. 43–45; Ministry of Defence (United Kingdom), p. 47 f.; Ministère de la Défense, p. 10.
4. If additional factors such as health, education and governance are included, Europe retains its second place position for an additional two decades.
5. Martin Dempsey at Center for Strategic and International Studies (CSIS) on 18 Mar. 2013. http://csis.org/event/thoughts-future-gulf.
6. Associated Press. 'Greek unemployment at new record high.' Boston.com. 10 Oct. 2013. http://www.boston.com/news/world/europe/2013/08/08/greek-unemployment-new-record-high/JQ8olaw20WYDtBc0bUuWjO/story.html.
7. German Marshall Fund of the United States. Transatlantic Trends, Key findings 2013, Executive Summary http://trends.gmfus.org/files/2013/09/TTrends-2013-Key-Findings-Report.pdf, p. 1.
8. Lloyd's et al., 16; also see Pavel and Nordenman, p. 2.
9. David J. Berteau, Guy Ben-Ari, Joachim Hofbauer, Priscilla Hermann, and Sneha Raghavan. European Defense Trends 2012: Budgets, Regulatory Frameworks, and the Industrial Base. Center for Strategic and International Studies. 18 Dec. 2012. http://csis.org/files/publication/121212_Berteau_EuroDefenseTrends2012_Web.pdf, p. 2.
10. See freerepublic.com; Wall Street Journal, 19 Jun. 2013 for text of Obama speech http://www.freerepublic.com/focus/f-chat/3033186/posts.
11. The Times of London; 1 Feb. 2014.
12. National Intelligence Council, p. 17.
13. Lloyd's et al., p. 17.
14. National Intelligence Council, p. 17.
15. Ibid, p. 101, confirmed by recent simulations.
16. Ibid, p. 101.
17. See Center for Strategic and Budget Assessments for 2011 budget; European defence spending in 2011 was about 220 billion Euros or about $300 billion.
18. Ibid, p. 16.

19. Ministère de la Défense; European Union Institute for Security Studies, p. 139–144; Pavel and Nordenman, p. 2.
20. China's GDP in 2012 was $8.2 trillion while the US and EU each has a GDP of about $16 trillion.
21. Office of the Secretary of Defense Annual report to the Congress Military Power of the Peoples Republic of China.
22. Lloyd's et al., 28, National Intelligence Council, p. 66.
23. Lloyd's et al., p. 83, 90.
24. Ibid, p. 37–40.
25. Security Foresight Analysis, p. 45.
26. Pavel and Nordenman, 3.
27. National Intelligence Council, p. 24 f.
28. Ibid, p. 16 f.
29. Ibid, p. 51.
30. Deutsche Welle. 'The new arms race in Asia.' 18 Mar. 2013. http://www.dw.de/the-new-arms-race-in-asia/a-16681158.
31. National Intelligence Council, p. 68.
32. Ibid, p. ix.
33. National Intelligence Council, p. 27.
34. National Intelligence Council, p. 31; European Union Institute for Security Studies, p. 16, 46.
35. National Intelligence Council, p. iv.
36. Lloyd's et al., p. 44 f., 103; National Intelligence Council, p. 52.
37. Ministry of Defence (United Kingdom), p. 16, 26; US Joint Forces Command, p. 59; Department of National Defence (Canada), p. 39–41.
38. Gerald M. Borsuk and Timothy Coffey; Moore's Law: Defense Horizons #30, National Defense University, 2003.
39. National Intelligence Council, p. 43, 109; Strategic Foresight Analysis, p. 126.
40. Nik Gowing. Skyful of Lies and Black Swans: The New Tyranny of Shifting Information Power in Crises. (Oxford: Reuters Institute for the Study of Journalism, 2009).
41. Delégation aux Affaires Stratégiques, p. 16.
42. European Union Institute for Security Studies, p. 14 f.
43. Ministry of Defence (United Kingdom), p. 71, 130; European Union Institute for Security Studies, p. 39–41, 46–48.
44. Lloyd's et al., p. 111.
45. National Intelligence Council.
46. Strategic Foresight Analysis, p. 45.
47. Lloyd's et al., p. 47.
48. For example see the Tallinn Manuel on International Law Applicable to Warfare by Michael N. Schmitt.
49. Strategic Foresight Analysis, p. 37.
50. Stars and Stripes, 23 Mar. 2012 article by Steven Beardsley.
51. See Council on Foreign Relations Policy Innovation Memorandum #10 by Micah Zenko.
52. Dempsey at CSIS.
53. National Intelligence Council, p. 64 f.; Multiple Futures Project, p. 6; Department of National Defence (Canada), p. 3 f. (before: 3–4).
54. National Intelligence Council, p. 64 f.
55. Ministère de la Défense, p. 21; National Intelligence Council, p. 71.
56. National Intelligence Council, p. 72.
57. Multiple Futures Project, p. 47, p. 57 f.; Ministère de la Défense, p. 60, p. 70.
58. Department of National Defence (Canada), p. 93 f.
59. Ministère de la Défense, p. 56–79.
60. Department of National Defence (Canada), p. 91 f.

61. Strategic Foresight Analysis, p. 12.
62. Strategic Foresight Analysis, p. 12.
63. Ministry of Defence (United Kingdom), p. 84.
64. National Intelligence Council, p. 72.
65. Ministère de la Défense, p. 66.
66. Air Sea Battle would seek to create new efficiencies and synergies by assigning a division of labour to sea and air assets. It would also operationally envision strikes against land-based targets that deny US military access to neighbouring sea and air space.

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History is Continuity in Change

III

The Role of Joint Air and Space Power in NATO in a Rebalanced Security Paradigm

By Lieutenant General (ret.) Frederik H. Meulman

Recent developments in the Ukraine and the annexation of Crimea by Russia have shown the world, and in particular NATO, that fundamental NATO-Russia security agreements and assumptions are no longer valid. Russia's action in the sovereign territory of the Ukraine shows that Russia has acted in contradiction of one of the key principles of the NATO-Russia Founding Act of 1997, namely the principle of 'refraining from the threat or use of force against each other as well as against any other state, its sovereignty, territorial integrity or political independence in any manner inconsistent with the United Nations Charter and the Helsinki Final Act'. Also the 'true strategic partnership', sought after by NATO with Russia as stated in NATO's Strategic Concept 2010, has declined since Russia has not reciprocated in regard to NATO's strategic intent. The changed relationship with Russia has even led to the return of the word 'opponent' in the vocabulary of NATO.

What is the meaning of the current contingency in the Ukraine and the changed relationship with Russia for NATO and its related force posture[1]? It shows:

- That 'history is continuity in change' and that security arrangements and assumptions are not cast in concrete.

- That the receiver's perception of reality and likelihood of political messages and signals is not always consistent with the intent of the messenger. I only have to refer to President Putin's speech at the Security Conference in Munich in 2007 in which he stressed that 'a unipolar world is unacceptable and impossible and that Russia will play an increasingly active role in establishing a reasonable balance between the interests of all the participants in the architecture of global security'. The Crimea crisis is a direct result of this doctrine and should not have been a surprise.
- That the trend of drastic reductions in defence budgets and diminishing Air Power capabilities, in particular at the hands of NATO/European Member States, is inconsistent with the need for a full spectrum range of Joint Air and Space Power capabilities and competencies to cope with the entire spectrum of possible security challenges.
- That, although the deficiencies in Joint Air and Space Power capabilities and competencies in NATO have already existed for more than a decade, the need for mitigating the existing Joint Air and Space Power capability and competence gaps is now even greater than before. The current security contingency shows again that political security policy must be supported not only by the presence of a credible military capability to initially deter any adversary, but also to face the opponent if required. This rebalanced security paradigm presses NATO and in particular NATO/Europe to face the facts; it revalidates that Article V and self-defence of the Washington Treaty is not a notion of the past, and that the meaning of a political-military and economic strategic security provider goes hand in hand with the need to maintain a credible military force to protect its interests.
- That in the future, the new 'win and deny' warfighting strategy of the United States may lead to situations whereby NATO/Europe may no longer automatically and fully rely on the availability of American capabilities and competencies, especially if the US is committed elsewhere in the context of this strategy.

- That the United States is carefully watching NATO/Europe's response to this contingency.
- That NATO must show a renewed cohesion and coherency in its perception of security. To date, NATO Member States have had a different perception of and emphasis on stability and security. For the newest NATO members this was a focus on Collective Defence. For others the predominant focus is on Crisis Management and/or Cooperative Security. This has led to situations where it was sometimes difficult to reach consensus in NATO and to situations in which NATO gave off a signal of strategic intent of all 28 Member States, but the follow-on execution showed that the Alliance and national interests were not fully consistent.
- That NATO must assess the impact of the current security situation and changed relationship with Russia, and review the validity of its Political Guidance (PG) in the light of this rebalanced security paradigm in Europe.
- That NATO Member States have to realign their national interests with the collective interests of the Alliance. Fair burden sharing and solidarity should prevail above 'sovereignty'. Collective decisions also mean a shared commitment to deliver.
- That NATO must give full effect to the implementation of its (reassessed) Political Guidance. 'No more words, but deeds.'

In the case of the contingency in south-eastern Europe, NATO should reckon with a model of escalation where it has to deal with an adversary that has the full range of credible offensive and defensive capabilities and doctrine of conducting operations in a predominantly conventional manner. This situation is different from conflicts that NATO was involved in during the last three decades, like in the Former Republic of Yugoslavia, Afghanistan and Libya.

It is for this reason that NATO Member States, in particular those nations geographically most closely located to the crisis area, want visible (re-)assurance of their safety and security. Credible defence and deterrence for

NATO is a matter of having the right intentions and the capabilities to support that premise. Of course, a balanced set of actions, preferably based on dialogue for de-escalation is the desired paradigm of action. But if for whatever reason the situation deteriorates, NATO must be capable of managing the conflict in order to deter further escalation and eventually be capable of defending itself and its Member States.

All NATO Member States underscore article V of the Washington Treaty i.e. Collective Defence. A situation as such would take precedence over all other missions and it is without doubt that Member States would be prepared to draw on all available options and capabilities to fulfil their commitment to NATO. Still in crisis situations short of Article V, NATO must be able to take swift actions that show NATO's resolve and willingness to deter and defend[2]. This puts a premium on political and military decision-making at the right time and having the full range of required capabilities and competencies available for fast, flexible and responsive action. It is in particular these areas where Joint Air and Space Power can play a very important role because of their inherent characteristics: speed, reach, mobility, flexibility, relative low cost and high political visibility. Currently, NATO/Europe lacks essential capabilities to live up to these new contingency related requirements.

First, NATO/Europe lacks the strategic Air Power enablers and access to enabling space capabilities that the United States has. If for whatever reason NATO/Europe cannot directly count on the availability of these US enabling capabilities, NATO/Europe is restricted in its options[3]. The focus here is in particular on assured access to space based information and capabilities related to assure security, such as: strategic transport, aerial refuelling, ISR, SEAD, Ballistic Missile Defence, Combat Search and Rescue (CSAR), Medical Evacuation, and Electronic Warfare (EW). Besides the need to develop these key enabling capabilities, NATO must critically review its reinforcement plans and its reception and staging capabilities with regard to air bases and related

infrastructure, especially to host Air Power reinforcements that can signal intent and in so doing, resolve a crisis before it escalates.

Second, NATO needs uninterrupted access to information and intelligence that provides indication and warning of emerging crises in NATO's area of strategic and operational interest. Although a few NATO/European Member States possess strategic intelligence gathering capabilities, there still is the need for continued access to the intelligence gathering capabilities of the United States. Preferably, NATO/Europe should also embark on the procurement of full spectrum strategic and operational intelligence and surveillance gathering capabilities. In addition, since NATO has no own institutionalized intelligence collection capabilities, it is fully reliant on the will of Member States to share information and intelligence. NATO Member States currently lack the overall ability and will to fully share information and intelligence due to national caveats.

Third, the development of a NATO/European set of full spectrum Joint Air Power capabilities and competencies and maintaining continuous access to space based information and data, places a premium on consultation and cooperation. Together, NATO/European Member States spend about 220 billion Euros per year on defence. The problem is that the way the defence money is spent, is predominantly based on national policies and preferences. By accepting common interests and having the political will to plan, coordinate and procure the required collective, bi- and multinational defence capabilities, NATO/Europe will be able to develop a coherent set of Joint Air and Space Power capabilities and competencies. Furthermore, if the existing sovereignty restrictions can be lifted, it is possible to obtain further cost-effective capability development solutions. Therefore, the key to Smart Defence is Smart Politics.

Fourth, NATO/Europe's Joint Air and Space Power capabilities and competencies must be adequately educated, trained, exercised and validated

to react in a fast, flexible and responsive manner throughout the spectrum of crisis and conflict. Besides NATO's Air Policing posture and the current contributions to the NATO Response Force, it is important for NATO to assess the employability and responsiveness of its residual Air Power capabilities to determine the actual status and see if improvements are needed. Furthermore, throughout the NATO Command and NATO Force Structure, sufficient and adequately trained and deployable personnel are necessary to meet NATO's requirements. The current contingency in Europe, with a possible adversary who has agile defensive and offensive air superiority capabilities, requires a review of priorities and the ability to conduct specific tasks and competencies. Three decades of limited conflicts have shifted NATO's Air Power doctrine of the past from a predominant air-to-air orientation towards air to ground missions (70/30 to 30/70). The necessary refocusing of priorities in tasks and the achievement of a high level of training and expertise will definitely take time to properly train aircrews and should be done without affecting the ability to properly execute other Air Power tasks. Therefore, speed of action is important!

Fifth, is NATO's Air Command and Control posture sufficiently trained and equipped to engage in an air heavy major joint operation? Such an engagement asks for a well-trained and equipped C2 structure with sufficient competent personnel, augmentation and supplementation. Until now, the focus was on the ability to carry out a Smaller Joint Operation (SJO) – Air Heavy. A Major Joint Operation (MJO) and specifically a Major Joint Operation 'plus' will ask for air capabilities, competencies, training and exercising that definitely exceed the current level of proficiency.

Sixth, one of the cornerstones of NATO is deterrence, based on an appropriate mix of nuclear and conventional capabilities. It is for this reason that NATO will need to reaffirm its current nuclear deterrence posture and retain a credible 'Dual Capable Aircraft' (DCA) capability in Europe.

Seventh, now that the focus in NATO and in particular NATO/Europe should be on establishing a set of full spectrum joint air capabilities and competencies, and maintaining assured access to space based information, there is the potential in NATO for a 'Joint Air Power Capability and Competence Building Initiative'. This initiative should set the collective conditions for providing adequate support (train, advise and assist) to NATO Member States which lack the possibilities and skills to further develop and master their own Air Power capabilities and competencies (warfighting skills). This initiative can also be extended to partner nations.

Conclusion

The contingency we currently face in south-eastern Europe and the changed relationship with Russia is a wake-up call for NATO that it must be prepared for contingencies throughout the full spectrum of conflict. This asks for a coherent set of full spectrum Joint Air and Space Power capabilities and competencies; a set of capabilities and competencies that in particular NATO/European Member States currently lack.

The capability and competence gap in NATO is not new, but has only become more manifest with the recent developments in the Ukraine and the changed relationship with Russia. This situation requires extra attention at the highest political and military levels in NATO and its Member States. The contingency in the Ukraine shows once again that a common sense of urgency and political support are needed to turn the tide of reductions in defence budgets and capabilities and to find ways to create the necessary Joint Air and Space Power capability and competency solutions.

Joint Air and Space Power in NATO has proven that it can act in a fast, flexible, responsive and scalable manner. The availability, especially in NATO/Europe, of an educated, trained and exercised set of full spectrum Joint Air Power capabilities and competencies and assured access to space based

information is an essential condition for NATO to have a successful political option to act if necessary. The strategic and operational effects that Air and Space Power in NATO can deliver are crucial for a credible NATO deterrence and defence posture.

The new contingency in south-eastern Europe adds new security challenges to NATO in addition to the existing and emerging ones. Therefore, the current contingency in Europe sets an extra premium on assessing and addressing the readiness, preparedness and availability of NATO's most essential toolkit that can show NATO's resolve and political intent in a fast, flexible and responsive way i.e., Air and Space Power in NATO.

Endnotes

1. In the context of this essay, a contingency can be defined as 'an emergency involving political decision-making and the deployment of military resources on a limited scale within the NATO Treaty area'. 'Due to the uncertainty of the situation, contingencies require plans, rapid response and special procedures to ensure the security of the population and the safety and readiness of personnel, installations and equipment within NATO'.
2. The situation in the Ukraine shows that Air and Space Power in NATO must again take into account expeditionary operations on a limited scale within the NATO Treaty area and with a relatively short warning time in order to deter and defend against the full range of threats to the Alliance. This is not a return to the Cold War posture, but delineates a new situation.
3. The present Air Power force posture in Europe only shows a very limited number of strategic enablers ready for action in an emerging conflict or crisis. Therefore, reinforcement from the United States is needed. However, this takes time for military and political decision-making and actual deployment, and asks for the availability of adequate reception, staging and eventually onward movement capabilities. Finally, NATO/Europe should reckon with the fact that other commitments might limit the possibilities of the United States to provide key enabler support, which will limit NATO in its response options.

The Enduring Quest for Capability Development in NATO

IV

Aligning National Interests with Alliance Interests

By Lieutenant General (ret.) Frederik H. Meulman

For 15 years, NATO has been actively pursuing efforts to improve the operational capabilities of the Alliance. It was at the April 1999 Summit in Washington D.C. that the Alliance leaders launched the Defence Capabilities Initiative (DCI). Since that time, and at each Summit, Alliance leaders reiterated their support for capability development in NATO and agreed that special emphasis must be given to overcoming remaining critical shortfalls.

Today, these shortfalls still exist and the transatlantic capability gap is greater rather than smaller. New defence capability initiatives, like the recent 'Lisbon package of the Alliance most pressing capability needs', the NATO Forces 2020 and its related CFI, and Smart Defence (SD) have so far failed to bridge the gap between the declared policies of Alliance leaders at the highest level and the provision of required essential capabilities and resources.

The problems related to existing gaps between NATO's overall aim of developing the required capabilities and competencies as well as the capability gap between the United States and the rest of NATO have been further highlighted by the recent developments in the Ukraine and in particular, the

Crimea Peninsula. These developments have demonstrated that NATO faces a rebalanced security situation; one in which the thoughts of the possibility of a major conflict on NATO's borders have become a new reality.

The *paradox,* between the declared policies to preserve NATO's effectiveness as the globe's most successful political-military Alliance and the inability to achieve the full range of necessary capabilities (especially Joint Air and Space Power) leads to the conclusion that no real political will seems to exist to overcome these critical shortfalls and further, that national interests and Alliance interests are not properly aligned. This is also demonstrated by the downturn in defence budgets, resulting in diminishing defence capabilities and impacting the pace and scope of transformation and modernization in NATO.

The gap is a twofold: one in capabilities and the other in competencies. The first capability gap exists between the requirements for executing NATO's LoA and the reported existing capability 'Priority Shortfall Areas' (PSAs). The second, and increasing capability gap, is between the United States and other Member States, leading to a disproportionate reliance on a single NATO Member State. The competence gap focuses on deficiencies in or lack of key competencies. In particular in education, experience and doctrine development all related to 'the mastery of the air profession'.

When it comes to defining the priority capability gaps more precisely, the conclusion reached is that these are spread across all Services, but, explicit to Joint Air and Space Power, a broad range of critical and essential skills are absent[1]. Capabilities and competencies, which combine to create a pivotal toolkit for NATO, the combined qualities of which provide NATO and national leaders with instruments of unmatched responsiveness and flexibility. It must be acknowledged that there is a Joint dependence on Air and Space Power, because of the role that Air and Space Power plays in almost every aspect of the execution of any operation[2].

Taking this situation into account, there is a sincere and growing risk that NATO will not have the required Joint Air Power competencies and capabilities or access to supporting Space Power capabilities, to cope with the developments, threats and challenges in both the current and future (inter-)national security environment. This environment is not easy to predict, but it is safe to say that the future and its associated challenges are uncertain as well as complex; potentially destabilizing dynamics will lead to having to confront compounded risks.

Political-Military Strategic Issues

The defined Problem is even further complicated by:

First, NATO's Cohesion. The Collective Defence commitment in NATO remains firm and binding and NATO's fundamental and enduring purpose is to safeguard the freedom and security of all its members by political and military means. Notwithstanding this firm commitment to Collective Defence, NATO shows signs of fatigue and there is a fair chance that cracks will arise in the cohesion of its organization, especially when it comes to the Essential Core Task of Crisis Management. The emphasis and priority given by the respective NATO Member States to this task differ depending on the existing vital and major national interests at stake. This complicates decision making in NATO based on solidarity, shared purpose and fair burden sharing and might have an impact on the effectiveness and cohesion of NATO as a whole.

Second, the US Pivot to Asia. A geo-political strategic rebalance, a shift of foreign and defence policy from the Middle East and Europe to the east and southeast of Asia. The United States intends to focus 60 % of is Naval Fleet and Air Forces in the Asia-Pacific rim. Although currently not the case, it is quite possible that the Continental United States in the foreseeable future may pursue a division of labour and thus a division of responsibilities and burden sharing between the United States and NATO/Europe.

A division of labour that might actually strengthen NATO as whole, if the consequences of this approach are taken seriously by the NATO/European Member States. If so, it implies that NATO/Europe needs to be able to operate independently at the Periphery of its Area of Responsibility, while at same time relying on the availability of a set of full spectrum capabilities. Especially on Joint Air Power capabilities and competencies provided by NATO/European Member States, as well as being able to maintain assured access to space based information available in NATO.

This division of labour between NATO/United States and NATO/Europe is not only related to the US pivot to Asia, but also to the recent results of the Quadrennial Defense Review (QDR) 2014. With the far-reaching defence cut backs in the United States, there is a real need for the prioritization of capabilities and the related need for an alternative strategy. The QDR 2014 indicates defence strategy realignment from a 'two war' towards a 'win and deny' strategy. Especially, if the United States for example is bound to a conflict in Asia, the deny option implies that NATO/Europe must be capable of assuring its interests predominantly by itself and cannot rely on the availability of the full range of United States Air and Space Power capabilities and in particular the so-called strategic enablers. Should this be the case, the need for a NATO/Europe to have the full spectrum of Air Power capabilities and assured access to space information is even more pronounced.

Third, the existing arrangement in NATO is that no single Ally should provide more than 50 % of certain critical capabilities. Such apportionment has far reaching consequences for capability development in NATO and the availability of essential capabilities. Especially, if NATO/Europe has to rely on its own responsibilities and related Air and Space Power capabilities.

Fourth, so far there are no real solutions. The latest capability developments and cooperation initiatives in NATO will most likely not solve or substantially mitigate the existing and widening capability gaps. They will definitely solve

some capability requirements; they will boost interoperability between NATO members and partners, both in capabilities and in manpower. But the issues solved are predominantly linked to the so-called 'low-hanging fruit' and will exclude real complex and expensive capability development programmes. For example, the Connected Forces Initiative has so far, not provided clear and unequivocal evidence that the intended interrelated and dependent NATO Command and Control Structure, to include its Air Command and Control Concept, works properly. Further, it's still not fully clear if NATO's Training Concept will mark a path towards a coherent education, training, exercising and evaluation/validation paradigm, thereby creating the necessary competencies and war fighter skills.

Fifth, a Focus on Capability Oriented Planning. Except for one nation that has the full spectrum of capabilities and competencies and a few who focus on a broad or broader spectrum, most of the NATO Member States tend to focus on national capability developments based on a strategy of capability oriented planning. This leads to a tailored set of defence capabilities and competencies and not the full spectrum of capabilities and competencies needed to cope with the whole range of possible operations. It also implies that interdependencies between nations exist and will grow.

NATO, in order to be successful in addressing future crisis and conflicts therefore requires a guaranteed 'commitment to deliver' by its Member States (assured access and availability) and the national will to provide the necessary core competencies. Otherwise, essential needed capabilities and competencies will probably not be available in sufficient quantity and quality and will limit the planning and execution of NATO operations. So far, reality has shown that a guaranteed 'commitment to deliver' is politically not feasible, although this might be the only option for a meaningful NATO in the coming years. Furthermore, there is a need for increased transparency and information sharing in defence planning, both in terms of defence austerity measures and in capability development.

NATO is at Crossroads

First, NATO is transforming from a combat posture in Afghanistan, towards a situation where education, training and exercising will probably be the main focus in order to maintain NATO's military preparedness and readiness in the years to come. However, the recent developments in the Ukraine and the changed relationship with Russia emphatically reveal the importance of a NATO Alliance that is ready and prepared for short-term contingencies on the borders of a NATO member, potentially equalling the level of a MJO or above (MJO-plus). Second, because Air Power in NATO is faced with the paradox that is, on the one hand being the pivotal toolbox for NATO operations, but on the other hand being confronted with severe defence budget reductions and diminishing capabilities. This paradoxical situation is even further complicated by the political-military strategic issues described above. And it is especially this Air Power paradox that leads to the awareness that NATO has arrived at a point where it must make vital decisions: 'cooperate and share responsibilities and commitments – or decline'[3].

The tailored capability approach of almost all of the European NATO Member States will lead to an even greater, unhealthy, dependency on the United States than today, which further complicates and compounds the already existing imbalance between the United States and NATO/Europe. Currently, the dependence on United States capabilities, especially Air and Space capabilities is too great and can no longer be guaranteed by the United States under all circumstances. This unhealthy dependence must be addressed by NATO and in particular the NATO/European Member States. How could this be done? By acquiring the required full spectrum Joint Air Power capabilities and competencies and maintaining assured access to space information with a focus on executing a 'Smaller Joint Operation (SJO) – Air Heavy'. Furthermore, there is the need for the political will to coordinate with NATO on the effects of defence budget cuts

and to create a consulted, coordinated, synchronized and harmonized defence capability development process within.

For almost all of NATO's Member States cooperation is no longer a choice, but simply a necessity; the US indicated several times they cannot do it on their own anymore. And although there are different possibilities for defence cooperation before we really hit the issue of sovereignty[4], it is now high-time to align national interests with Alliance interests. All this calls for a well thought-through action plan in NATO. How? By defining shared interests and shared responsibilities at the highest military and political level in NATO and by widening the concept of sovereignty.

This calls for a focused Plan of Action:

- First of all, that plan should focus on a common sense of urgency and political will to mitigate existing capability and competency gaps; National and Alliance interest must come together. A sense of urgency that capability development and widening the concept of sovereignty are necessary ways forward for a meaningful NATO in the coming years. In short, the agreed notion that a fundamental and essential change has to be made.
- Second, an agreement of commitment based on the understanding in NATO that there is a need for division of labour, responsibilities and commitments based on shared mutual interests.
- Third, an informed political debate to develop a gradual approach whereby the possibilities of widening the concept of sovereignty are analysed and discussed.
- Fourth, based on the outcome of the previous steps and an extended security paradigm, new innovative and creative cooperation proposals must be developed. Only in this way, and by recognizing the need to explore innovative ways will it be possible to set the conditions for a new framework of common defence and security and to guarantee that NATO is ready and prepared to meet both current and likely future security challenges.

Political will and support is the real key to success. It also asks for transparency, openness and trust between the different Member States; not words, but deeds. This approach might be the only option for a meaningful NATO in the future.

Assured Access and Availability

The focus of the Future Vector Project is on ideas, options and solutions that will guarantee that Joint Air and Space Power in NATO continues to be a key enabler for the security and success of NATO and its Member States[5]. So far, the existing boundaries of collaboration in NATO are manifested by the view that the decision on participation in an operation is a sovereign national responsibility. Above it is explained that NATO, in order to be successful in future crisis and conflicts, requires a 'commitment to deliver' by its Member States, thereby setting the conditions for an assured access and availability of needed capabilities and competencies. This can be achieved by 'widening' the concept of sovereignty, thereby creating the political conditions for an effective and guaranteed application of this commitment.

The discussion on 'widening' the concept of sovereignty should focus on those cooperation possibilities that create opportunities of common interest and within an agreed legal framework, between two or more countries. A focus on cooperation whereby Member States are willing to share on a case-by-case basis. This discussion is not about fully transforming an intergovernmental organization into a supranational framework. It is not about establishing a supranational European defence organization. It is about solving some of the current challenges on a limited, case by case approach – the opportunities are there if the political will exist.

Joint Air and Space Power Options in NATO

This section will focus on ideas, thoughts and options that complement current initiatives and might open new avenues of approach to solve capability

and competency problems in NATO. The realization of most options should be feasible with a short-term focus (i.e. before the year 2020); the implementation of some can certainly occur earlier. Of course, the cost and cost-effectiveness of the options are interesting aspects. For virtually all the options apply the adage that 'the costs are out-weighed by the benefits' applies. For all options, however, it is reasonable to assume that they will lead to a greater effectiveness, efficiency and availability of needed capabilities and competencies. All options have been developed in view of their contribution to the realization of the required set of full spectrum Air and Space Power capabilities and competencies. This leaves no room for explicitly limiting the fulfilment of required capabilities and competencies or for some of the options becoming subject of further cuts in Air Power capabilities. For all the options where cost is involved, the advice is to develop business cases at the beginning of the decision-making process. The ideas, thoughts and options are grouped under four themes: 1) capability development – political; 2) political-military cooperation and competency development; 3) funding; 4) Research and Development, Science and Technology and Industry. Each of the themes will be addressed in the remainder of this easy.

Capability Development – Political

This theme addresses proposals that are mainly political in nature and aim to create the political conditions for effective and efficient ways of delivering capability development:

- A Single Toolkit Approach. All NATO Member States work from a single toolkit approach. This means that, no matter what efforts, the resources will always come from that toolkit. Since 22 out of 28 NATO Member States are also member of the EU, it is evident that any efforts to improve the defence capabilities of these two organizations must be fully harmonized[6]. In order to strive for the availability of a full spectrum capability, especially in the realm of Joint Air and Space Power in Europe, it is therefore essential that NATO and the European Union (EU) strive for optimal

cooperation in defence planning[7]. At the last EU-Summit dealing with the European Union's Common Security and Defence Policy (CSDP) in December 2013, Heads of States and Governments agreed a 'fully complementary and more systematic and long term approach with NATO to defence cooperation through increased transparency and info sharing'. This political intent can be turned into a promising and highly visible initiative if both organizations, in a short time, launch a coordinated capability development initiative where it is most needed; that is in the realm of Joint Air and Space Power. If for whatever reason, this approach is not likely to materialize, it is recommended that the NATO Headquarters in Brussels take the lead in starting a Joint Air and Space Power Capability Development Initiative, with an invitation to the European Defence Agency (EDA) to cooperate to the fullest extent possible when feasible. This option is further elaborated in the broad headlines below.

- Top Down and Bottom Up. There is a long-standing discussion if capability development must be organized top-down or bottom-up. Of course, ultimately, it is always the Member States that decide what they want. But a further development of the existing top down institutional support by NATO would be very beneficial. To this end, it is recommended to implement, a politically approved and mandated, NATO Capability Development Team, preferably a collaborative approach between the International Staff (IS), International Military Staff (IMS) and ACT, in order to start a highly visible Air Power capability initiative in this way. This Team can have a twofold focus:
  - Continuous interaction and coordination with regard to an effective and efficient utilization of scarce defence resources. Discussion and consultation with the Member States regarding planned budget cuts, to make sure that no actions are taken that further degrade the needed capability set of Joint Air and Space Power capabilities.
  - Interaction, discussion and coordination with the NATO Member States about actions to be taken to optimize defence spending in a way that existing gaps can be further mitigated and the inter-

dependent nations collectively create a coherent Joint Air and Space Power capabilities toolbox.

To these ends, it is advised that the Team starts with an analysis of the required full spectrum Joint Air and Space Power capabilities in NATO (with emphasis on NATO/Europe), taking into account the NATO's Defence Planning Process (NDPP) priority shortfall and surplus areas. Based on an assessment of the prioritized Joint Air and Space Power requirements, a 10–15 year Joint Air and Space Power capability development plan should be prepared. The next step could be a dynamic out-reach plan to consult the respective Member States (with a focus on NATO/European members) to discuss possible avenues of approach. Under the recently started Framework Nation approach opportunities must be identified where shared interests exist. This Team must have complete oversight to make sure that 'the Initiative' covers the required capability development requirements as much as possible. Furthermore, initiatives could be placed in the context of creating as much as possible 'assured access, assured availability and a commitment to deliver'. How? By assessing the modalities and possibilities of extended cooperation in the context of widening the concept of sovereignty.

It is advised to take an active, focused approach and to develop cooperation initiatives that meet the interests of the Member States and the Alliance as a whole. To this end the German initiated NATO Framework Concept and the UK developed Joint Expeditionary Force initiative can be seen as likely avenues of approach that can take Smart Defence with its burden sharing through a lead nation philosophy one step further. Interests of participating Member States must be distributed as much as possible on the basis of a fair burden sharing and an appropriate return of investment (e.g. industrial participation, basing options, assembly, and Maintenance Repair and Overhaul (MRO)).

One of the options for enhanced operational cooperation lies in the possibility that NATO acts as a *capabilities broker* for NATO and its Member States. Since NATO is dependent on the availability of ready and prepared national capabilities and has a good understanding of what is

available in the national inventories, it is well positioned to act in a *capabilities broker* capacity. Therefore, if the situation arises, individual Member States should not approach other nations, but approach NATO to make the necessary capabilities and competencies available (as in the manner of the Berlin Plus arrangement).

- Role and Task Specialization. Where almost all NATO Member States cannot afford a full-spectrum defence capability approach, innovative solutions must be developed; solutions that must exceed the existing ones. Current defence cooperation arrangements increase the possibility for deployment, but the decision to commit forces is still a national one and the decision-making process is guaranteed not to infringe on the sovereignty of a country. This cooperation boundary is sub-optimal as it fails to address the real potential that exists for improving effectiveness and efficiency. Role and task specialization allows for spending scarce defence budgets on key capabilities and core competencies. It also allows for the maximum division of responsibilities, economies of scale, and will prevent the independent rising and increasingly expensive maintenance cost of aging and legacy Air Power systems, which consume a substantial part of the available defence budgets. So task and role specialization will allow for a more optimal use of scarce national defence budgets (e.g. where nations do not operate aircraft, they might be willing to concentrate on a contribution to other key Joint Air and Space Power capabilities, knowledge base or resources). However, this approach is only possible if countries are prepared to make far reaching political and legally binding agreements prior to the commencement of the respective defence planning processes.

Political-Military Cooperation and Competency Development

This theme offers proposals that focus on military cooperation, optimizing military capability effectiveness and efficiency and setting conditions for improving competencies. The pre-conditions for success are very much of a political nature.

- *F-35 European Participating Air Forces Initiative*. Extended cooperation is most probably feasible if users of same platforms establish forward leaning, effective and efficient cooperation proposals. For example, the F-16 success story is very much based on a cooperation model between the European F-16 Participating Air Forces (EPAF). Taking this model as a starting point, the F35 community in Europe (and other aviation platforms users) can provide wider opportunities if the group of European F-35 users are willing to cooperate and share. A division of responsibilities in the context of the European F-35 users can lead to a more efficient and effective approach. The concentration of core competencies established between the European F-35 users can lead to an integrated model of deep cooperation, based on the following recommended key elements:
  - minimum necessary number of F-35 Main Operating Bases (MOB);
  - Main Training Base/Weapons School (MTB);
  - Maintenance and Logistics Base (MLB);
  - basing for all the operational and technical courses/Main Education Base (MEB);
  - basing for the European F-35 assembly and engine maintenance of the F-35/Main Assembly Base (MAB).

  This deep-cooperation model based on shared interests, asks for far reaching political and legal arrangements between the F-35 participating nations. It might even go further and focus on pooling and sharing F-35 aircraft for training and actual deployments (national assets to be flown by pilots from other F-35 EPAF nations). This extended cooperation model also creates economies of scale in the joint acquisition and use of spare parts and combined stockpiling of weapons and ammunitions[8]. A step-by-step approach, thereby leveraging on each next step in the cooperation process is advised.
- *A Regional Approach to Air Policing in NATO*. Peacetime air policing is about safeguarding the security and integrity of the airspace of a country. Recently, the Netherlands and Belgium agreed to start jointly policing the

Benelux airspace from 2016 on, to include Renegade situations[9]. In NATO, there are a number of Member States that do not possess the capabilities for protecting the integrity of their own airspace (the Baltic States, Iceland, Luxemburg, and Slovenia). Furthermore, more efficient and effective Air Power cooperation can be expected if Member States are willing to share common interests in the field of safeguarding the security and airspace integrity of their nations. This far-reaching cooperation requires formal agreement and an agreed legal basis in the form of a Treaty between the Member States involved.

- *Capability Development through Mutual Support.* A number of NATO Member States are modernizing or have plans to modernize their current Air Power capabilities. This leaves room for a coordinated and synchronized programme, whereby the replaced Air Power equipment might well serve a purpose for other NATO countries to develop and/or strengthen their Air Power capabilities or competencies. NATO might also support NATO Members States and partner countries which are most interested in getting support in further developing Air and Space Power capabilities and competencies.
- *A NATO/European Missile Defence Initiative,* which complements the United States/European Phased Adaptive Approach (US/EPAA). This can take a three-pronged approach:
  - A European phased adaptive approach to develop a Combined-Joint set of European endo- and exo-atmospheric capabilities that complement US missile defence capabilities in Europe. This implies the development of interoperable ground based systems and ship based radar and missile systems.
  - Extensive Combined-Joint cooperation in procurement, in Combined-Joint Education, Training and Exercises and in establishing bi- or multilateral units. As regards the latter, cooperation options are possible in areas like the establishment of multinational crews on board air defence and command frigates, collectively operating bi- or multilaterally procured radar and missile systems on board the ship and developing

a political framework for a 'commitment to deliver', an integrated Dutch – German – Polish Surface to Air Missile Wing and the development of a standing multinational missile defence competence centre.
  - The willingness of countries to complement the United States Aegis/Ballistic Missile Defence mission in the Mediterranean Sea/Europe by providing capable maritime BMD assets and/or manpower. This refers to the first bullet, whereby a cooperative US initiated lend-lease policy might provide the 'BMD-shooter capacity' on board European Air Defence and Command frigates, while the a combined NATO/European approach sets the conditions for operating this capacity in an effective and assured manner.
- *A NATO/European Joint Air Warfare and Training Centre*[10]. Besides the increasing need for large Air and Space Power programmes to be built (like strategic airlift, aerial refuelling and Intelligence Surveillance and Reconnaissance, opportunities also exist for extended cooperation in the field of education, training and exercising (developing competencies and warfighting skills). For example, the establishment of an integral NATO/European Joint Air Warfare and Training Centre, that brings together Air and Space competencies and warfighting skills and avoids fragmentation of scarce knowledge and resources. A Centre that can plan, task and execute Combined-Joint air warfare exercises, can act as a NATO European Weapons School, is the main hub for the development of Air and Space Power doctrine and can provide tailor-made Joint Air and Space Power competency courses. The Centre can also play a central role for NATO in developing, providing, evaluating and validating standards in the field of Joint Air and Space Power operations, logistics, survivability, etc. The Centre must be NATO's source of information regarding existing Joint Air and Space Power courses and is instrumental in the development of new ones.
- *A NATO/European Joint Helicopter Command.* Almost all NATO/European nations work with helicopters. The total available capacity consists of a mix of light, medium or heavy transport helicopters and attack-helicopters.

For different reasons, helicopters are a desirable capability but are also costly. The development of a NATO/European Helicopter Command (or Agency) can lead to coordinated and cost-effective deployment of helicopter capacity. This might also include the development of opportunities for Combined-Joint training, exercising and validation, and doctrine development.

Funding

This theme focuses in essence on Common Funding as a token of shared interests and commitments between the NATO Member States.

In order to get the best 'bang for the buck', Common Funding should be used to the maximum extent possible. It is, in essence, an optimal version of shared commitments where interests of the Member States meet and where common security and national and Alliance interests merge. 'Costs lie where they fall' is a key notion in NATO. The question is whether this adage optimally supports fair burden sharing, effective and efficient operational training, exercise and the deployment paradigm in NATO.

This notion ignores the fact that each Member State takes a fair share in setting the conditions and providing for enduring safety and security and meeting combined national interests. It is for this reason that collective training, deployment, redeployment and operating cost of essential Air and Space Power capabilities (e.g. airlift, tankers, ISR) to support and sustain NATO's mission should be part of the mechanism of common funding.

Research and Development, Science and Technology and Industry

NATO should strive for an involvement in the Research and Technology (R&D), Science and Technology (S&T) and a Defence industrial base to

support the development of innovative technologies as early as possible. This is especially important in the realm of Joint Air and Space Power, which by definition is very much technology oriented and dependent.

NATO must determine a strategy for stockpiling essential Rare Earth Elements, especially those that are fundamental for Joint Air and Space Power capability developments (e.g. radar and laser technology, brake parts, aviation electronics etc.). Finally, NATO should establish a reasonable common funded budget for accelerating development projects in the realm of Joint Air and Space Power.

Conclusion

This essay is about the enduring quest for capability development in NATO and the necessity to align national with Alliance interests and to work extended options of defence cooperation in the field of Joint Air and Space Power based on widening the concept of sovereignty. It is fair to say that there is a sincere Joint Air and Space Power problem in NATO.

Not only Joint Air and Space Power in NATO has been pivotal to success in a broad array of crises and conflicts that NATO has embarked on. At the same time, it is fair to say that NATO's six decade-long Air Power odyssey is now at risk and the problem is real. So far, all the capability initiatives that NATO has launched, have failed in achieving their intended aims. Therefore, NATO is at crossroads: 'cooperate and share, or decline'. In addition, there are a number of developments in the geo-political and defence planning arenas that further complicate and degrade NATO's Air and Space Power posture.

Therefore, it is now time to take a holistic approach to develop those defence capabilities in NATO that are most needed and wanted: Joint Air and Space Power capabilities that provide NATO and especially NATO/Europe

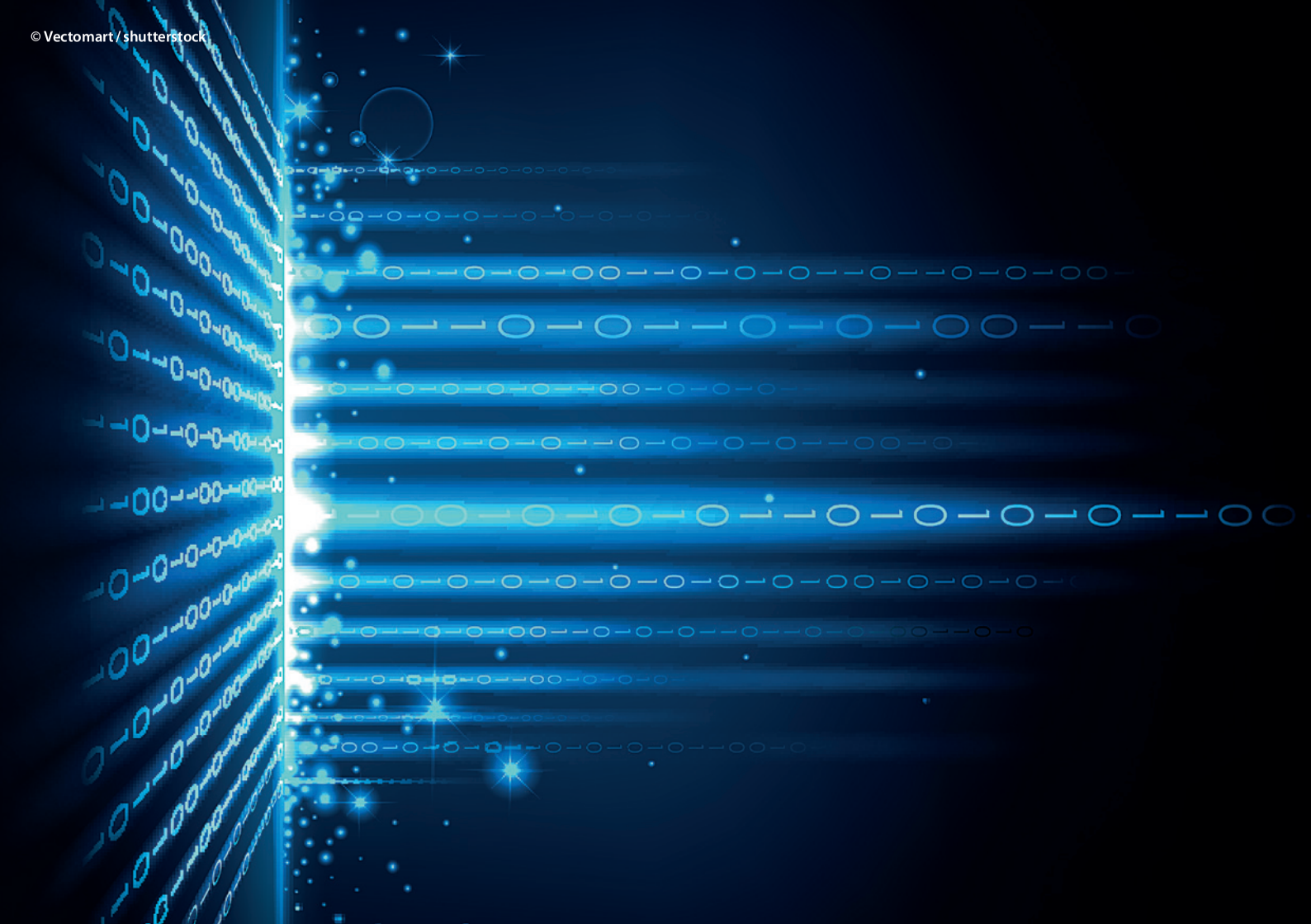
with the essential capabilities for, amongst others, deployment, employment, offensive and defensive operations, as well as C2.

This essay has provided ideas and thoughts for extended options of defence cooperation in the field of Joint Air and Space Power – options that complement existing ones. Especially, if there is the political will to widen the concept of sovereignty and embark on role and task specialization; collective acquisition; assured access and assured availability; as well as a commitment to deliver. For too long, the existing security and Air Power paradox has blinded and paralysed us into a false sense of security, disregarding future security developments in areas of the world where our national vital interests and Alliance interests are at stake. No longer can one Member State or a few do the job, whilst the security interests of all are involved.

The 'box of cooperation possibilities' will open to the fullest extent possible and with the greatest opportunities for efficiency and effectiveness, if a common sense of urgency exists and if there is a collective understanding that there is no more time to lose. The paradigm of increased security interdependence asks for an extended political will to prepare for the future: to share responsibilities in capability development and to set the conditions for an assured availability of forces and manpower resources if the need arises. In order to remain effective, there are many cooperation possibilities to turn the tide in the context of a changing security environment, both in the short and longer term. However, for effective and efficient Joint Air and Space Power defence capability development cooperation, one thing is fundamental and essential: political will and support. If this doesn't happen: NATO's future is really at risk. Therefore, it is now time to translate words into action.

Endnotes

1. Recent operations and planning show, amongst others, shortages in the following capabilities: Theatre and Ballistic Missile Defence (T/BMD); Joint Intelligence, Surveillance and Reconnaissance (JISR); Joint Precision Strike (JPS); Air Command and Control (Air C2) capabilities and competencies; Air-to-Air Refuelling (AAR); strategic airlift; SEAD; CSAR; Special Forces aviation; airborne Electronic Attack (EA); and Surface Based Air Defence.
2. Lt Gen D. Mercier, French Air Force, 'Thinking about Air and Space Power in 2025, five guiding principles'. Air and Space Power Journal (May–Jun. 2012), p. 26 f.
3. As stated by Mr Diego Ruiz Palmer at the 2012 JAPCC Air and Space Power Conference. Mr Palmer is the Special Advisor for Security and Economics to the Secretary General of NATO.
4. 'Sovereignty of the State' can be defined as 'supreme power or independence, whereby States are legally independent from other States and make their own decisions how a State is opposed to other States'. 'No other State is authorized to give orders to another Sovereign State.'
5. This does not exclude that Air and Space Power in NATO can perform roles and missions independently in order to achieve strategic effects.
6. It must be noted that e.g. during Operation Unified Protector in Libya, a number of EU Member States operated in a NATO led operation and under the premise of shared decision making (e.g. Sweden and Finland).
7. Like NATO with its NATO Defence Planning Process, The EU is developing capabilities under its Capability Development Plan (CDP) to cope with the requirements linked to the so-called Petersberg tasks. In the European Union it is the European Defence Agency (EDA), which leads this effort. In this respect the EDA is the counterpart of Allied Command Transformation, which has the lead role in developing NATO's NDPP for political assessment and approval.
8. It goes without saying that the F-35 ideas for extended cooperation also apply to other Air and Space Power (weapon) systems like Unmanned Aerial Vehicles (UAVs) and cooperation in the field of Missile Defence (MD).
9. A Renegade situation occurs if an (air transport) aircraft is used for terrorist attacks. Depending on meeting particular criteria that define a Renegade situation, one can distinguish between a suspect, probable or confirmed Renegade aircraft. Ultimate use of force by a nation State is allowed to resolve a Renegade situation. So far, the responsibilities for applying force resides nationally and is differently placed with the Member States.
10. The intention is that the mission of the Centre is explicitly deconflicted with the responsibilities of existing NATO bodies like the Joint Warfare Centre in Stavanger/Norway and the Joint Forces Training Centre in Bydgoszcs/Poland. Cooperation and streamlining of activities with existing NATO organizations and Centres of Excellence is recommended if this enhances the mission- and cost-effectiveness of the proposed NATO/European Joint Air Warfare and Training Centre.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A New Concept for Air, Space and Cyber Power

V

By Colonel Professor John Andreas Olsen, RNoAF

Introduction: Every War Must End

Fred Charles Iklé wrote a short, but highly important book in 1971, Every War Must End, in which he questioned why fighting often continues long past the point where a rational calculation would indicate that military action should cease. He also questioned why so few military victories translated into political success, and asserted that politicians and officers alike spent much time on contingency plans, the opening act of war and perfecting warfighting skills, while giving little or no real thought to war-ending criteria:[1]

Thus it can happen that military men, while skilfully planning their intricate operations and coordinating complicated manoeuvres, remain curiously blind in failing to perceive that it is the outcome of the war, not the outcome of the campaigns within it, that determines how well their plans serve the nation's interests. At the same time, the senior statesmen may hesitate to insist that these beautifully planned campaigns be linked to some clear ideas for ending the war, while expending their authority and energy to oversee some tactical details of the fighting. If generals act like constables and senior statesmen act like adjutants, who will be left to guard the nation's interests?

Iklé concluded that the long-term outcome of many wars depended on whether the militarily victorious side managed 'to reform the enemy's

government, to transform a former foe into a new friend'. Such strategic foresight laid the basis for stable and prosperous democracies in Germany and Japan after World War II. When examining the outcome of out-of-area operations from the mid-1990s on, one common denominator for Bosnia-Herzegovina, Serbia, Kosovo, Afghanistan, Iraq, Libya and Mali is that ultimately the West seeks broad political, social-economic and military reforms in these states. Thus, the desired end-state, beyond military objectives, is a legitimate government structure, based on UN values. Consequently, NATO should design military campaigns with this objective in mind so that the transition between military engagement and follow-on reform processes is as seamless as possible. This is not to say that NATO should engage directly in or be responsible for all aspects of state-building, but rather that NATO should plan and conduct operations so that military engagement contributes to setting the conditions for attaining the desired end-state of legitimate governance.

This essay suggests that NATO members need to develop military-strategic concepts that better link the application of force in general – and Air, Space and Cyber Power specifically – to the endgame objective of fostering 'good governance' as the defining legacy of any NATO-led intervention.[2] This requires a conceptual approach that views the state of interest as a *system,* a strategy that seeks *systemic empowerment* (of the supported ally) and *systemic paralysis* (of the opponent), using both lethal and non-lethal means in pursuit of *strategic effects.* The essay proposes a generic, system-level approach to warfare and subsequent state-building that challenges traditional military planning, which is usually fixated on combat and destruction, and views state-building as the domain of civil authorities. Conceptually, the essay proposes that NATO adopt the framework (see Figure) for its approach.

Objective: Good Governance – Legitimate Regime

The details of the desired end-state of a NATO-led intervention will vary because each situation is unique in its composition and challenges. For

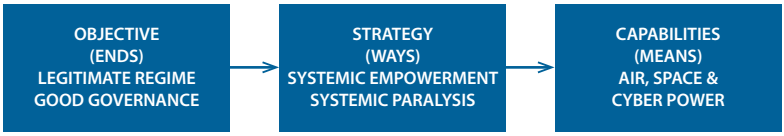

Figure: The ends-ways-means nexus.

the purpose of this essay it is useful to define three conditions that must be met to achieve good governance. First, a regime must establish internal security and law and order so that citizens can venture outside their homes without fear. Second, the regime must enable people to go about their daily lives: earning a reasonable living, access to education and social services, and the freedom to practise the religion of choice. This last element is particularly important in countries where many perceive Islam in general or particular branches thereof to be under persecution. Ensuring real freedom to worship and respect for each other's beliefs makes it more difficult for radical factions to misuse religion. Finally, a regime must encourage faith and trust in the government as well as loyalty by supporting and enabling desirable traits such as effective anti-corruption policies, integrity-building measures, professionalism, and merit-based selection in the civil service. When people feel safe pursuing their daily activities, are able to provide for themselves and their families, and perceive their government as credible, opposition groups will find it more difficult to garner levels of popular support that would endanger this basic level of security and stability.

Governance-reform efforts seek to facilitate the development of effective structures with transparent and accountable decision-making processes under democratic, civilian control. NATO's Partnership for Peace programme is a proven methodology for supporting and encouraging reforms, including judicial, economic and education aspects.[3] While NATO should not simply project a Western model into other social and cultural

environments, the partner regime should respect and accept the basic principles of good governance before NATO Member States choose to commit resources to its support.

Overthrowing an undesirable regime is one thing, in which NATO's preponderance of military power can be decisive; building up a state on the basis of democracy, individual liberty, and the rule of law is quite another. The question therefore becomes: how does one shape a military campaign from the start to support the objective of governance reform? Such a campaign would help the desired end-state government to anticipate and avert rather than react to crisis; instil confidence among its population, increase legitimacy and lay the foundation for a future alliance or partnership with NATO. All of this requires strong international cooperation and dedication. Organizations prefer to coordinate rather than be coordinated, but a credible international politico-military organization must take the lead.

Ways: Systemic Empowerment and Systemic Paralysis

While Western defence forces have achieved great success in modernizing their equipment, force structure, and training, that modernization has not extended into strategic thinking. Airmen have often proven themselves adept at the technological aspects of war, but feel less comfortable in the realm of abstract thought. Thus, current military doctrine governing regular and irregular warfare still centres on warfighting capabilities rather than on the opponent's overall system and on strategic effects. This stems largely from the still-pervasive belief that only ground forces can ensure military victory, and that the enemy leaders will only capitulate when they admit defeat on the 'battlefield'.[4]

According to noted historian Alan Stephens, the West is buying 'fifth-generation aircraft' but stuck in 'first-generation thinking'. Joint campaign

plans favour physical destruction of the adversary's ground forces. Operations focus on boots-on-the-ground – 'to seize and hold ground', 'close with the enemy' and 'search and destroy'. Consequently, airmen use Air Power to support the ground commander's scheme of manoeuvre and destroy targets so as to make it difficult for the adversary to engage in combat. Although Air Power has shown itself highly effective at taking out tanks, artillery and supplies, this line of thinking imposes severe limitations, since defeating the enemy's armed forces only removes one aspect of the problem. Western strategists must overcome their obsession with 'the battle', and instead concentrate on comprehending both the enemy and friendly systems and their leaderships, which represent both the cause of the conflict and the source of any sustainable solution.

Systemic paralysis seeks to prevent a state, government, or key forces from doing something, while *systemic empowerment* seeks to create better conditions for friendly actors. While the former sets out to degrade, disintegrate and damage, the latter seeks to facilitate, integrate and build. This concept follows two lines of operations, conducted simultaneously and in parallel: one *process-oriented* to achieve *psychological* impact, and the other *form-oriented* to achieve *physical* impact. The former centres on the intangible – mental and moral – aspects of warfare, while the latter deals with the material sphere.

As an illustration, *systemic paralysis* sets out to weaken the opponent's leadership, the decision-making processes, and the mechanisms for command, control, management and communication. Disrupting an opponent's decision-making calculus renders the opponent increasingly deaf, dumb and blind to act constructively. It uses incapacitation to neutralize key elements of the adversary temporarily, break the adversary's cohesion, disrupt the adversary's adaptability, and deprive the adversary of the capability for timely reorientation. Unable to cope with the tempo of events, the adversary's decisions and actions become strategically irrelevant.

When simultaneously working with local friendly forces, the combination of psychological and physical effects can be very forceful.

This strategic concept ensures that strategy focuses on war-ending rather than warfighting, thus avoiding the pitfall of reducing strategy to tactics. The systemic approach focuses on friends and enemies as systems – centres of gravity, critical vulnerabilities and key linkages. Although 'systems' are not necessarily mechanical and linear, and in fact may be highly complex and adaptive – even an agile and decentralized enemy can still be viewed as a system. An in-depth system-of-systems analysis allows for a broader and all-inclusive approach to affecting key political and physical nodes and connections. Actions that engage centres of gravity, target sets, and individual targets should contribute to achieving the pre-defined desired strategic effects, and set the conditions for follow-on activities such as establishing good governance and state-building measures.

The systemic approach emphasizes that military force is but one of several political instruments to deal with an adversary. The works of J.F.C. Fuller, Basil Liddell Hart, John R. Boyd, John A. Warden III and others provide excellent points of departure, although they tend to be more focused on paralysis than empowerment.[5] The comprehensive approach,[6] in its various forms, has proven useful at the tactical-operational level in Afghanistan; the challenge is to organize for success at the military-strategic level, and to get all the players to push in the same direction. Each action needs to be matched to the sought-after effect.

Means: Air, Space, and Cyber Power Capabilities

Air, Space and Cyber Power are true strategic weapons. Modern fighter-bombers, with their unique combination of speed (movement), intensity of force application (precision), and ability to attack from beyond enemy range (stealth and stand-off), give new meaning to the three classic

elements of warfare – mobility, strike and protection. Similarly, space capabilities are redefining the concepts of reach and persistence, and make the extraordinary precision of today's weapons possible in the first place. Cyber capabilities offer the possibility of neutralizing an opponent without firing a shot. The ideal of winning without extensive fighting on the ground and at minimal human cost is hardly new, but recent improvements in Air, Space, and Cyber Power technology open new paths to using resolute military force without deploying large numbers of troops. Why step into a tactical 'red zone' if strategic and operational effects can be dictated from a safe distance?

Air, Space, and Cyber Power creates significant advantages by using *tempo* as a strategic quality in its own right. Only recently has technology made it possible to attack multiple centres of gravity in parallel regardless of their locations, to strike them in very *compressed timeframes*, and to control the damage inflicted. Post-conflict hostility can be reduced by lessening the suffering and recovery time of the defeated party, by avoiding traditional wars with their perverse and long-lasting impacts.

Modern Air Power can hit targets with great accuracy (precision of impact), but the higher level, *precision of effect*, makes the difference. Space and cyber capabilities extend that precision even further. But the ability to strike anything must not translate into an approach of striking everything. Choosing the right targets is not a technical exercise; it requires knowledge of and insight into the opponents' culture, the inner workings of their power base, and their interior dynamics. The concepts of *systemic empowerment* and *systemic paralysis* emphasize the importance of acting discriminately to increase the likelihood of desired effects and decrease the likelihood of unintended consequences.

By streamlining the ends-ways-means nexus, Air, Space, and Cyber Power can play a very important role in linking the application of force (both

lethal and non-lethal) to government reform. Decision-makers must first establish a clear objective for operations, and a strategy for achieving that objective based on *systemic empowerment* and *systemic paralysis*. The strategic discussion can then focus on what Air, Space, and Cyber Power can contribute either as an independent, offensive, and possibly decisive instrument through strikes, or as an enabler and facilitator for other operations and efforts. It is at this level, with the ends and ways established firmly, that the discussion should turn to tactical missions such as air control, ISR, strike, and air mobility.

To bring this about, NATO Member States need to improve capabilities in various areas. Traditional topics of discussion in the area of military technology include low observability (or stealth), improved fusion of systems to gain knowledge dominance, and similar advances in the ability to find, identify, track and prosecute air and surface targets from a substantial distance. These technologies, when combined, radically redefine mass, speed, manoeuvre, strike and situational awareness. However, they have mainly centred on imposing *systemic paralysis* on an opponent rather than enabling *systemic empowerment* of a desired regime. That second goal requires increased reliance on capabilities not normally associated with military operations, such as environmental monitoring from Space, and Cyber operations.

Space as the ultimate high ground provides an ideal vantage point for observations over a wide area. Advances in both the resolution of images and the amount of information contained in the image now allow an astonishing number of previously unheard-of applications. For example, *satellite crop monitoring* involves the spectral analysis of high-resolution satellite images to track vegetation development. This type of information enables a government to identify crops, recognize problems and to intervene as necessary. Early indications of harvest failure could allow the government to plan well in advance to transport food and new seed supplies into

affected areas, thereby preventing hardship. Alternatively, governments can identify areas growing non-food crops such as opium poppies, and take action accordingly. Multiple civilian/commercial options exist, in use by many different players, including European ones. Centralized coordination of these capabilities would avoid duplication and ensure optimal use of the existing space infrastructure.

A similar argument can be made for *monitoring natural disasters* from space. Detailed knowledge of local situations can help a government make effective plans to mitigate the effects as rapidly as possible. Again, many civilian and commercial options exist, including the newly-launched European Sentinel-1A satellite and even a European centre of excellence. The same resources used for natural disaster monitoring can be used to *observe refugee camps and movements*, and satellites are now even being used to *detect and document genocide*, clearly identifying the party responsible. Here again, coordination must be improved in order to get best use from, and ensure a logical transition between, military and civilian capabilities.

Added to this, cyber operations offer entirely new ways of tracking and neutralizing opponents. Exploitation of cyber communications is already well known. NATO might consider expanding to another facet: tracking, stopping, or potentially even spoofing financial transactions. One reason why powerful opponents can gain influence in the first place is their access to large sums of money to fund their operations, and the ability to shift funds rapidly and securely. Depriving opponents of this capability would force them back to using cash, which is bulky to store and transport in large quantities, and vulnerable to theft or physical destruction. Constraining an opponent to cash exclusively therefore severely hinders his operations. Presumably, operations to counter adversaries' use of the international electronic banking system are already underway through various classified efforts. What is needed is a centralized and appropriately secure

clearinghouse of knowledge – who is doing what, which nation is pursuing what targets.

These practical examples show that Space and Cyber capabilities, added to Air Power, can provide precision effects (that is, effects highly targeted to the problem at hand) in both stopping an opponent and enabling the subsequent development of sustainable good governance. Importantly, post-conflict success relies on state-wide initiatives; most people live outside of any given capital. These capabilities may or may not be military – for example, in addition to military satellites usually optimized for intelligence purposes, many commercial satellites and drones monitor a variety of phenomena. However, *coordinating* the use of these many resources presents the key challenge, and one suited to an international organization such as NATO. Smaller nations in particular may be unable to afford complex, expensive military air and space systems, but they can develop a cadre of expertise in how to *utilize* all of the various resources most effectively, from deliberate planning to crisis response.

Existing bodies for the planning and conduct of Air, Space and Cyber operations should take into account both the need to paralyse the enemy and the need to enable long-term good governance by the desired regime. In the same vein NATO members should consider creating planning cells in appropriate military institutions and organizations that would coordinate the use of all the data made available through the new ISR systems for making decisions on how to advise allied governments. Some might argue that such a cell would fit best in the Foreign Ministry, rather than a Ministry of Defence, but military officers have been trained and educated to write complex, overarching plans. The key is to link the uses of Air, Space and Cyber Power in integration with other forms of military and political instruments of power to create both *systemic paralysis* and *systemic empowerment*.

Conclusion: Towards a Better Conceptual Framework

It has long been a truism that military victories do not necessarily yield political success. Part of the challenge is that military plans focus on 'the battle' rather than the actual end-state objective of government reform. The need to define an end-state that is credible, legal and moral as the critical element of every military plan has been in many ways the missing ingredient in modern strategy and warfare. This essay offers a conceptual approach that views the state of interest as a *system*, a strategy that seeks *systemic empowerment* of legitimate forces and *systemic paralysis* of opponents, using Air, Space, and Cyber Power in pursuit of *strategic effects*. Fundamentally, what NATO should consider as the enduring legacy of any intervention is a functioning state along the lines of common NATO and Partnership for Peace values.

Sceptics might suggest that 'good governance' is not achievable for all cases in which NATO Member States decide to intervene militarily: that may be so, but it gives NATO the necessary direction for establishing 'a better state of peace' and a basis for prudent, deliberate and comprehensive endgame planning. Sceptics might also offer that it is not NATO's place to take the lead in ensuring government reform: the answer is that no other organization is in a better position to do so, and if military intervention is considered worth the effort, it would certainly be sensible to have thought through the entire end-ways-means nexus prior to taking action. The grand and endgame strategy cannot remain *terra incognita*.

It is undoubtedly true that this approach will not work in all circumstances, but nevertheless it offers a conceptual framework that challenges the notion of force-on-force engagements, and it proposes a better use of Air, Space and Cyber Power to win the peace for which presumably the war is fought. The recent examples of Iraq and Afghanistan clearly demonstrate that a military campaign crafted without consideration of strategic

empowerment may end the force-on-force phase of the war, but stands very little chance of creating the conditions for a permanent peace.

NATO cannot and should not fix all ills of the world – and reforms need to take local culture and history into account – but NATO needs to develop a conceptual framework that defines end-state objectives before military operations begin. That conceptual framework should embrace the search for strategy in its ideal form. From there, NATO could examine the capability gap and determine the kind of capacity, capability, and competence each Member State should possess.

In the process, airmen need to understand, believe, and teach endgame strategy as the foundation of Air and Space Power. To succeed, Air, Space, and Cyber Power advocates must stop trying to use their capabilities merely as a substitute for ground-based operations, but rather connect Air, Space, and Cyber Power directly to the desired end-state of good governance, adopt new vocabulary and terminology for this purpose, and become spokesmen for a new conceptual approach.[7]

Recommendations: Strengthen NATO's Centres of Excellence[8]

NATO Member States should conduct in-depth studies that explain what Joint Air, Space, and Cyber Power can offer political and military leaders in the context of a strategy of *systemic empowerment* (of the supported ally) and *systemic paralysis* (of the opponent). These studies will remind NATO of previous lessons, and set the conditions for doing better next time.

Strengthen the Civil-Military Cooperation Centre of Excellence.[9] NATO should consider developing a unified concept that links the application of Air, Space, and Cyber Power to the end goal of government reform. The study could be considered as 'the Comprehensive Approach 2.0', and a reboot of 'effects-based operations', but with emphasis on turning theory into

practice – the true value of theory is better action. The Centre must be given a clear mandate for deliverables and a dedicated task force of Air, Space, and Cyber Power experts, security sector reform analysts, political, judicial and gender advisors, Non-Governmental Organizations, and subject area specialists (knowledgeable about specific societies, countries and regions), consisting of both military officers and civilians. This task force also could develop a concept for how to strengthen security sector reform in NATO's Partnership for Peace programme, focusing on building capabilities for Air, Space, and Cyber Power, and linking those capabilities to other sectors of governance. The Centre could offer courses and seminars, possibly based on the experience of Afghanistan and elsewhere, to educate officers (including foreign area officers) and political advisors who might be involved with future operations.

Strengthen the Joint Air Power Competence Centre.[10] NATO should establish a dynamic and vibrant environment for mastering Air, Space, and Cyber Power history, theory, strategy and doctrine; a milieu for cultivating broader knowledge of and insight into Air, Space, and Cyber Power; and a setting in which such experts have the opportunity to communicate their narrative to politicians, the media and fellow officers, and to interact to mutual benefit with experts from all sectors of governance. The project must have a strategic and conceptual focus, not a tactical and technological one. NATO Member States and Partners need to dedicate the 'best and brightest' to such assignments, with the objective of producing a series of high-quality RAND-like studies combined with a serious outreach plan for sharing the findings with politicians, officers, non-defence civil servants, and academics. The JAPCC could be such an intellectual hub for new strategic thoughts; its Sponsoring Nations should consider upgrading the mandate, promote it and make better use of it.

To sum up, NATO Member States should encourage the Civil-Military Cooperation Centre of Excellence to develop concepts in which the

application of modern air, space and cyber power is directly linked to security sector reform ('a better state of peace') and help turn the Joint Air Power Competence Centre into an intellectual hub for forward-leaning aerospace power thought ('air mindedness'). These recommendations are cost-effective, build on established institutions, offer opportunities for post-ISAF, and set the compass for how to better match the application of force with its overall purpose. Although strengthening these two centres of excellence is the key to develop a new concept based on *systemic empowerment* and *systemic paralysis,* NATO also should look at better ways to increase dialogue and cooperation between all its centres of excellence, to make the most out of NATO resources and ability to coordinate and conduct activities across the full spectrum of intervention.[11]

Endnotes

1. Fred Charles Iklé, 'Every War Must End', second revised edition (New York: Colombia University Press, 2005), p. 2.
2. I am deeply grateful to Pete Engelmann, Margaret S. MacDonald and Rohan Maxwell for significant contributions to this essay. I would also like to acknowledge much appreciated reviews from Phillip S. Meilinger, Richard P. Hallion, Alan Stephens and John A. Warden.
3. Rohan Maxwell and John Andreas Olsen, Destination NATO: Defence Reform in Bosnia and Herzegovina, 2003–2013, RUSI Whitehall Paper 80 (London: Routledge, 2013).
4. Robert A. Pape, Bombing to Win: Air Power and Coercion (Ithaca, NY: Cornell University Press, 1996).
5. For strategic paralysis, see for example David S. Fadok, John Boyd and John Warden, Air Power's Quest for Strategic Paralysis (Maxwell Air Force Base, Alabama: Air University Press, 1995). For further exploration, see John Andreas Olsen (ed.) Airpower and Strategy, to be published by Naval Institute Press (Spring 2015) with chapters from Peter Faber, Frans Osinga, John A. Warden, Alan Stephens and Colin S. Gray.
6. http://www.nato.int/cps/en/natolive/topics_51633.htm, accessed 15 May 2014, for more on the comprehensive approach.
7. See John A. Warden III, 'Strategy and Airpower', Air and Space Power Journal, Spring 2011, p. 64–77.
8. http://www.nato.int/cps/en/SID-4D26FFB3 238A5876/natolive/topics_68372.htm, accessed 15 May 2014, for more on NATO's centres of excellence.
9. www.cimic-coe.org. At the time of writing the Netherlands are considering re-locating and possible re-naming the Civil-Military Cooperation Centre of Excellence.
10. www.japcc.org.
11. The opinions and conclusions expressed in this essay are those of the author; they do not represent or reflect the official position of the Norwegian Ministry of Defence or any other agency.

The Future Role of Partnerships in Transatlantic Air and Space Power

VI

By Daniel P. Fata

Introduction

NATO's longest combat operation will draw to a close at the end of 2014 and with it, the Alliance's largest coalition of non-NATO partners will end a decade of operating side-by-side and wingtip-to-wingtip in Afghanistan. Nearly 50 NATO and non-NATO countries partnered on the ground and in the skies over Afghanistan in order to bring peace and stability to a war-torn nation and to prevent further terrorist attacks and activities from hitting the homelands of Europe, Canada, the United States and beyond. Partnering in this effort were forces from Australia, non-NATO Europe, the Middle East, North Africa, Southeast Asia, and Latin America. These nations, who arguably were not the initial set of targets of Al Qaeda's September 11 attacks which served as the catalyst for American and NATO involvement in Afghanistan, shared the same sense of threat and obligation the NATO Member States did and, thus, wanted to join the ISAF operation to do their part to join a common effort to protect their citizens from the danger of terrorism.

NATO's Allied Command Transformation is currently undertaking lessons learned analysis about how the Alliance worked with partner nations and what can be done to enhance military cooperation in the future. Some of the most visible and tangible benefits from having partners and NATO

Member States acting together in Afghanistan include the following: synergies of action and capabilities were found; interoperability was created and enhanced; political goodwill and understanding was generated; and burden sharing was undertaken.

As the ISAF mission ends and without a clear near-term military contingency to serve as a forcing function for maintaining partnership interaction with the Alliance (although some may rightfully believe the Alliance's enduring response to Russian actions in Ukraine may be the next major NATO mission to be undertaken), NATO officials need to develop some creative proposals in time for the September 2014 Summit for how to keep the partnerships bonds created at all levels via the ISAF mission going. There should be an urgency to ensure what has been gained in recent operational partnering is not lost and that these partnerships are seen as valuable relationships to have, foster, and which should endure.

Expanding upon what has already been achieved together between NATO and non-NATO states as well as institutions is needed. The opportunity to take partnerships to the next level of maturity and delivery may be best found in terms of what can be done in joint Air and Space Power. Given the importance of Air Power and the ease by which Partners and Member States can join forces to deliver visible displays of solidarity, common security, deterrence, and, if necessary, strike, the test bed for enhancing NATO's partnership relations starts with a strong foundation. The key will be to not lose momentum for what has already been deemed successful and to build new mechanisms, tools, and opportunities to continue to keep partners engaged, relevant, and prepared for the next challenge.

Benefits of Partnering to NATO

Why is partnering in the interest of NATO? Simply, the world is too complex not to have partners, particularly those who share the security concerns as

the Alliance does. Non-NATO members, whether they are nation states or international institutions such as the European Union, the African Union, the Organization for Security and Cooperation in Europe, or the United Nations, bring greater political and legal legitimacy to NATO's activities when they are engaged and involved. Partners also bring complementary and sometimes necessary missing military capabilities to a mission, thus making a mission more effective. Also, some partners are willing to share the mission's burdens financially, politically, and military by being part of the operation.

Beginning with operations in Bosnia-Herzegovina and Kosovo, NATO Member States realized that countries who were part of Europe but not part of NATO shared many of the same security and economic interests and concerns that NATO Member States did and therefore had an interest and a stake in seeing a viable and effective resolution to the events transpiring on the ground in the Balkans. Countries such as Austria, Sweden, and Finland, three members of the European Union but not NATO, took an active part in providing troops, logistical support, and money to help NATO's campaigns in the Balkans.

NATO's 2011 air campaign in Libya, Operation Unified Protector, saw numerous non-NATO Member States volunteering to be part of the operation. Sweden, Qatar, the United Arab Emirates, Jordan and Morocco offered contributions to the operations. Sweden was perhaps the most active partner nation offering 8 Gripen fighter aircraft to enforce the no-fly zone over Libya. It also supplied an air-to-air refueller to the operation. The countries of the Gulf and North Africa that participated in the Libya operation did so because, like their colleagues in the United States and Europe, they believed the security risks themselves and to the region were too great to keep Qaddafi in power. Thus, because of coalescence of national interests, disparate countries came together in common cause to deal with a shared security threat, which resulted in a unified action to eradicate the threat.

Why would a non-NATO Member State want to partner with Alliance? The examples illustrated above go a long in way in helping to explain and understand why non-NATO nations in Europe, Asia, and the Middle East have chosen to develop formal ties to the Alliance. Most of NATO's partners have sought a closer relationship for at least one of the following reasons: they share the same threats; they share the same values and principles; they have similar or complementary capabilities to NATO; they desire a closer functional and political relationship with NATO; they want to become more interoperable with NATO Member States; they want to have a varying degree of shared purpose, if not security, with the Alliance. For the past 20 years, partners have sought to utilize formal and informal mechanisms in order to develop a stronger relationship with NATO. The events in Ukraine have driven some partners, such as Finland and Sweden, to raise the public debate about what partnership with NATO means for them and, more importantly, why having a seat at NATO's table in one form or another will be even more critical to their respective nation's security going forward.

Key instruments used have been participation in Alliance operations (as mentioned) but also membership in NATO's Partnership for Peace program, the Euro-Atlantic Partnership Council, the Istanbul Cooperative, the Mediterranean Dialogue, the NATO-Russia Council, the NATO-Ukraine Council, and the NATO-Georgia Council. During the past two decades, these different arrangements and forums have varied in their degrees of success and engagement between NATO and individual countries from Europe, Eurasia, North Africa, and the Middle East. In fact, in 2006 at NATO's Summit in Riga, Latvia, NATO Member States leaders announced the creation of a global partners initiative which would allow countries from Asia and other parts of the world to develop similar relationships and arrangements with NATO and to be able to 'choose the areas where they wish to engage in and cooperate with NATO in a spirit of mutual benefit and reciprocity'.

Limits to Partnership and What Partnership is Not Intended to Be

Is the goal of partnerships to create a global NATO? Without having to put too fine a point on it, the mission of NATO is first and foremost defined in the 1949 Washington Treaty. The common defence of the Alliance territory and its Member States remains priority number one. However, as the world has changed and threats to the Alliance have grown from an attack by the Soviet Union to now terrorism, cyberwar, rogue state actions, nuclear strikes and more, NATO leaders have realized not only the value in being able to protect the Alliance territory beyond its traditional borders but also that there are like-minded partners who share the same threats and concerns, are military and economically capable, and have political and legal obligations to protect their national citizenry which coincide nicely with the same aims of the Alliance. Because of this synergy, NATO has endeavoured to widen the aperture of whom it engages with while at the same time ensuring that all activities remain rooted in the 65-year old mission of the Alliance. So, calling it a 'global NATO' would be inaccurate. However, calling it a 'NATO with global partners' would more accurately depict the philosophy of today's NATO leadership in terms of how it envisions engaging with partners.

Partners are not just capability gap fillers that the Alliance as whole or individual Member States do not want to fill. Moreover, having a robust set of partners cannot let treaty allies off the hook for providing key capabilities as related to the LoA and national requirements. Finally, partners should understand that a relationship with NATO does not mean that Article 5 guarantees are extended which automatically equates to an attack on a partner operating with NATO equals an attack on NATO itself.

What Next? What Might It Look Like?

With the ISAF mission coming to an end, with Allied air forces taking to the skies to help ensure NATO retains and displays a visible, deterrent capability

in the midst of the Russia-Ukraine crisis, and with the September 2014 Summit approaching, a to-do list of activities which could be proposed to maintain NATO partner momentum is required … and Joint Air and Space Power is the easiest means by which to tackle the larger issue of what to do about future partnerships.

There are a few different approaches NATO can take in terms of engaging partners on Air and Space Power activities. First would be to recognize what the Alliance needs in terms of partner capabilities to match or enhance existing NATO Air and Space Power assets. Second would be to understand what partners specifically and individually want to get out of a relationship with NATO post-2014. Third would be to determine what existing structures are available and might be needed to support new partner activities. Fourth would be to prioritize who does what and who oversees these activities.

Examples of activities that come to mind for how members and partners can come together include the following:

- participation in NATO air and cyber exercises as well as air policing missions;
- inclusion in joint training of air, missile defence, and other related capabilities;
- certification of Air and Space Power units to NATO interoperability standards;
- sharing of key competencies including doctrine and education;
- opportunities to host NATO out-of-area exercises;
- establishment of joint air wings (including UAS) hosted on non-NATO territory;
- inclusion in pre-decisional discussions at North Atlantic Council for possible involvement in future NATO operations;
- filling operationally-important capabilities such as air-to-air refuellers, ISR, strategic and intra-theater lift, rotary wing, and other;

- creation of joint maintenance facilities for commonly used air platforms such as the F16, F18, C130s, C17s, Eurofighters, A400Ms, and other fighters and transport aircraft;
- development of Joint Air and Space procurement programs;
- pursuit of Joint Air and Space Power industrial research and development programs.

It is also possible to develop tiered levels of partnerships so that NATO can obtain the most benefit from those partners who are most willing, capable, ready, and able to take full advantage of a robust, multi-layered relationship with NATO and can provide the most utility to the Alliance. One could envision partners such as Sweden, Finland, Australia, Georgia, New Zealand, South Korea and Japan as being part of an inner circle of partners who have demonstrated their capacity and willingness to operate with NATO where it matters and with capabilities that bring tangible benefits to the mission. Other circles or rings of partnership would be occupied by those that have differing degrees of capabilities, political desire to establish closer, but not too close, of a relationship with NATO, or other reasons for which they do not belong at the time in the inner circle. Given the partnership process is meant to be demand driven, the ability of a partner to move in or out of the inner circle is dependent on their national decisions. What would be important, though, is that membership in the inner circle would derive the most amounts of benefit and support from the Alliance and other levels of partnership would commensurately be compensated.

A similar concept would be to declare 'lead partners' for the Alliance who can offer specialized capabilities which NATO deems important in either a complementary or necessary role. Such examples in the Air and Space Power domain could include partners that have excess air-to-air refuelling capacities, intra-theater lift capabilities in certain geographies, ISR technologies which can operate at different altitudes, with differing intelligence

sensors, or that are able to fly in remote areas. Having a 'lead partner' would not only benefit the Alliance's mission set, it would create a catalyst for partners to work with NATO on a program that becomes personalized and tailored to both NATO and the partners' interests and thus would likely be more sustainable over time.

Conclusion

What is the end state, then, of partnerships? At present, there is no end state for partnerships, which means it is an open book in terms of shaping these partnership forums, activities, and constructs in a way which mutually benefits the Alliance and the partners involved. Arguably, the end state of any partnership relationship with NATO is to create a more effective and efficient Alliance activity whether it is a military operation, a political statement, or support to a task deemed important to the NATO leadership and members.

Deepening NATO's existing partnerships, both with individual nation states inside and outside of Europe, and with key international institutions, is necessary going forward. An emphasis on less formal and more ad hoc partnership arrangements is of critical importance as is being able to make these relationships more responsive, flexible, and ultimately effective.

Ultimately, NATO should want to create a demand driven partnership program where nations and institutions recognize the value of partnering with NATO as well as having a closer relationship with the Alliance. Such a relationship must be mutually beneficial to both parties in order for it to be effective and enduring. Moreover, tangible outcomes must be produced such as enhanced military security cooperation, greater intelligence sharing, and stronger political bonds to name a few. The opportunity set to engage in robust partnering as it relates to Joint Air and Space Power is very broad. It is also realistic and relatively easy to undertake.

Alliance leaders should embrace a more active role by non-NATO nations in order to ensure NATO is able to effectively respond to threats and crises inside its borders, on its borders, and in areas of the world where like-minded governments and peoples share the same concerns and need for security that we share in the transatlantic community.


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Beyond Optimization

VII

Innovation and Adaptability for NATO Air and Space Power – The Role of Industry

By Professor Dr. Phil. Holger H. Mey

'If I had asked my customer what they wanted, they would have said faster horses!'
Henry Ford

Air and Space Power is fundamentally technology-based and driven. NATO Member States are crucially dependent on aerospace and defence industry to provide modern technologies and solutions. This includes the ability to optimize and adapt capabilities based on today's technologies, but also to provide radically new and innovative technologies and concepts. Technological solutions, however, can only be provided by an economically sustainable defence industrial base. In a world of rapidly proliferating technology capable of trumping current Western advantages in networked Air and Space Power, NATO Air and Space Power providers and industry will need to do more than optimize procedures related to current planning, budgets, and procurement priorities. Air and Space Power providers and industry must cooperate closely and this at a very early stage of requirement definition, system specifications, and acquisition processes. Europe's government leaders need to make better use of NATO and industrial associations to improve dialogue,

coordination, and cooperation between industry and Europe's Air and Space Power providing services. Without action, fragmented European and Atlantic industries and militaries will see technological advantages slip away as other power centres are able to take greater advantage of both economies of scale and rapidly proliferating military technology.

The spending gap between the United States and Europe on Research and Development (R&D), including investments into military Science and Technology (S&T), has long been a challenge for the European aerospace and defence industry and for transatlantic industrial cooperation. This challenge has been worsened by the still rather fragmented nature of Europe's defence industrial base. Individual European nation states continue to plan and fund mainly for their own military research and development. This challenge is now compounded by the innovation and financial power of non-allied countries across Asia, Africa, and Latin America. On the one hand, this means that it will be more and more difficult to maintain Western technological superiority; on the other hand, this also offers new possibilities for export and cooperation with certain emerging economies.

This essay is about more than optimizing demand based on current planning, budgets, and existing procurement processes. It is mostly about a fundamentally new relationship between all stakeholders. This essay will show how industry and air forces can improve their coordination and collaboration in the face of a rapidly changing global defence technology landscape.

This essay maps out a response to the urgent challenges and opportunities, showing how NATO and the EU, as well as national and international industrial associations, can facilitate forward-looking cooperation that seeks to respond to global challenges, also by putting more emphasis on new fields of defence technology competition. These would, among other things, include such relevant challenges as cyber security, unmanned

vehicles and robotics, advanced energy, biogenetics and personnel development and training. Maintaining technological superiority will also involve careful consideration of export policy.

While industry is somewhat reluctant to share and consult with customers and, in particular, competitors when future revenue seems highly uncertain, industry clearly has an interest in adjusting its investment portfolio to more accurately reflect the future needs of Air and Space Power. However, industry sees a three-fold problem: (1) Customers want consulting for free; (2) Customers force industry to present ideas and 'secrets' openly to competitors; and (3) Customers expect up-front investments (advance payment) by industry without the certainty of a return on investment through future equipment or systems sales.

The Air and Space Power-related services and governments of NATO Member States would seem to have great interest in cooperating with industry. Armed Forces have less and less money. They have fewer and fewer personnel. Skilled professionals are in short supply and difficult to retain. Innovation from within has grown more difficult. Industry, on the other hand, is about innovation, as Henry Ford's quote reminds us. Industry can provide valuable advice on what is practical and affordable. Industry has a significant comparative advantage in optimizing systems and managing complex trade-offs – which is also the key to achieving greater synergy among NATO's Air and Space Power providing military services. Industry can conduct dialogue with those organizations to achieve design optimizations that reflect more than higher, faster, further. More importantly, industry can help improve investment in innovation, also with NATO and EU coordinating bodies. National or European industrial associations can serve as valuable intermediaries.

Mutually beneficial cooperation on innovation, optimization, and adaptability can be achieved if both sides understand and appreciate their

respective interests. Industry needs to understand the requirements of, and challenges for, the armed forces, while the Armed Forces need to understand that (private) industry needs to protect its intellectual proprietary rights, its competitive advantage and, at the end of the day, its profitability.

This essay advocates the establishment of structured dialogue between the Armed Forces and industry at a very early stage of the requirements definition, design, and procurement process, arguing this is a prerequisite for a healthy defence technology and industrial base, which, in turn, is the prerequisite for technologically superior Air and Space Power.

Industry Has Concerns

While industry's interest in greater dialogue with the customer is clear, industry also has certain concerns. Industry has to be able to protect the value of its proprietary knowledge, its Intellectual Property Rights (IPRs). Industry fears losing IPRs to the competition. Industry is worried about competition law. Should one company enjoy 'early' access to the customer, it could be judged as unfair (and illegal) competition. Many of these concerns could be alleviated by working with industrial associations like Aerospace and Defence Industries Association of Europe (ASD) or issue-related specific consortia like Network Centric Operations Industry Consortium (NCOIC). Industry is also concerned that the 'customer' (NATO) is looking for 'free advice' when it should be paying and, indeed, in the long run, this underinvestment makes all products more expensive. There are limits to how long industry can offer such advice without demanding an actual order. Industry also wants to address funding levels for studies and research and development. Industry wants to achieve a simplification of the procurement process and a reassessment of procurement policies and criteria.

The defence market, including the one within NATO, is only partly a 'free market', even if characterized by strong and increasing competition; the

market remains regulated by national protection mechanisms and national security policies. Only in the limited areas of direct NATO procurement can NATO act as a multinational 'customer'. In order to be formally correct, NATO normally prefers to choose the lowest price offer, which is not always the best value for money in the long run. NATO could improve its ability to budget for long-term initiatives on technology development. NATO authorities should recognize that a better balance between economical, technical, and political criteria would help to keep industry motivated for a long-term buy-in. This is especially important for Air and Space Power because of the huge investment and time needed to build up the necessary system know-how. Millions of Euros invested now will save billions in decades to come. Spending is necessary today on a structured dialog to protect and expand long-term technological advantages.

Obstacles to Greater Cooperation

NATO Member States do not always share common security interests and concepts when it comes to cooperation between industry and the military. Budgets are tight and decreasing and in many areas, civilian and commercial technology defines the state of the art. Much could be done to improve common, multinational understanding of concepts, technologies, export policies, and program planning. Long-term planning has proven especially difficult. Procurement is sometimes based on immediate demand from newly identified mission needs. Budget constraints lead to price-driven procurement policies, which do not always end in the best solutions or the lowest life-cycle costs.

Research budgets have gone down significantly and often concentrate on 'technological assessment capabilities'. This has led to the reorganization of NATO research management and coordination efforts, for example, the transition from the Research and Technology Organization (RTO) to the

Science and Technology Organization (STO). While research institutes are still financed for their activities, industry is not or only in part. Long-term business opportunities that would incentivize and justify industry to do self-funded investments remain difficult to define. Even moderate up-front investments, made for the customer, such as the above mentioned 'strategic consulting for free', draw opposition from business management. 'Big' companies are capable of some limited investments – though they too need to see program and profit perspectives to continue. Small companies are often a source of innovation, but they are even more dependent on clear market opportunities.

The situation is worsened by the increasing competition between industries on the global market – a direct consequence of reduced budgets in home nations. Export polices could also be more strategic with a greater focus on innovation and adaptability, also in financing. Additionally, the increasing speed of technology developments and rapid global technology distribution means defence is no longer the technology driver in some sectors. Commercial markets drive innovation and investment for the backbone of modern forces, information and communication technology. Commercial innovation has clearly changed the technologies of security and warfare. The cyber domain, in particular, has opened a wide range of new opportunities – and dangers – for Air and Space Power.

Industry as an Architect of Optimized, Innovative and Adaptable Solutions

Despite these concerns and obstacles, it is important for industry and NATO Air and Space Power providers to pursue closer cooperation. Industry can play an important role by intensifying customer relations. Measures should include engaging the customer in a dialogue; industry can serve as an 'architectural design bureau'. The customer who wants to build a house usually has no idea about costs and trade-offs. He might wish to have a

dream house until he is confronted with the costs. The architect might have to help him understand what is reasonable and affordable.

As a system designer, industry has a comprehensive responsibility to optimize all the various elements that go into an 'ideal' system, while also maintaining the innovation and adaptability necessary to stay ahead of the competitor. As a system integrator, industry can help designing better integration of Air and Space Power capacity. In being able to demonstrate trade-offs and optimization to the customer while fostering innovation and adaptability, industry will need to establish a rapid prototyping and demonstration capability. Industry can provide transparency and insight into system architecture, and thus, also into overall cost structures. In sum, industry can help clarify demand, working with the customer to understand the differences between what is wanted – if money and design trade-offs played no role – and what is actually needed and affordable.

A more coordinated industrial overview will provide a better range of choices for the customer. Industry can offer, for example, 80/60 solutions, i.e., 80 % of the capability that is initially desired for 60 % of the price. Plug 'n Play architecture provides for more choices. Modularity allows better customization. There will be a premium on cross-section functionality. Greater transparency of cost structure means industry can provide a catalogue of cost options, taking into account block-upgrade options, growth potential, iterative improvements, spiral development, and pre-integration. Indeed industry is going beyond a catalogue of products to offer long-term services like concept-of-operations centres, support centres, and through-life support. With the customer providing common guidance and specifications, all of this can be done. Many options are available and selecting among them will be important, for example, optimizing design for high readiness levels or for high mean-time between failure or for low maintenance costs rather than for power, speed, and thrust.

Industry can offer long-term investment partnerships with the customer by asking the customer better questions and helping the customer to also ask better questions. Such partnerships should evolve around integrated teams, joint personnel recruitment and development programs, and joint export efforts. Industry will need to demonstrate what it can do in terms of building demonstrators, providing full-system design, building training centres, and inviting customers to research centres. Ultimately, the objective is to arrive at a common understanding of demand – in various timeframes and in national and international terms – and of how to best serve that demand through innovation and adaptation. Reacting quickly and flexibly on the basis of sudden changes in demand also requires innovation and adaptation in terms of requirements and specifications.

Using and Improving Existing Institutions

NATO research coordination is, after some reorganization, concentrated in the Science and Technology Organization network, composed of eight panels and one institute, the Centre for Maritime Research & Experimentation (CMRE). The NATO Collaboration Support Office manages these, a direct NATO office under the direction of the Chief Scientist of NATO and the Science and Technology Board. There is not an explicit aerospace panel in this organization, but aerospace aspects are part of the activities of all panels.

Industry involvement in NATO research coordination is very limited due to a lack of research and technology programs. Research and technology cooperation is performed nationally or in bi- or multilateral cooperation programs. In the European Union context, these cooperation programs may be managed by the European Defence Agency, but with strong Member State decision authority. For analysis work and preparation of R&T requirements as well as R&T project suggestions, EDA has formed a network of expert groups, the so-called Cap Techs, representing the main

capability and technology areas relevant for defence. Each group consists of a chairperson, national coordinators, governmental experts, and non-governmental experts. The latter come from industry, institutes, and universities. The Cap Techs are an important instrument for further coordination of the European defence R&T process.

Currently, direct exchange between industry and NATO is mainly performed via NATO Industrial Advisory Group (NIAG) studies and some limited contracts with Centres of Excellence (COE). The interest of industry is limited; there is no full reimbursement of costs. At the same time, there is the difficult requirement and obligation to share information with potential competitors. Despite these challenges, NATO has streamlined its science network and is improving links between NIAG and STO. Nevertheless, much should be done to improve coordination with COEs (where capability needs are analysed), and with other technology networks.

STO and NIAG should be more flexible toward an early exchange of views on long-term technology challenges. Nevertheless, STO and NIAG provide a certain balance of interests between all stakeholders. If accountable results are needed, this balancing is essential. Strengthening the links between COEs and STO/NIAG would offer a promising start to enhancing a more flexible and broad-ranging R&T dialogue between industry and NATO Air and Space Power organizations.

Industry associations or long-term cooperation schemes, like NCOIC, can play a role here, working toward framework agreements in an EDA/ESA/Commission project. The EDA has struggled with a technology road map. An out-of-the-box, high-ranking working group should generate ideas for cooperation in terms of Letters Of Intent (LOI). Similarly, the EDA would benefit from extending the CAP tech task toward long-term demand – looking, for example, at the 'air force after next'. Whether in NIAG or beyond, the science, technology, research and development parts of NATO

need to be better embedded in those creative and change-oriented organizations that drive innovation. The NATO-HQ Strategic Analysis/ Emerging Threats division might be adaptable, playing a role in obtaining LOI on technology cooperation between nations with the requisite industrial capacity.

While working within existing NATO and EU institutions is important, an additional step toward better cooperation should be the evolution of existing European structures toward a European Defence Science Board along the lines of the US Defence Science Board. The US DSB convenes study groups, currently including 'Energy Systems for Remote/Forward Operating Bases' and 'Military Operations in a Complex Electromagnetic Environment'. These groups consist of experts from government, industry, and academia. The DSB website explains the collaborative nature of the work (see: http://www.acq.osd.mil/dsb/history.htm):

'Currently, the Board's authorized strength is thirty-two members and seven ex officio members (the chairmen of the Army, Navy, Air Force, Policy, Defence Business Board and Defence Intelligence Agency advisory committees). The members are appointed for terms ranging from one to four years and are selected on the basis of their pre-eminence in the fields of science, technology and its application to military operations, research, engineering, manufacturing and acquisition process. The Board operates by forming Task Forces consisting of Board members and other consultants/experts to address those tasks referred to it by formal direction. The products of each Task Force typically consist of a set of formal briefings to the Board and appropriate Department of Defence officials, and a written report containing findings, recommendations and a suggested implementation plan.'

Having such a powerful science board should help Europe to at least partially fill the often-cited US-European gap, especially if Europe succeeds in forming a more coordinated European procurement approach.

Optimizing Investment through Better Dialogue

Industry can seek to be a better partner for the customer, pursuing dialogue about future developments and serving as a trusted 'architectural consultant' also on system design. Industry can be an affordable solution provider as well as a financial partner. Industry can provide expertise, also in seeking out the customers' preferred partnerships. Industry can offer clear paths into future, particularly in terms of spiral development, ongoing upgrades, and systemic innovation and adaptability.

Early progress will be more likely with system modifications, especially under the aspects of harmonization, interoperability, and effectiveness. Big platforms will be a greater challenge, but consensus on those is also urgently needed. NATO should also think about how to better include industry in existing initiatives. Up to now, initiatives like Smart Defence are mainly addressing the military cooperation side. Including industrial policy issues in ongoing NATO capability projects would offer a step forward. National and international industrial associations would be the ideal partners for such an endeavour. Intensifying industry participation in military exercises with demonstrators for new technologies will also improve optimization, innovation and adaptability.

Industry can provide leverage with unique selling points, particularly when it comes to understanding extremely complex and demanding requirements. Industry's highly competent skill sets offer the ability to manage large, non-single-platform projects, also in offering opportunities for small and medium enterprises.

In the face of globalization and rapid technological and geopolitical change, the time has come to review current approaches and mechanisms for collaboration between NATO members and industry on innovation, optimization, and adaptability. The commercial and legal aspects of pre-commercial

and commercial procurement need to be revisited. NATO Members States must work with industry to identify business models and create win-win situations. In this context, providing NATO Air and Space Power providers with cutting-edge technologies while protecting industry's intellectual property rights will be a key challenge. Finally, NATO institutions and channels can facilitate greater transatlantic cooperation, particularly if they focus on technology sharing, improved interoperability, and increased economy of scale. Avoiding unnecessary and redundant spending will also be a key priority.

NATO Member States procurement policy, facilitated by a European Defence Science Board, should move toward greater support for innovative technologies and solutions by better utilizing industrial expertise. There is much room for greater rationalization of R&D activities within NATO. The Alliance can also facilitate more developed cooperation between industry and national and international scientific and laboratories and research centres. Logistics and deployability challenges call for new approaches to private contractor support during operations. NATO should proceed with a philosophy that allows for 80/60 solutions while maintaining a technological edge. In the end, it is about defining common requirements and reducing the number of variants.

The Way Forward

With defence budgets unlikely to significantly increase in short-term, industry wants not just optimization but a whole new orientation, with particular attention to issues of innovation and adaptability relating to science and technology as well as research and development. The EU Council's tentative steps at the December 2013 Summit offer hope. This might give the EDA more freedom of action beyond its current focus.

Looking into the future, over-capacity will continue to push industry toward greater consolidation. In the years to come, new defence and security technologies will proliferate, as will new ways of organizing innovation and

adaptability. Additive or three-dimensional printing will be as disruptive as advances in robotics and genetic engineering. Even as global cooperation becomes more important in these fields, it will also be necessary to maintain a residual independent capacity for innovation and adaption – cooperation requires an independent capability to cooperate and something others are interested in. Furthermore and in some areas, nations want to have key capacities indigenously available, e.g., France wants their own ballistic missiles or many European nations want their own new European UCAV. As the world enters a new era of production and design, Europe's national defence industries will be challenged to improve dialogue with Air and Space Power providers across a wide range of evolving technologies.

NATO Europe, in mid-term perspective, needs an Unmanned Combat Arial Vehicle (UCAV). Such a programme would be ideally suited to establish, and test, this essay's recommended improvements in dialogue and cooperation among NATO Member States as well as between NATO and industry. NATO Member States should agree to initiate such a programme and make every effort to come-up with harmonized requirements.

The European Union countries are in the process of reorganizing the defence market from capability definition to procurement. Even if this is a long-term effort, some significant effects will already be visible in the short-run. This process has to struggle with the same constraints that NATO is facing. Therefore, European institutions like EDA are a natural strategic partner for NATO. An advantage of EU-NATO cooperation would be an extension beyond the membership of the respective organizations. This would be important for standardization or interoperability issues, but also for global security cooperation with non-NATO countries. Such cooperation should partially mitigate the huge gap between the US and European research and development. This would benefit NATO as well. The mechanism for cooperating between countries would need to be linked to national industrial policies and decided case-by-case.

Defining standardized market mechanisms for armament cooperation within NATO and for third parties should be an important first step. Armament cooperation is an important tool of security policy; dialogue between industry and militaries can improve design optimization, innovation and adaptability across a wide range of future Air and Space Power capabilities.

Conclusion and Recommendations

The role of NATO as the place where Member States and industry harmonize their national interest and define common objectives could and should grow significantly. NATO should identify options for improving an early and open exchange of ideas with industry across a wide range of science, technology, research and development fields. NATO's added value is in the newly established STO/NIAG network organization and processes, which will be even greater if improved cooperation with COEs is successful. A high-level discussion with Allied Command Transformation and NATO's Collaboration Support Office (CSO) should set the ground for more intensive cooperation.

Establishing regular high-level discussions with all stakeholders should be an immediate objective. This should involve the inclusion of technology issues in the COE conferences, the development of a common long-term technology roadmap, the identification of quick wins for capability improvements, and the establishment of a database for technologies and suppliers beyond C3 (Command, Control, Communication) Technology. A European UCAV stands out as a technology that could benefit greatly from the structured cooperation foreseen in this essay.

Also important would be development of long-term program perspectives in cooperation with Member States. A European Defence Science Board along the lines of the US Defence Science Board should spearhead

this process. These would motivate industry to buy into the process, particularly where NATO can bring in the benefit of a global reach. This would be particularly important for standardization and interoperability issues. As always, a balance must be struck between concentrating efforts on the most urgent capability requirements and giving long-term issues of innovation and adaptability the significance they deserve.

In seeking to shape the market place, NATO and its Members States should promote more efficient processes, criteria, and standards to optimize value for money in defence procurement, while fostering the ability to innovate and adapt over the long term. There will be a premium on common requirements with fewer variants. Cooperating within European institutions should partially compensate for the huge investment gap between the US and Europe. Establishing standards for armament cooperation inside NATO and beyond should help to strengthen the overall added value of NATO. NATO bodies and industry should motivate Member States by showing, and later by demonstrating, the benefits of cooperation under renewed NATO leadership. Industry, in cooperation with NATO, can serve as a system integrator capable of design innovation and optimization in the face of difficult trade-offs. This cooperation can provide transparency and insight into system architecture, and thus, also into overall cost structures. Industry in dialogue with the military across a broad range of national, NATO and EU forums can help clarify demand, optimizing design, also in terms of innovation and adaptability, to ensure that what is wanted does not get in the way of what is needed.

All these proposals offer important, short-term, practical steps to improve the challenge of optimization, innovation, and adaptability. Better dialog can bring important progress across a range of sectors and forums. This progress, however, should not be confused with progress on answering more fundamental questions. Do Europe's states understand the continuous importance of military power in international relations? Do they

understand the need to define Europe's role in the world and the level of ambition this implies? In sum, Europe's states still need to clarify how they think Europe can maintain its wealth and global influence. If superior defence and security technology is to be part of the answer, then Europe's states need to better enlist organizations like NATO and EU and industrial associations to improve dialog, coordination and cooperation between industry and Europe's militaries to achieve higher levels of optimization, innovation, and adaptability to unpredictable threats.

The New Burden Sharing Imperative

VIII

By Dr. Hans Binnendijk

During most of NATO's history, more equal burden sharing with the United States was generally considered a vague goal for Europe – a worthy objective to move toward when other needs were met, but not an imperative. There was always the comfortable assurance that the United States would step in and provide whatever was missing from the European military inventory. NATO forces did provide most of the layer cake defence against the overwhelmingly superior Soviet conventional forces during the Cold War. But they were backed up by the promise of ten American combat divisions in ten days and much more. And if that failed, American nuclear weapons were available for first use under the doctrine of flexible response. During the past 20 years, that existential threat disappeared. Crisis management operations also did not require significant European force structure. The United States again took the lead in Afghanistan and was content with a 2:1 American: European force ratio in ISAF. The magnitude of the European contribution was politically as important as it was militarily. In both cases, NATO Europe provided enough defence capability to keep the Americans satisfied.

American burden sharing pressure on Europe usually took the form of percentage goals. The pressure was sometimes reinforced by threats of troop withdrawals. For example, the goal of 3% growth in annual defence

spending was enforced by the threat of Nunn Amendment enactment. Europe responded to these pressures to satisfy the United States politically, not because Europe felt it was a defence requirement. In the past decade, European NATO Member States has paid little attention to the NATO agreed 2% of GDP defence spending goal. After the Ukraine crisis, that 2% goal may be re-energized. Now a new burden sharing approach has been adopted as a NATO guideline: the notion that no one country should be required to provide more than 50% of the NATO contribution to any one type of mission. This in fact creates the requirement for European NATO Member States to develop a full spectrum of military capabilities, though not necessarily equivalent to US capabilities.

European leaders are becoming keenly aware of this new imperative. During the 2014 Munich Security Conference, German President Joachim Gauck said that Germany would be an equal and reliable partner. German Defence Minister Ursula von der Leyen promised that Germany would enhance its international responsibility and suggested 'European answers to European defence capability problems'. French Foreign Minister Laurent Fabius lamented declining defence budgets in Europe saying 'we must do more'. Dutch Minister for Defence Jeanine Hennis-Plasschaert said the West has 'no time to lose' to reinforce its military capabilities. NATO Secretary General Anders Fogh Rasmussen has continually called for Europe to strengthen its defence capabilities.

A Possible Perfect Strategic Storm

The nature of burden sharing has changed dramatically in the past year. One might argue that it is now a necessary imperative for European NATO Member States to develop a full spectrum of military capabilities, not a political option. This is particularly true for European NATO Member States Air Power since it is highly dependent today on US enablers to operate. The strategic situation has changed for several reasons:

- The two decade long assumption that there will not be a major war in Europe is in some doubt. While no one expects Putin's Russia to launch a major attack on a NATO member, Russia's military incursion into Georgia, annexation of Crimea and possible annexation of part of Eastern Ukraine creates the risk of incident and escalation. And covert operations designed to destabilize the Baltic States cannot be ruled out, which will elicit a NATO response. Defence of the Baltic States would require a major joint operation.
- While NATO Air Forces combined may be larger than Russia's, Russian Air Power is staging a modernization comeback and would have significant advantages fighting close to their own border. The most recent Jane's assessment of the Russian Air Force states: 'The future appears brighter for Russian Air Power with renewed investment including the planned procurement.'[1]
- US defence cuts are significant and could get even worse under sequestration. The annual defence budget will fall from over $700 billion in 2011 to about $500 billion in 2015 even without sequestration. As a result, the recent QDR posits a 'win, deny' strategy for dealing with two nearly simultaneous major theatre conflicts.[2] That is a shift from 'win, win' and later 'win, hold, win' strategies contained in earlier military strategies. The concern is that a theatre involved in the second of two nearly simultaneous conflicts may not receive enough dedicated American forces for a prompt win.
- The American strategy to pivot its attention to Asia was not intended to reduce America's commitment to NATO or Article V, but it did reduce US force structure in Europe. At the time it was believed that the existing US force structure in Europe could be further reduced because the European security situation appeared quite stable. The rebalancing of US force assignments between Asia and Europe is intended to shift to 60/40 by 2020. Now there are but two US Brigade Combat Teams left in Europe, and no permanently assigned tanks. The implication is that conflict in Europe is not expected to be the first of these two theoretical major theatre operations.

- Events in Asia are becoming more unstable. North Korea continues on its path towards building a small arsenal of nuclear weapons and its missile technology shows signs of improvement, threatening not just American allies but as some point the United States directly as well. Incidents between North and South Korea continue. China continues to reinforce its maritime claims with intimidation against its neighbours and America's allies. China and Vietnam are engaged in a contentious dispute over a Chinese oil rig placed in contested waters. During his recent trip to Asia President Obama reinforced commitments to Japan, South Korea and the Philippines.
- China is fast developing an Anti-Access Area Denial (A2/AD) capability that has American military planners worried. Within the next decade or so they will be able to deny the US Navy and Air Force the ability to operate without significant risk in the first island chain. To a lesser degree, Russia and Iran seek to develop a similar though less effective capability. The United States is considering strategies to counter this Chinese A2/AD capability, including much more integrated naval, air and land operations called Air Sea Battle, designed to maintain freedom of action in five domains (sea, land, air, space and cyberspace). It will require perhaps even greater American military focus on Asia than is currently inherent in the pivot.
- The prospect of American and/or NATO use of force in the Middle East while inconsistent with the pivot remains a possibility. Should negotiations on Iran's nuclear plans fail and should their nuclear weapons development continue, then the United States may decide to respond to the red line that the Administration has declared. That could represent a fairly intense military campaign. In addition, the Syrian civil war may still require an international force to intervene, possible undertaking stabilization and reconstruction operations.
- Potential American adversaries are working together more closely than ever. There are growing signs that Russia and China will continue to develop closer ties as they both resist American efforts to support

its allies. And together they provide strong support for North Korea and Iran. A new geostrategic situation is emerging in which the policies of these potential adversaries may be more closely coordinated in the future.

- European defence spending reductions have been dramatic, first creating more hollow forces and then removing entire national capabilities. Europe is more dependent than ever on US forces should conflict erupt on the continent. It has not yet reacted to the new strategic situation that it faces.
- The US and the rest of NATO have responded to Russia's annexation of Crimea and its provocations in Ukraine by sending 600 US paratroopers to Poland and the Baltic States, conducting modest naval exercises in the Baltic Sea, reinforcing Baltic Air Policing with US F-15s and NATO AWACs, and sending F-16 training missions to Poland. These deployments are highly symbolic and serve as a sort of trip wire, but they would not stand in the way of any serious Russian effort against NATO's eastern flank. Additional NATO force structure changes are under consideration such as creation of forward based reception centres. This is intended to deter Russia but could also trigger further Russian military responses.

All of this could create a worst-case situation in which Europe is faced with a perfect storm. While unlikely, it must be considered because of recent events. The United States could find itself heavily engaged in Asia or the Middle East and Russia might decide to take advantage of America's overcommitment elsewhere and Europe's inability to operate effectively without full American support. The scenario is not about American abandonment. The American commitment to NATO is solid. The perfect storm scenario is about the need for Europe to have adequate military capabilities to offset the fact that the United States may be engaged elsewhere with the preponderance of its military capability. This is particularly true for Air and Space Power.

Consequences for Joint Air and Space Power in NATO

If European NATO Member States are faced with the need to create a full spectrum of military capabilities that could operate with a smaller American contribution in times of great global tension, then NATO/European Joint Air Power has considerable shortfalls to make up.

European NATO Member States have a reasonably sized fighter aircraft fleet of about 1244 compared to 3125 for the United States, 2179 for Russia, and 1769 for China.[3] But most European fighters are old third generation fighters. Non-US NATO nations are slated to buy less than 500 F-35s, which would provide a good fleet of fifth generation aircraft for the alliance, but even that number may shrink due to budget pressures. And most nations are well below the NATO standard training requirement of 180 flying hours per pilot per year due to funding shortfalls. Completing those F-35 purchases and boosting pilot readiness should be a high European priority.

But perhaps the greater problem lies with the ability of European Air Forces to enable and sustain air operations. Below is an unclassified assessment by Dr. Charles Barry of the major European Air Power shortfalls[4]:

- Standoff Precision-Guided Munitions (PGMs).
- Dynamic Targeting Capabilities (ability to attack moving targets, not just fixed targets like facilities, stationary troops, etc. This includes weapons that can be re-programmed in flight, and it also requires skilled targeteers working in NATO CAOC's).
- Aerial refuelling capacity. Europe has 72 (27 med/45 large) refuellers of all types/sizes, mostly small. US has 523 (73 med/450 large) refuellers JISR platforms (like AWACS, Allied Ground Surveillance, JSTARS).
- Drones (both reconnaissance and attack).
- Deployable 'kit' (mobile maintenance and test equipment, munitions handling equipment, ground re-fuel equipment, airfield security units,

air traffic control and weather forecasting units, runway lighting and repair equipment, etc.).
- Medium to large helicopters, survivable and all-weather capable (mainly transport but also some attack. NATO allies in Europe have about 900 medium transport helicopters. By comparison, the US has approximately 2700 medium and heavy lift helicopters).

These assets are not only needed in sufficient volumes but in a posture for rapid arrival and utilization in distant theatres of operation. It is unlikely that European Air Forces can begin to seriously address these shortfalls under current budgets and projected further reductions.

The Strategic Deterrence and Defence Dimension

America's European partners also need to address two strategic burden sharing issues. First, in light of Russia's annexation of Crimea and its public nuclear intimidation against Poland, Europe must leave no doubt that the current NATO nuclear deterrent posture will remain effective. The NATO Strategic Concept and subsequent Deterrence and Defence Posture Review agreed to a solid formula for NATO nuclear deterrence. As long as nuclear weapons exist, NATO will remain a nuclear power. But national parliaments in some cases have voted to remove the nuclear capabilities from future fighter aircraft and raised doubts about their nations' long-term willingness to participate in nuclear deterrence. Aggressive arms control proposals for non-strategic nuclear weapons should be pursued, but success is unlikely given current NATO-Russia relations. And without such success, the current NATO nuclear posture should be retained. NATO's three nuclear powers cannot be asked to bear the burden of nuclear deterrence alone.

Second, NATO's missile defence posture also needs some burden sharing attention. Today, the United States is paying the overwhelming cost of

defending Europe against missile attack from states like Iran. The agreed NATO missile defence plan is based on the US Phased Adaptive Approach connected to the NATO Active Layered Theatre Ballistic Missile Defence (ALTBMD) Command and Control System. The latter is paid for by NATO, but the relative cost is not high. But a new problem has arisen with regard to BMD burden sharing. By scrapping, for solid technical reasons, Phase Four of the Phased Adaptive Approach, the US has removed from the program the only element that would have provided any defence for the continental United States. Therefore, the system originally designed to defend all of NATO, now defends only Europe. But the US is stuck with most of the bill. European nations are beginning to find ways to contribute more actively, including contributing their own limited missile interceptors to the system and providing additional radar coverage where they can. But in order to prevent Congress from cutting budgets for European-only BMD systems, Europe should pre-empt with its own upgraded package of BMD contributions.

The Way Forward

Russia's annexation of Crimea has created an opportunity to revisit the decline of Europe's Air Power capability. NATO needs to develop a 'Get Well Plan' for European militaries, including Air Power. NATO should reset the goal of 2% of GDP allocated for national defence and endorse the 50% guidelines discussed above. Second, it should adopt some version of regional approaches to defence acquisition and operations that go beyond the current Smart Defence. Both Germany and the United Kingdom have proposed a version of such a plan. Now NATO should embrace it. Third, *NATO should set an initial goal of creating by 2020 a European Joint Air Power capability that can operate on its own for 30 days in a near-region SJO, until the US can redeploy assets that might be committed to non-European contingency operations.* That would entail purchasing an adequate number of fifth generation fighter aircraft and dealing with the capability shortfalls

listed above. And fourth, the summit should reinforce the conclusions of the Deterrence and Defense Posture Review and adopt a more fulsome package of European contributions to European missile defences.

Endnotes

1. Jane's Sentinel Security Assessment – Russia and the CIS; 13 Mar. 2014. The quote continues: 'In 2013 alone 86 new aircraft and more than 100 new helicopters were commissioned into the air force. In 2014 the VVS are earmarked to obtain 120 aircraft and 90 helicopters. By the end of 2020, the VVS hopes to augment its fleet with 3,000 new airframes. The most potent instance of long-overdue new equipment is the Sukhoi Su-34 'Fullback' strike/attack aircraft, of which up to 120 examples are expected to enter the inventory, with other new hardware including the Mil Mi-28N 'Havoc' attack helicopter, Yakovlev Yak-130 trainer and Ilyushin Il-112 transport. If this ambition is achieved, by 2020 70 % of the VVS fleet will be equipped with modern aircraft.'
2. The 2014 QDR states 'US forces will be capable of defeating a regional adversary in a large-scale multiple phased campaign, and delaying the objectives of – or imposing unacceptable costs – on a second aggressor in another region.', p. 12.
3. Military Balance.
4. Compiled from multiple sources from Dr. Barry who covers NDAT issues for the National Defense University.

Annex A

Core Team – Biographies

Project Lead: Lieutenant General (ret.) Frederik H. Meulman

Lieutenant General (ret.) Frederik H. Meulman graduated from the Royal Military Academy in the Netherlands 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 (CAOC) in Kalkar. 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. Lieutenant General (ret.) Meulman is married to Nanette, they have two sons and one daughter.

Dr. Hans Binnendijk

Is a Senior Fellow at the Center for Transatlantic Relations at Johns Hopkins University's School of Advanced International Studies (SAIS), and at RAND. Until July 4, 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 on the National Security Council staff as Special Assistant to the President and Senior Director for Defense Policy and Arms Control. He also served as Principal Deputy Director of the State Department's Policy Planning Staff and Legislative Director of the Senate Foreign Relations Committee. He has received three Distinguished Public Service Awards. In academia, he was Director of the Institute for the Study of Diplomacy at Georgetown University and Deputy Director at London's International Institute for Strategic Studies. He has written widely on US national security issues, on NATO and on Asia. He serves as Vice Chairman of the Board of the Fletcher School and as Chairman of the Board of Humanity in Action.

Daniel P. Fata

Is a Vice President at The Cohen Group, a Washington, D.C.-based strategic advisory firm, where he focuses on Europe, Eurasia, Afghanistan, and Canada. He previously served as the US Deputy Assistant Secretary of Defense for European and NATO Policy. Prior to DoD, he was Policy Director for National Security and Trade on the Senate Republican Policy Committee. He is a fellow at the German Marshall Fund of the US Mr Fata earned a B.A. with Honors in Political Science from the University of Connecticut and a M.A. in International Relations from Boston University.

Lieutenant General (ret.) Ralph Jodice

Ralph commanded NATO's Allied Air Command, Izmir, Turkey, and was the Combined Forces Air Component Commander for Operation Unified Protector. He has over 3,500 flying hours in the F-111A/E, T-38A, F-15E and UH-1N. He commanded an F-15E fighter squadron and group. He was: a division chief on the USA Joint Staff, J-3; the commander of the 80 Flying Training Wing's Euro-NATO Joint Jet Pilot Training Program; the USA Defense Attache, China; the Deputy for USA AF International Affairs; and the Commander of the Air Force District of Washington. He is a graduate of the USA National War College.

Professor Dr. Phil. Holger H. Mey

Began his professional career in 1986 as a Research Associate at the Stiftung Wissenschaft und Politik. From 1990 to 1992, he served as a Security Policy Analyst on the Policy Planning Staff of the German Minister of Defense. In 1992, he founded the Institute for Strategic Analyses (ISA) and served as its President and CEO. He conducted over 30 studies for various Ministries and Government Agencies. In 2004, Prof. Mey became Head of Advanced Concepts, Airbus Defence and Space. Over many years, he was a frequent TV and radio commentator, publisher, and lecturer. Prof. Mey is a Honorary Professor at the University of Cologne, Germany.

Colonel Professor John Andreas Olsen

John Andreas Olsen is deputy general director in the Norwegian Ministry of Defence, colonel in the Royal Norwegian Air Force, and visiting professor at the Swedish National Defence College. Recent assignments include tours as deputy commander at NATO HQ, Sarajevo (2009 to 2012), dean of the Norwegian Defence University College (2006–2009), and student at the German Command and Staff College (2003–2005). Professor Olsen is the author of Strategic Air Power in Desert Storm and John Warden and the Renaissance of American Air Power. He is the editor of 'A History of Air Warfare', 'Global Air Power', 'Air Commanders and European Air Power'.

Lieutenant General (ret.) Stefano Panato

Lieutenant General Orazio Stefano Panato retired in 2013 as president of CASD: the Italian Ministry of Defense post-graduate Institute for global strategy and security open to senior national and international officials. He was also Deputy Chief of Staff of the Air Force; Deputy Director of the Italian agency for foreign intelligence, AISE; military adviser to the Italian Permanent Delegation to NATO. During his 4.000 flying hours he piloted a variety of aircraft: mostly jet fighters, but also transport aircraft and helicopters. In addition he qualified as a test pilot at the Empire Test Pilots' School in the UK.

Lieutenant General (ret.) Friedrich W. Ploeger

Lieutenant General Friedrich Wilhelm Ploeger retired 2013 as Deputy Commander and acting Commander of Air Command Ramstein. He is a fighter controller by origin. His military career includes high ranking NATO and national positions in the fields of planning and military policy, i.a. as Director Military Policy and Arms Control and Disarmament in MoD Berlin. He also commanded from unit to division level and beyond. Before coming to Ramstein, he held a triple hatted position as Commander of the German Air Force Air Operations Command, Combined Air Operations Centre Uedem and as Executive Director of the Joint Air Power Competence Centre.

Air Marshal Graham Stacey

Air Marshal Stacey is a senior level commander with extensive experience in the multinational and joint operational environment. His operational experience includes deployments to Bosnia-Herzegovina, Kosovo, Kuwait, Iraq and Afghanistan. His current appointment is Deputy Commander, NATO Joint Forces Command Brunssum. Air Marshal Stacey has been supported by the following members of the Brunssum team: Colonel Kris Chafer GBR A, EXO to DCOM; Group Captain Sean O'Connor GBR F, Branch Head J35; Wing Commander Alex Grun GBR F, Integrated Analysis Team; Wing Commander Allan Steele GBR F, LEGAD; Wing Commander Phil Hateley GBR F, MA to COM; Wing Commander James Lafferty GBR F, J2 ISR; Lieutenant Colonel Daniel Coe USA F, J35; Mr Andy Ormerod, GBR Consultant.

Annex B

Advisory Team

1. General (ret.) Stéphane Abrial
2. Lieutenant General (ret.) Veysi Agar
3. General (ret.) Mieczyslaw Bieniek
4. General (ret.) Vincenzo Camporini
5. Lieutenant General (ret.) Leandro De Vincenti
6. Lieutenant General (ret.) David Deptula
7. Major General (ret.) Tom Knutsen
8. Major General (ret.) Charles W. Lyon
9. Diego A. Ruiz Palmer
10. Lieutenant General (ret.) Friedrich W. Ploeger
11. General (ret.) Egon Ramms
12. Lieutenant General (ret.) Dr. Dirk Starink
13. Major General Dr. Victor Strimbeanu
14. Air Marshal (ret.) David Walker

Annex C

List of Acronyms

A2/AD	Anti-Access/Aerial Denial
AAR	Air-to-Air Refuelling
ACT	Allied Command Transformation
Air C2	Air Command and Control
AISE	Agenzia Informazioni e Sicurezza Esterna
ALTBMD	Active Layered Theatre Ballistic Missile Defence
AOR	Area of Operational Responsibility
ASD	Aerospace and Defence Industries Association of Europe
AT	Advisory Team
BMD	Ballistic Missile Defence
C2	Command and Control
C3	Command, Control and Communication
Cap Tech	Capability Technology Group (Part of EDA R&T Organization)

CAOC	Combined Air Operations Centre
CDP	Capability Development Plan
CFI	Connected Forces Initiative
CIMIC COE	Civil-Military Cooperation Centre of Excellence
CMRE	Centre for Maritime Research & Experimentation
COE	Centre of Excellence
COIN	Counter Insurgency Operations
CSAR	Combat Search and Rescue
CSDP	Common Security and Defence Policy
CSIS	Center for Strategic and International Studies
CSO	Collaboration Support Office*
CT	Core Team
DCA	Dual Capable Aircraft
DCI	Defence Capabilities Initiative
EA	Electronic Attack
EAD	Enemy Air Defence

EC	European Commission
EDA	European Defence Agency
EPAF	European F-16 Participating Air Forces
EU	European Union
EW	Electronic Warfare
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IMS	International Military Staff
IPRs	Intellectual Property Rights
ISAF	International Security Assistance Force
IS	International Staff
ISA	Institute for Strategic Analyses
ISR	Intelligence, Surveillance and Reconnaissance
IW	Irregular Warfare
JAPCC	Joint Air Power Competence Centre
JISR	Joint Intelligence, Surveillance and Reconnaissance

JPS	Joint Precision Strike
LoA	Level of Ambition
LOI	Letters Of Intent
MAB	Main Assembly Base
MEB	Main Education Base
MD	Missile Defence
MJO	Major Joint Operation
MLB	Maintenance and Logistics Base
MOB	Main Operating Bases
MOD	Ministry of Defense
MOU	Memorandum of Understanding
MRO	Maintenance Repair and Overhaul
MTB	Main Training Base/Weapons School
NATO	North Atlantic Treaty Organization
NCOIC	Network Centric Operations Industry Consortium
NDPP	NATO's Defence Planning Process

NIAG	NATO Industrial Advisory Group
NIC	National Intelligence Council
OCCAR	Organisation Conjointe de Coopération en Matière d'Armement
PGM	Precision-Guided Munition
PG	Political Guidance
PSA	Priority Shortfall Area
QDR	Quadrennial Defense Review
R&D	Research and Development (includes 'Technology')
R&T	Research and Technology (no 'Development')
RPAS	Remotely Piloted Air System
RTO	Research and Technology Organization
S&T	Science and Technology
SAIS	School of Advanced International Studies
SD	Smart Defence
SEAD	Suppression of Enemy Air Defence
SJO	Smaller Joint Operation

STB	Science and Technology Board (highest authority of STO, managed by the Chief Scientist, staffed by member nation delegates)
STO	Science and Technology Organization
T/BMD	Theatre and Ballistic Missile Defence
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Air Vehicle
US/EPAA	United States/European Phased Adaptive Approach
US	United States
WMD	Weapons of Mass Destruction

*NATO CSO Panels

AVT	Applied Vehicle Technology Panel
HFM	Human Factors and Medicine Panel
IST	Information Systems Technology Panel
SAS	System Analysis and Studies Panel
SCI	Systems Concepts and Integration Panel
SET	Sensors and Electronics Technology Panel
NMSG	NATO Modelling and Simulation Group
IMC	Information Management Committee

Joint Air Power Competence Centre

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