

***EURAC AIR POWER PAPER***

***A EUROPEAN PERSPECTIVE  
ON  
AIR POWER***

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## **EURAC AIR POWER PAPER**

The EURAC Air Power Paper will be officially endorsed on the occasion of the EURAC gathering held during the 2001 edition of the Paris Air Show by the following Air Chiefs:

- Brigadier General Josef BERNECKER, Chief of the Austrian Air Staff
- Lieutenant General Michel MANDL, Chief of Staff of the Belgian Air Force
- Major General Leif SIMONSEN, Commander of the Tactical Air Command, Denmark
- Lieutenant General Jouni PYSTYNEN, Commander in Chief of the Finnish Air Force
- General Jean-Pierre JOB, Chief of Staff of the French Air Force
- Lieutenant General Gerhard BACK, Chief of Staff of the German Air Force
- Lieutenant General Dimitrios LITZERAKOS, Chief of the Hellenic Air Force General Staff
- Brigadier General Patrick A. CRANFIELD, General Officer Commanding the Air Corps
- Lieutenant General Andrea FORNASIERO, Chief of Staff of the Italian Air Force
- Major General Tomas Colin ARCHER, Chief of Staff of the Royal Norwegian Air Force
- Lieutenant General Dick L. BERLIJN, Commander in Chief of the Royal Netherlands Air Force
- General António José VAZ AFONSO, Chief of Staff of the Portuguese Air Force
- Air General Eduardo GONZALEZ-GALLARZA MORALES, Chief of Staff of the Spanish Air Force
- Major General Mats NILSSON, Inspector General of the Swedish Air Force, Commander of the Air Force Command
- Lieutenant General Hansruedi FEHRLIN, Commander in Chief of the Swiss Air Force
- General Ergin CELASIN, Commander in Chief of the Turkish Air Force
- Air Chief Marshal Sir Peter SQUIRE, Chief of the Air Staff, Royal Air Force

## FOREWORD

Since 1993, the Heads of 17 national European Air Forces have met within the forum of the European Air Chiefs' Conference (EURAC). They participate in these meetings as professional airmen and not as official representatives of their countries. Therefore, EURAC is not an institution and strives to be independent, impartial and informal.

The aim of EURAC is to improve co-operation and understanding among European Air Forces and thereby increase their efficiency and effectiveness. EURAC seeks to encourage solidarity through collaboration and friendship among the participating countries, while guaranteeing top-level co-operation in the field of military aviation. It focuses on the key issues of the moment and on topics of mutual interest.

In the evolving and increasingly complex international security environment such a forum has an important role to play, both now and for the foreseeable future. Given these fundamental changes in the international security environment, EURAC agreed that a paper of the key concepts of Air Power should be produced. The first EURAC paper was produced as a booklet, named Air Power's Contribution to Security and Stability and issued in 1996. It aimed to enhance the general understanding of Parliamentarians, Civil Servants, Joint leaders and equally influential individuals and institutions about the contribution that Air Power could make to defence and security.

The recent Kosovo conflict and the changes in the European Defence policy led to a thorough review of the booklet. EURAC considered the importance of the lessons learned from the Kosovo crisis and the increased attention to European Defence warranted close scrutiny. Accordingly, on behalf of EURAC, the German Air Force hosted an Air Power Colloquium in Hamburg in August 2000 to address European Defence and Security Policy. The collective output has been incorporated into this new EURAC Air Power Paper (APP).

This new Paper considers the effective and efficient employment of Air Power across the entire spectrum of military operations. But above all, it reflects the vision of 17 European Air Chiefs about the future of Air Power and how it will remain the military instrument of first political choice.

## INTRODUCTION

Following the demise of the Warsaw Pact, and the ending of Superpower confrontation in Europe, the end of the 20th Century was typified in some parts of the Globe as a return towards regional conflicts, as ethnic, religious and economic factors began to re-shape the political map.

The start of the new century is still characterised by unpredictability and instability, and the continuation of “little wars”, or crisis, which reappeared in the 1990s. In this new strategic context, European nations are not fighting for their survival, but to avoid the spread of conflict or for essentially moral and humanitarian ideals. This does not necessarily mean, however, that European interests could not again be threatened by large-scale conflict. Such conflict could stem from spillover, following escalation of adjacent regional or local conflicts. Consequently, capabilities will continue to be required for the core military task of safeguarding the integrity of the home state and deterring aggression.

In fact, these recent changes in the international security environment have broadened the spectrum of conflict within which military forces may be employed and the geographical area over which they could be deployed. The nature of their missions has evolved to encompass Crisis Response Operations (CRO)<sup>(1)</sup> in addition to the combat missions. These operations, as it showed in the Balkans, call for even more sophisticated and responsive means than before, as it is now essential to solve crisis as quickly as possible, with a minimum of human losses, and under close media scrutiny.

Air Power is at the very core of the politico-military strategy used to pursue moral and humanitarian ideals. Modern long-range weapon systems combine precision with discrimination. They can reduce collateral damage and protect friendly forces. By adhering to the concept of proportionality, and ensuring legitimacy during operations, enemy casualties can also be minimised. Above all, Air Power can serve as an essential part of military action guided by the concept of the use of minimum force which should ensure a proportionate response.

This paper will define Air Power and discuss its characteristics and capabilities. Capitalising on the “Kosovo lessons learned” and the EURAC Air Power Colloquium findings, it will then address how Air Power will contribute to security and stability over the next 15 years, taking into account advantages in technology, and the demographic and budget limitations that will impact all EURAC nations. Finally it will provide a vision of awareness of the limitations and the challenges that lie ahead.

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<sup>1</sup> Crisis Response Operations range from humanitarian operations, support of peace operations, to peace enforcement operations, by force if needed.

## WHAT IS AIR POWER ?

With the diversity of machines which travel through the air and space, and the capabilities each has to offer to military operations, defining Air Power precisely in one single formula is almost impossible. The following definition, mainly inspired by the British Air Power Doctrine AP3000, Third Edition, requires some additional comments.

### **Definition**

“Air Power is the ability to project and employ military force in air or space by or from an air platform or missile operating above the surface of the earth.” In this definition, *military force* has to be understood as all military strength dedicated to offensive and defensive missions as well as all other non-destructive, supporting duties such as reconnaissance or airlift. *Air platform* is defined as any aircraft, helicopter, unmanned air vehicle, spacecraft or satellite. More and more, the official terminology uses *aerospace power* to qualify this form of aerial and spatial strength. In order to maintain some continuity with the previous EURAC booklet, this Paper intentionally retains the original *Air Power* phraseology.

Air Power is not only delivered by Air Forces but also includes the aerial capabilities provided by the other services (Army, Navy, Marines), and even by civilian aviation.

Finally, Air Power is not only composed of weapons systems but relies on personnel who employ it, infrastructures to operate from or spare pieces vital for its use.

### **Strategic view of Air Power as contribution to military Power**

#### **The Strategic Effect of Air Power**

The ability of Air Power to reach, disrupt, or possibly destroy an opponent’s strategic or operational centre of gravity suggests that Air Power is inherently capable of military action with strategic effect. That effect may be created through independent, distinct action or through joint or multinational activity operating in cadence with other forces. The essential feature of air operations for strategic effect is that the activity – which could also include similar action by maritime or land forces – although aimed at strategic targets in support of the overall campaign objectives or end state, may be mounted distinct from the joint campaign or from outside the theatre boundary. It is this distinction, which sets air operations for strategic effect apart from other Air Power roles and missions.

The objective of strategic effect missions is similar to that of manoeuvre warfare: to shatter the enemy’s cohesion and will, rather than simply to destroy his manpower and material. This objective is achieved by applying strength against an adversary’s vital interests through the application of firepower, manoeuvre and surprise throughout the operating area, with missions timed simultaneously at all levels of warfare. Target sets identified through the use of campaign planning tools may include the machinery of government, military forces, and infrastructure plus research and production facilities. All will have been approved and scrutinised by commanders and planners with regard to the strategic aim and, equally importantly, with regard for extant Rules of Engagement,

the laws of armed conflict and associated targeting concepts such as distinction and proportionality.

### **Air Power: The Instrument of Choice**

The 1990's witnessed three major aerial offensives which, if only at a first glance, appeared to be revolutionary, as they were probably successful and decisive.

- In the case of the Gulf War (*Operation DESERT STORM* – 1991), Western Air Power took the lead in rendering the Iraqi occupation of Kuwait untenable.
- In Bosnia in 1995 (*Operation DELIBERATE FORCE*), an aerial bombardment by NATO forces seemed to be instrumental in imposing peace – of a kind at least – on the warring factions.
- In *Operation ALLIED FORCE* in 1999 (Kosovo Air Campaign), 11 weeks of air strikes appear to have been the single most important factor in compelling the government of the Federal Republic of Yugoslavia at the time to come to terms with the transatlantic alliance regarding the crisis in Kosovo.

Indeed Air Power has emerged from all of this as, it would seem, the supreme form of military capabilities, the obvious instrument of choice.

The success of the Allies' three great aerial offensives was such that many commentators were already arguing that Air Power had “come of age”, after centuries of being dominated by land and maritime forces, warfare seemed to be entering a new epoch, the aerospace era.

Thanks to night-vision devices and highly accurate navigational aids, advanced combat aircraft could operate in adverse weather conditions and on a round-the-clock basis.

The availability of precision-guided munitions, including a new generation of aerodynamic missiles, also gave them an unprecedented capacity for striking at discrete targets. The inherent flexibility of Air Power – which enables it to be switched from one assignment to another with comparative ease and alacrity – had been enhanced through the development of multi-role platforms equipped with versatile, and often interchangeable, systems.

Integrated, sophisticated intelligence-gathering and dissemination systems furnished them with an unparalleled amount of information regarding the battle space.

In other respects too, modern airforces were better able to make use of the advantages that had always flowed from a capability to exploit the freedom of the skies, not least the ability to venture almost anywhere; whereas the majority of the Earth's surface is covered by sea, with just a third made up of dry land, all of it is enshrouded by the atmosphere. Their reach extended through in-flight refuelling, aircraft, always relatively swift, could now also attain speeds that greatly exceeded those of even the fastest surface forces.

The ubiquity, perspective and reach of aerospace platforms liberate them from the obligation to engage in sequential patterns of operation. Whereas ground forces have to achieve tactical breakthroughs in order to fulfil operational objectives which in turn leads to progress at the strategic level of war, in theory at least Air Power can undertake missions on all the levels on the very outset of a conflict.

Furthermore, not only has the accuracy and lethality of modern weaponry endowed aerospace forces with unprecedented scope in terms of the spectrum of targets they can engage with a good prospect of success. But also such forces remain, for the time being at least, less vulnerable to destruction by terrestrial means, than the other way around.

All of this suggests that, in certain circumstances at least, air forces can project power relatively swiftly and with fewer risks than would attend the employment of other types of military units. In Bosnia and Kosovo Air Power's contribution to the coercion of the enemy appeared to be of paramount importance. Here, protracted aerial attacks evidently exerted sufficient pressure to obviate the need for Western troops to take the offensive at all. Formerly hostile territory could be occupied after having been rendered untenable through the direct and indirect application of Air Power.

If, in the eyes of some states, aerospace forces have become the instruments of first resort, it is also true that not just the availability of Air Power, but also the achievement of air superiority, if not supremacy, are now prerequisites for the launching of many types of terrestrial operations.

During *Operations DESERT STORM, DELIBERATE FORCE* and *ALLIED FORCE*, Air Power enabled coalitions to achieve success within the parameters laid down by their dominant political authorities, not the least of whose stipulations was that casualties among their servicemen and women among non-combatants should be kept to a minimum.

The very extent to which that particular goal was fulfilled sets a precedent that can only prove immensely difficult to maintain.

## KEY CHARACTERISTICS

The aerial offensives detailed previously highlight the 3 Key Characteristics of Air Power: height, speed and reach. Each characteristic will now be considered further.

### **Height**

The primary key characteristics of air assets is based on the possibility to use the third dimension. The ability of aerospace systems to operate over a large spectrum of heights, ranging from low-level flight to geo-stationary orbit, gives them not only speed and reach but also the ability to observe (overtly or covertly) activities in aerospace or on the surface of the earth. The military advantages of elevation include enhanced observation and perspective of the battle space.

### **Speed**

The speed of aerospace systems allows military Air Power to be projected or redirected more rapidly, missions to be completed in shorter time and a greater number of tasks to be undertaken within a given period than any other military Power.

Recent history shows that speed remains a critically important characteristic of Air Power, because of the lengthy decision making process that is inherent in our democracies.<sup>(2)</sup> Once the appropriate decision has been taken, Air Power permits to implement it in the fastest possible way.

### **Reach**

Reach, the quality arising from range and the ability to use height, allows air platforms to fly over long distances in any direction, unconstrained by the physical barriers of topography. The range at which Air Power can be used from bases either ashore or afloat, can be dramatically extended by the use of air-to-air refuelling (AAR) or space orbit.

In that respect, without being re-deployed, Air Power can be employed effectively from remote home bases, staying relatively immune from enemy attacks.

Air Power can also be employed to demonstrate the political will of a country or a coalition wherever wanted.

Finally, during crisis management, reach is relevant when it is important to operate outside the territory of warring parties while assisting in containment measures or conducting information gathering, by surveillance, reconnaissance or early warning.

*During Operation ALLIED FORCE over Kosovo in 1999, US B-2 bombers were tasked on round-trip missions from the Continental US to attack targets in Yugoslavia. These flights, extended by 3-5 Air-to-Air Refuelling activities, lasted some 30 hours.*

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<sup>2</sup> The air campaign in the Balkans showed that the involvement of political leaders in the operations was important to the extent that it impacted the planing and targeting process.

## KEY CAPABILITIES

### ***Interaction of key characteristics***

The interplay of the key characteristics previously mentioned gives rise to many military capabilities such as responsiveness, flexibility, ubiquity, mobility, concentration, penetration, visibility or survivability. Although these capabilities are common to Land, Sea and Air strength, Air Power benefits from being able to use height, speed and reach. This increases, by an order of magnitude, its capabilities.

Besides, the panoply of high technology air systems, Air Power has two additional characteristics: precision and diversity of appropriate effects.

All these characteristics are now developed.

### ***Responsiveness***

Considering the key characteristics in the round, reaction time remains the critical factor for all kinds of military involvement, be it combat, humanitarian, crisis response or rescue operations.

The rapidity with which Air Power can be deployed and employed makes it particularly suitable as a military instrument for political crisis management. Responsiveness ranges from ground alert at home locations, deployed readiness to airborne alert, either outside or even inside an area of operation.

Any change to the political or military situation can be met in kind with an immediate and appropriate change of posture or military action. Accordingly, Air Power is the instrument of first choice to contain a crisis or to de-escalate it, and it is the rapidity with which Air Power can be deployed, employed or withdrawn, which demonstrate its responsiveness.

### ***Flexibility***

Air Power can be employed simultaneously across the entire spectrum of military operations, from humanitarian missions (e.g. airdropping food and medicine or medical evacuation) to armed conflict where weapons are used to destroy enemy targets. Air Power can attain simultaneously strategic, operational and tactical level objectives and it can be applied at different geographical locations within the entire theatre. Air assets do not have to disengage from one operation and regroup in order to move to another - an extremely risky and complicated manoeuvre for surface forces.

Finally, at the tactical level, some very versatile aircraft, known as multi-role aircraft, have the ability to conduct a large variety of missions (offensive or defensive); swing-role aircraft can even switch from one role to another once airborne during the same mission.

*During the Gulf War, in 1991, some US F-18 shot down Iraqi fighters with air-to-air missiles on their way to Iraq, where later on they bombed ground targets.*

## ***Ubiquity***

Due to its speed, range and flexibility, Air Power may simultaneously pose a threat and influence an opponent's strategic options anywhere and any time. This influence may range from continuous surveillance to precise and appropriate demonstration of force or delivery of humanitarian aid. Manned, unmanned airborne platforms and satellites provide high-endurance observation/surveillance capability for different military planning levels.

## ***Precision***

The precision capability of Air Power offers specific advantages throughout the entire conflict spectrum, especially as collateral damage is likely to remain a most sensitive issue <sup>(3)</sup>. Modern technology not only allows Air Power to identify and track targets correctly, but also to attack them accurately, to minimise collateral damage, to reduce risks to civilians and friendly forces and to optimise cost/effectiveness.

Precision guided munitions <sup>(4)</sup> (PGM), together with reconnaissance, surveillance and target acquisition are decisive contributions also applicable to humanitarian missions, especially for the task of protecting friendly ground troops, operating under a peace enforcement mandate, who, for example, come under attack in the vicinity of civilians.

## ***Mobility***

Because of its inherent mobility, Air Power can be brought to bear with a freedom and speed denied or limited to other military means. Mobility enables Air Power to operate virtually from any location into anywhere. In addition to the mobility for combat operations, mobility also enables support operations for the transportation of ground troops, materiel, weapons or food into combat or reserve zones.

## ***Concentration***

To achieve success in a crisis it is essential to concentrate superior force against a potential adversary at the decisive time and place.

Air Power is the only form of military power able to achieve concentration with means coming from different parts of the planet within hours to deliver weapons or humanitarian relief at the right time and place.

Concentration of air assets does not mean that forces must be based at any one place, but rather that they should be deployed in such a way that an enemy threat could be countered or a decisive blow delivered. Concentration of sufficient air assets to achieve the decisive or most important task at the time is the first principal in the employment of Air Power in conflict, crisis resolution or humanitarian operations.

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<sup>3</sup> The Kosovo crisis brought important lessons about the handling of Collateral Damages. They will be part of the planning of any incoming operation and they will be closely examined by political leaders and media.

<sup>4</sup> Precision guided munitions are highly accurate weapons such as laser guided bombs (LGB) and missiles, Global Positioning System (GPS) guided bombs or TV guided weapons.

## ***Penetrating Power***

The penetrating power, being a direct result of the key characteristics of Air Power (height, speed and reach) can be achieved quickly and deeply into areas into which other means cannot reach, with a high degree of survivability.

It is not only the ability to enter enemy territory and to attack targets with great precision, but also the capability to use sensors and weapons and to gain access to information without entering in the hostile area or cross the border. This is known as the stand-off capability.

## ***Visibility***

The presence of military forces is a demonstration of political will or intent and as such is a valuable tool in crisis management. It is generally accepted that conflict prevention is one of the core defence activities (deterrence) and that Air Power remains the force of first political choice because air assets can be deployed or re-deployed swiftly over great distances as part of any diplomatic initiative.

The deployment of Air Power in sufficient strength and composition in or near a crisis area may serve to deter potential hostility with minimum risk to own forces or to gain valuable time in preparation for Crisis Response Operations.

Once established in a crisis area, Air Power may serve as an instrument to influence both the moral and will of hostile combat troops or even the civilian population.

*In the Gulf conflict in 1991, Iraqi troops attempted, to no avail, to surrender to Unmanned Aerial Vehicles overhead their positions, which were being used to spot for long-range artillery.*

## ***Diversity and adequacy***

Air Power has the capability to meet a variety of objectives. According to the tasks given it can be decisive by destroying, neutralising or incapacitating targets. Therefore, it makes use of a broad range of both lethal and non-lethal weapons or ammunition which allow reaching the objective with the appropriate means.

*During ALLIED FORCE in 1999, a power plant in Belgrade was neutralised for some days by a carbon fibre bomb, which did not destroy the installation but did deny use of it.*

## ***Survivability.***

Air assets can be protected by various means ranging, from stealth characteristics, electronic measures to active self-defence devices. Due to the combination of these technical advantages and its key characteristics, Air Power gives the political and military leaders the ability to operate across the majority of the conflict spectrum with a minimum number of casualties and aircraft losses.

Survivability is enhanced when it is combined with concentration of force.

## **ROLES AND MISSIONS**

Taking into account the key characteristics and capabilities described above, Air Power can accomplish the following missions within the wide spectrum of military operations, all missions converging towards the achievement of the two fundamental roles: control of the airspace and power projection.

### ***Air Policing***

Air Policing is a permanent mission. It is conducted during peacetime as it is in a crisis situation. It consists mostly of detecting, intercepting or controlling unidentified aircraft entering the airspace of responsibility (which could be national airspace). The interceptor may be required to force the intercepted aircraft to leave the airspace or to land for ground inspection. Another facet of Air Policing is to assist or to rescue civilian or military aircraft in distress.

### ***Defensive Counter Air***

Defensive Counter Air (DCA) operations aim at the destruction or neutralisation of enemy air assets to inflict them maximum attrition and to protect friendly forces, territory or facilities. DCA missions are generally reactive and rely on defensive air-to-air fighters on airborne or ground alert status, or on other ground/sea based defence systems such as surface-to-air missiles, to be committed against hostile platforms when detected.

### ***Offensive Counter Air***

Offensive Counter Air (OCA) mission aims at the destruction or neutralisation of hostile air platforms or missiles, and their supporting infrastructures (air bases or command and control facilities).

### ***Suppression of Enemy Air Defence***

The Suppression of Enemy Air Defence (SEAD) mission is to neutralise, destroy or degrade enemy surface-to-air defence systems.

SEAD operations allow other air operations to proceed without undue loss or interruption.

### ***Air Interdiction***

Air Interdiction (AI) is a form of aerial manoeuvres that destroy, disrupts, diverts, or delays the enemy's surface military potential before it can be used effectively against friendly forces.

### ***Close Air Support***

Close Air Support (CAS) is the use of air assets to directly support ground forces.

CAS is flown against targets that are in close proximity to friendly forces and therefore requires precise co-ordination. CAS should only be used when the surface force cannot handle the enemy with organic firepower.

The CAS missions that were flown in Kosovo did not conform to the above definition because no friendly ground forces were present in the conflict area. In Kosovo, Air Power alone was used to find, identify and destroy fielded forces, a mission that would otherwise be executed by ground forces or in support of ground forces.

### ***Reconnaissance and Surveillance***

Air and space platforms can observe different theatres of operation both visually and electronically (covertly or overtly), from inside and outside the area.

Reconnaissance and surveillance, with tactical, strategic, manned and unmanned air platforms and satellites, operating with different sensors (optical, infrared, radar), provide essential and timely information to the political and the military decision makers.

### ***Electronic Warfare***

Electronic Warfare (EW) operations involve the military use of electronics to determine, exploit, reduce or prevent the hostile use of the electromagnetic spectrum, and the action taken by friendly forces to ensure they are still able to use it effectively.

The three main roles of EW are: Electronic Support Measures, Electronic Countermeasures and Electronic Protection Measures.

Combined with reach and height, aerial EW can cover an entire conflict theatre of operation.

### ***Airlift***

Airlift involves the movement by air of personnel and cargo to, from, within and between theatres of operations.

Airlift is not only the means to transport combat troops and their logistical support, it can also be exploited to move food and emergency aid, to conduct aeromedical, airborne and special operations or to evacuate personnel in danger.

Airlift can be strategic or tactical, using fixed- and rotary-wing aircraft.

### ***Air to Air Refuelling***

Air-to-air Refuelling (AAR) extends the range, payload, time-on-task and flexibility of aircraft. It can be used to support all categories of air operations.

AAR is a Force multiplier.

### ***Combat Search and Rescue***

Combat Search and Rescue (CSAR) operations involve the use of aircraft to rescue personnel in distress in hostile territory and, in particular, to recover aircrew who have abandoned their aircraft.

Due to the complexity of this mission, being an operation conducted in hostile territory, CSAR usually involves specifically trained combat teams and rescue teams. It may involve the employment of Special Forces and other combat forces such as attack helicopters, fighter-bombers and SEAD to provide covering firepower for rescue aircraft.

# FUNDAMENTAL CONSIDERATIONS ON THE USE OF AIR POWER

Air Power must be considered in almost any military action as it can be employed in a broad range of operations, ranging from non-combat support to full scale wartime scenarios.

Fundamental considerations are designed to provide political leaders and joint commanders with some guidance about how to best employ Air Power. They don't necessarily guarantee success, but as a minimum these considerations must be taken into account in planning to apply Air Power.

## ***Control of the air***

The achievement of control of the air is of vital importance to all military forces and is one of Air Power's greatest contributions to the successful execution of both surface and sub-surface operations.

The first mission in the application of Air Power is to establish a situation<sup>(5)</sup> where friendly force operations on land, at sea or in the air can proceed unhindered while friendly force centres of gravity remain safe from attack.

## ***Use of Airspace***

### **Airspace control**

Airspace control and co-ordination between all friendly military air assets (aircraft, UAV<sup>(6)</sup>, missiles,...) and possibly authorised civil aircraft is a prerequisite to ensure the efficiency and safety of air operations. It has to be achieved under a unique control structure to guarantee the coherence of the global action. As Air Forces personnel have the means and the knowledge to carry out this mission, they should be assigned to this function.

### **Flexible use of airspace**

Air Power can be applied over large distances, thereby crossing international airspace or the sovereign airspace of many countries. In order to apply Air Power in an efficient and

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<sup>5</sup> Measuring control of the air is complex, however, there are three recognised levels of control used in planning and execution of military operations:

***Favourable air situation-*** It is a situation in which the extent of air effort applied by the enemy Air Forces is insufficient to prejudice the success of friendly land, maritime or air operations.

***Air Superiority-*** It is a situation in which, at a given time and place, the enemy Air Power will not be able to interfere with friendly operations.

***Air supremacy-*** It requires a permanent situation where friendly forces are able to operate anywhere at any time with complete freedom of action from threat aircraft or ground based anti-aircraft systems. This is not essential for all operations.

<sup>6</sup> UAV: Unmanned Aerial Vehicle

visible manner, overflight rights and flexible use of airspace must be ensured, including thorough and effective civilian-military co-ordination.

## **Command and control**

### **Unity of command**

Unity of command is a prerequisite to apply Air Power effectively and efficiently. It provides the necessary cohesion for the planning and execution of the air operations. Since the application of Air Power requires sound knowledge of its inherent capabilities and potential, it is mandatory that centralised command be executed by an airman (joint force air component commander).

### **Centralised planning**

Air Power must be employed under the adage of centralised planning. Only then can Air Power be quickly employed in different theatres, in different campaigns and at different levels of military operations, regardless of whether it is used for strategic, operational or tactical purposes<sup>(7)</sup>.

To decentralise planning to different commanders (some operational but most of all tactical level commanders) would make it virtually impossible to shift Air Power in a rapid and flexible manner from one area in the theatre to another, or between theatres, in order to maximise its effectiveness. In the same way, centralised planning will allow the nature of the missions given to different air assets to be changed.

### **Decentralised execution**

Decentralised execution allows for the greatest freedom and flexibility in mission execution and the best airmanship and professionalism according to the situation at hand.

### **Pro-active Command and Control structure**

In any kind of military operation it is of vital importance to think ahead, in order to take and keep the initiative. This is even more appropriate in the use of Air Power as it can be deployed and employed very rapidly. Only a pro-active command and control structure will take full advantage of Air Power.

The C4ISTAR (Command, Control, Communications, Computer, Intelligence, Surveillance, Targeting and Reconnaissance) system must be based on an adequate air surveillance and reconnaissance gathering capability, processing, a near real-time information distribution and display capability and adequate aids for the planning and decision, execution, monitoring and assessment process.

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<sup>7</sup> Air Power can be applied at three different levels of war: the (politico-military) strategic level; the operational level and the tactical level. To operate at the strategic level implies coordinating the development, deployment and use of Air Power in order to achieve (inter-) national security aims. To operate at the operational level of military operations means the applications of Air Power in one or more related campaigns within one or more theatres of operations in order to achieve overall military objectives. To operate at the tactical level of military operations means employing Air Power for mission execution. However, in the context of applying Air Power, it is the aim of the mission that determines if a target is of a strategic or tactical nature.

In addition, in a combined and joint operation, it is essential that all players have a free access to the available information and intensively exchange information and tactics. Lessons learned from the Kosovo crisis showed that national “island solutions” might be effective from a purely national perspective, but will definitely be counterproductive in a multinational environment.

## ***Planning considerations***

### **Political interaction**

Clausewitz<sup>(8)</sup> stressed that war is the continuation of politics with the addition of other means. Political control of military operations should be achieved through cohesion of political aims with clearly defined military assumptions, objectives and the desired end state or exit strategy. These strategic factors should be in place during the planning stage for the air campaign.

Military leaders have the responsibility to keep politicians informed about important military matters such as collateral damage (CD) issues or the rules of engagement (ROE) in order to make them fully aware of the consequences of their decisions.

For instance, ROE through their complexity and possible limitations might have an impact on the mission effectiveness and aircrew safety.

In the same way, the guidance given to minimise the risk of CD has to be realistic, achievable and consistent with the previously agreed military objectives and desired end state.

*As an example, the Visual Identification (VID) condition before being authorised to open fire against an hostile aircraft, is one of the most dangerous ROE. It may put the interceptor within the hostile aircraft missile envelope even before having the opportunity to see it and thereby that creates a vulnerable situation for the friendly intercepting aircraft.*

### **The right system mix**

The right combination of systems (platforms, weapons, and C4ISTAR) enables Air Power to be employed in a timely, appropriate, proportional and flexible manner. This has to be considered by military leaders in the planning phase of an operation.

### **Media and public opinion interactions**

In western democracies, any kind of military operation needs the support of public opinion. This support is granted or denied based upon information released by the media. Moreover, the lack of public support may have an adverse impact on the conduct of the operation.

Therefore, media and public opinion need to be informed about Air Power, its capabilities and limitations in order to avoid conceptual misunderstanding.

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<sup>8</sup> Carl von Clausewitz (1780-1831) was a Prussian officer and intellectual who served with both the Prussian and the Russian Army. He also served as a staff officer and prominent military educator. Clausewitz is widely acknowledged as the most important of the major Strategy theorists. His most important work is "On War" (Vom Kriege). Two of his main points were the close interaction between war and politics and the major impact of unpredicted events on planned missions.

## ***Operational effect***

### **Interoperability and Common training**

As multinational coalitions will generally form the basis to conduct military operations, there is a need for standardisation, common training and exercises between European countries in order to develop interoperability. Common doctrines, supported by standardisation of procedures, validated through participation to joint and multinational training exercises, will prepare European military personnel to operate together in a coalition. This is a key condition to optimise the use of Air Power in a multinational environment.

### **Basic principles**

Conducting operations with modern powerful well-equipped air assets against opponents who are less or much less equipped should not prevent military leaders from using basic war principles such as unpredictability or surprise.

*For example, old technology missiles could threaten highly sophisticated aircraft if they fly the same predictive route every night.*

## **CONTRIBUTION TO SECURITY AND STABILITY**

Potential threats to European security are more likely to result from regional conflicts, ethnic strife and other crisis around or far from Europe. Unstable internal situations and external relations may have an impact on our interests around the World. The security and stability issues assume, therefore, a priority for all European countries, organisations and institutions. The question therefore is what kind of security architecture will serve our interests best?

For the foreseeable future, each of the overlapping political instruments and means available (diplomatic, informational, economic and military) will continue to be required individually or collectively to manage crisis situations. Clearly different situations will require different contributions from the mix of means and instruments available. In this context, Air Power has proven to be a versatile, decisive and essential component of military power (Kuwait, Iraq, Bosnia, Kosovo, etc.). The increasing requirement to respond quickly to challenges will require forces that can participate in various peace support operations.

### ***Crisis Response Operations (CRO)***

Crisis Response Operations (CRO) can be described as multifunctional operations which encompass those diplomatic, military and civil activities, initiated and executed in accordance with international laws, contributing to conflict prevention and resolution.

### **Operations in support of peace**

Operations in support of peace are neither in support of, nor against a particular party, but rather are conducted in an impartial manner, with the aim to restore peace and security. Therefore it is likely to find consensus, contributions and support with the focus primarily on operations of this kind. The variety of types of operations is reflected in the following general understanding.

#### *Conflict prevention*

Generally conducted in accordance with the principles of Chapter VI of the United Nations (UN) Charter, conflict prevention military activities will be tailored to meet political demands such as deterrence, political pressure, credibility, sanctions, etc...

#### *Peace keeping (PK)*

These operations are normally conducted in accordance with the principles of Chapter VI of the UN Charter. The mission assigned is to monitor and facilitate the implementation of the peace agreements. The use of force is limited to self-defence.

#### *Peace enforcement (PE)*

These operations are normally conducted in accordance with the principles of Chapter VII of the UN Charter. They are coercive in nature and are conducted to force all parties to negotiate a peace agreement or to persuade them to implement it. Operations of this kind may require a long-term involvement. The aim is the transition from PE to PK as soon as appropriate.

### *Peace making (PM)*

These activities are conducted in response to a conflict. They cover all diplomatic and military measures needed to establish a cease-fire and a peace settlement.

### *Peace building (PB)*

These activities are to strengthen political settlement of a conflict in order to consolidate peace and support economic reconstruction. PB includes political, social, economic and military measures and means. PB normally requires a long-term political process. Military measures are normally needed to guaranty a stable and secure environment in which civilian agencies can develop their activities.

## **Humanitarian Operations**

These activities are conducted to alleviate human suffering. Military forces may take - during a short time - responsibility for specific humanitarian relief functions.

## ***Air Power's contribution to Crisis Response Operations***

Taking into account the Air Power key characteristics, capabilities and fundamental considerations, Air power serves as a valuable and flexible political and military instrument that can be applied to a wide spectrum of operations. Therefore, Air Power is an extraordinary tool to enhance security and stability.

- **In humanitarian and evacuation operations**, Air Power contributes primarily by providing strategic and tactical air transport as well as aerial reconnaissance. However, if there is opposition, broader aspects of Air Power might be required possibly in conjunction with units from other services to establish the required military control in the area of operation and the lines of communications to and from the area. The aim will be to create favourable conditions for the humanitarian and evacuation operations. Such operations must be performed in close co-ordination with relevant authorities and organisations.
- **In conflict prevention and peace keeping operations**, Air Power, through its high mobility, continuous surveillance and fast accurate fire support, has a critical supporting, intelligence and deterrent role. Air superiority may permit the deployment of a minimum number of ground forces, while providing them with an enhanced level of protection. Moreover, Air Power will decisively contribute to escalation dominance.
- **In peace enforcement and peace making operations**, Air Power is a decisive tool for pursuing the politically set goals. For conflicts ranging from conventional, open warfare to sub-conventional action, such as terrorism or ethnic conflict, Air Power can bring swift, measured and yet devastating firepower to coerce warring factions to peace. Aerospace assets can provide reconnaissance and logistic support. Air Superiority, gained by Air Power, is a condition sine qua non before deploying ground forces, while providing them with an enhanced level of protection and support as necessary. Basing assets outside the immediate area of operations will give a relatively high degree of security. Air Power can be turned on and off rapidly and so provides a flexible

and immediate resource to respond to both commencement and cessation of conflict.

The attached annex depicts the contribution of Air Power to Crisis Response Operations.

### ***Lessons from Kosovo***

Notwithstanding the great value of Air Power in modern warfare, the development in security and stability asks for new and better answers. Therefore the Air Power instrument needs to be improved continuously. The air campaign in the Balkans in 1999, as the first offensive operation lead by the North Atlantic Treaty Organisation (NATO), has allowed Western analysts to identify some shortcomings connected as much to the organisation of the campaign as to the necessary adjustment of doctrine, techniques and equipment. The following is a condensed version of the EURAC study about this crisis.

As mentioned before, the conduct of air operations in the Balkans suffered to some degree by the lack of a unique command in some areas. The overlap of the US and the NATO structures was counterproductive as far as effectiveness, coherence of military action and especially trust between the different multinational actors were concerned.

The involvement of political authorities in the air operation was also an important factor. First, to justify to the public and the media the duration of the air operation and its legitimacy. Then to explain the planning and targeting process. The reduction of the “sensor to shooter” decision cycle, the almost real-time transmission of data, as well as the use of smart weapons, made it possible for the political authorities to endorse the order to destroy an objective or not at the last minute. This will remain an issue as fear of the impact of collateral damage, albeit due to an unfortunate, understandable accident, can be transformed into a political error with enormous consequences.

The ongoing operations have demonstrated the need for a much faster decision cycle which is less dependent on weather conditions. The reconnaissance-targeting-Battle Damage Assessment (BDA) cycle has been found too long or at least did not benefit from adequate assets or sufficient well trained personnel. A real-time observation and battle damage assessment capacity, one that integrates in a network all the information gathered from satellites, UAV, SIGINT<sup>(9)</sup>, etc. still needs to be developed.

### ***The EURAC Colloquium Findings***

In August 2000, a EURAC colloquium was held in Hamburg in Germany. The participants studied the Helsinki Headline Goal document which was published at the EU ministerial Summit in December 1999. The need for this document was found in a common EU approach on defence. The most important findings of the EURAC colloquium were :

- To develop a common European Air Doctrine based upon NATO Air Doctrine (with as much overlap as possible).

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<sup>9</sup> SIGINT: Signal Intelligence. This form of intelligence consists in intercepting, gathering and analysing signal transmitted by radars, radios,...

- Enhance multinationality in training and exercises, improve language capabilities, training standards and procedures, and assure a common understanding on tactics.
- Provide and pool strategic and tactical airlift as well as air-to-air refuelling assets.
- Enhance C4ISTAR. Reduce the sensor-to-decision-maker-to-shooter cycle. Initiate co-operation amongst Air Forces for the dissemination of information on intelligence, surveillance and reconnaissance.
- Improve and make better use of limited resources, such as multi- and swing-role aircraft, SEAD assets, employment of UAV, PGM<sup>(10)</sup> and surveillance and reconnaissance systems.
- Facilitate timely agreements concerning overflight or transit arrangements (such as regulations on airspace management), host nation support, Status Of Forces Agreement and co-operation in the field of logistics.

## **Summary**

Air Power is proven to be a valuable and flexible political and military instrument for execution of a variety of peace support operations. Indeed, the ever-changing security environment demands even more responsiveness. Recent conflicts and the operations related to them have showed some limitations and the need for improvements among European Air Forces. Especially the limitations in areas such as command and control, airlift, air-to-air refuelling, precision and intelligence, which collectively decrease the effectiveness of Air Power.

A lot of these shortcomings can be overcome by co-operation. Keywords then are common doctrines and procedures, multinational training, sharing and pooling of assets and sound agreements on transit arrangements. Also more capabilities will be needed, with special attention to precision weapons, intelligence and strategic airlift. In so doing, we have to assure cost-effectiveness. Together we should make use of new technologies where possible to achieve this.

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<sup>10</sup> PGM: Precision Guided Munitions (Laser, TV, IR... guided munitions)

## FUTURE DEVELOPMENTS / WAY AHEAD

### **Technology**

The ability to meet challenges confronting Europe over the next fifteen years and beyond will remain inextricably linked to the air platforms, weapons, communication systems and sensors we have available and the continual speed of technological change. Nations will all be constrained in the developments of future systems and be confronted with the difficult balancing act between obtaining the best that technology has to offer with what is affordable.

### **Space**

The future use of space offers enormous potential and it is likely that future military operations will rely heavily on space based systems; however, for many nations, affordability will be difficult and collaborative ventures may be the only means of attaining access to these systems. The future roles for space systems are likely to extend beyond communication, intelligence, surveillance and reconnaissance tasks into more offensive activities that may in turn attract more debate in the field of Arms Control.

### **UAV/UCAV/URAV<sup>(11)</sup>**

It is increasingly clear that unmanned vehicles will become an important component in the air inventory, albeit the degree to which these platforms replace or supplement manned aircraft will be an issue to be reconciled on a national basis. These platforms offer enormous potential within many different roles i.e. communication/relay platforms, EW, reconnaissance, surveillance, or even weapon delivery. They offer a capability that is able to penetrate potentially hostile airspace (at no risk to the operator) and then dwell for sufficient time to target and cue attack systems or offensive aircraft, provide real-time sensor intelligence to commanders on the ground or in the air, or to conduct battle damage assessment. Rightly or wrongly, the Western World has become accustomed to *minimal friendly casualty* conflict; the advent of this technology brings the concept of *no casualty* conflict even closer in the eyes of some spectators. This assumption is an issue that we will need to deal with in a realistic and pragmatic manner to counter it.

There is much work to be done with the development of these platforms in the short to medium term. Their effective exploitation is likely to be constrained by the payload required for specific missions, airworthiness aspects and, perhaps most challenging, the issues of over flight of national airspace and their integration within both peacetime and combat airspace management procedures.

### **Weapons Developments**

There is an ever-increasing trend towards developing weapons that carry out missions in a politically charged environment and in the face of a media presence that may be

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<sup>11</sup> UAV/UCAV/URAV: Unmanned Aerial Vehicle/Unmanned Combat Aerial Vehicle/Unmanned Reconnaissance Aerial Vehicle

relaying the application of Air Power as it happens. The Kosovo air campaign provided ample evidence of the beneficial and negative aspects such media attention attracts, which in turn influences both political and public support for military action.

To maintain political support for the use of Air Power, mission planning at all levels is focussed on ensuring almost casualty free operations and minimising the potential of collateral damage. Successful achievement of these aims may in the future demand tailored munitions for manned and unmanned stealthy aircraft where demand for long range precision and the capability to inflict non-structural or non-lethal damage could become paramount.

Among the recurring themes are smaller ammunition, smarter, increasingly accurate seekers and novel warheads – a concept referred to as “functional kill”, where the desired result is denial of an adversaries capability with minimal destructive or environmental harm. The use of carbon fibre munitions against electricity power stations in Iraq and Serbia is a case in point. Looking to the future, air delivered incapacitants in the form of foams and sprays is now considered a potential next step as are laser and other directed energy weapons. The latter are already a fact of life having been employed against short-range tactical missiles in the Middle East.

## **Interoperability**

Recent decades have shown, with exceptions such as the Falklands Islands Conflict, that Air Power will always be employed in a multinational environment. So there will remain a strong need to practice and promote interoperability. Having in mind already existing organisations and different forms of co-operation (NATO, EU, EAG<sup>(12)</sup>, PfP<sup>(13)</sup>, bilateral agreements), each nation has to decide and define what interoperability means in precise terms. The base-line seems to be a common standard for a fast and secure communications system where access to real-time and relevant information will be the key to success. The challenge of a future Extended Air Defence is another example of how “plug-in” capabilities of different systems could contribute decisively to combat effectiveness.

## **Resources**

In considering this issue there is a need to have a look at both human and fiscal resources which, combined with the ever increasing advancement of technology, are critical components of future military capability.

## **Human**

Recruitment and retention is related directly to the desirability of a military career – a career path deemed less fashionable when compared with the high levels of payment and benefit to be gained from a career in commerce or industry. Critically for the military, it is commerce and industry that are seeking to attract the same high quality recruits. This is an issue that has been debated by EURAC since 1997 with particular emphasis on the retention of military pilots who are leaving for the most part to join

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<sup>12</sup> EAG: European Air Group, which regroups 7 Air Forces (UK, France, Italy, Spain, Germany, Belgium, Netherlands, in chronological order of adherence)

<sup>13</sup> PfP: Partnership for Peace (44 member States in 2001)

civil airlines. However, the problem extends beyond the cockpit to the support areas where again high quality personnel (particularly communication engineers or technicians) are being drawn into the commercial sector. This dilemma will likely continue through the timeline of this paper and is an issue that warrants close attention.

There are two other factors to be considered: economic stability across Europe and the “peace dividend” that followed the collapse of the Berlin Wall. European countries continue to enjoy the benefits of a strong economy and there is evidence that the demographic swing away from the military described above has accelerated since the end of the Cold War and the initiation of large-scale reductions in all elements of European armed forces. Indeed, a number of European nations have also taken the decision to cease conscription that, up to now, had been used to create a further pool of trained and experienced military personnel. This demographic change is not solely an issue to do with numbers of personnel; it extends into the need for high calibre personnel to operate the more technical equipment and systems that are present in air force inventories.

## **Financial**

The second factor to the resource debate concerns the allocation of national funding for Defence. Here again the “peace dividend” has played a key part and all EURAC nations have been subject to some form of strategic review and/or fiscal realignment of defence spending. Whilst Governments retain an interest in Defence issues – and turn their minds to European Defence initiatives, the post-Cold War scenario and the threat assessment concerning the likelihood of a large scale conflict threatening the Sovereignty of a European nation has led to reductions in defence spending. The focus is very much on doing more with less by being more cost effective and finding alternative means to execute military tasks or achieve military objectives.

The methods employed to achieve cost effectiveness do vary from country to country and are too disparate to deal with all individually. Common to all nations however is the fact that maintenance of all military capabilities has a high cost which must in turn be balanced with the need to replace old equipment, systems, etc., and procure new. Perhaps the most significant factor in this issue is the ever increasing cost of new equipment be it small in size (but high in technological advancement) or large in size and highly advanced (such as a modern aircraft) - the common fact is that unit cost has increased at a rate disproportionate to defence funding.

There are difficult decisions ahead for all Air Forces, however, the solutions do not all predicate the purchase of ever increasingly expensive equipment. Other factors need to be taken into account to include Commercial-off-the-shelf (COTS) purchase, leasing of equipment or a service, or developing a capability within a coalition. The latter, whilst not without potential difficulty in terms of operation, could find favour with all Air Forces regardless of defence spending allocation.

### *Commercial-off-the-shelf (COTS)*

In an environment where airframe life can be expected to be expensive, military adoption of COTS equipment allows quick and economical response to the expansion of commercial microprocessor capacity for battle management, communications, data acquisition and display systems. Such commercial exploitation, however, raises the risk of computer hacking or virus infection and will prompt close examination of the

problem of isolating and protecting sub-systems while preserving essential connectivity within them.

### *Leasing*

This may be an attractive solution to resolve a number of aspects of military capability particularly in the support and training environments. Decisions in this regard may be influenced by the type of service of equipment required, the length of time it may be needed, the operating cost and the ability to attain upgrading without long lead time.

*In that respect, a study is currently conducted in the UK to assess the possibility of acquiring an Air-to-Air refuelling capability through private investments.*

## CONCLUSION

Looking at that last decade in particular, the effectiveness of Air Power has been demonstrated in three major offensive air campaigns and numerous peace support and humanitarian relief operations. Politicians, non-governmental organisations, charities and the general public at large have come to recognise the extensive array of capabilities Air Power offers and collectively regard Air Power to be a flexible, responsive and effective instrument.

In this EURAC Air Power Paper we have shown that it is not just the sum of the key characteristics – height, speed and reach - which gives Air Power its intrinsic capability. Only when fundamental considerations are taken into account, can the total effect of Air Power be optimised in order to attain a strategic effect that land and sea forces cannot match. This makes Air Power unique and indispensable.

The need for air forces to be configured for major conflict is irrefutable. Nevertheless, it is a reality that Air Power will continue to be required to contribute to Crisis Response Operations. Therefore, it is essential that air forces are capable (trained, manned and provided with resources) to accomplish the broad spectrum of air operations, of which operations in support of peace are likely to remain in primacy within the timeframe of this Paper.

EURAC has focussed on its own findings from the Kosovo crisis, and more recently, on the results of the Hamburg Air Power Colloquium, which have highlighted shortfalls in some areas:

- The need for further enhancement in all areas of multinationality and interoperability will remain one of our key objectives and we will look to find and promote how more appropriate and timely agreements could be put in place. Particular attention will be focussed towards Command & Control aspects.
- Cost effective use of limited resources such as multi-role aircraft, precision guided munitions and reconnaissance has also to be considered, as it is enhancing capability through the pooling of support assets like tactical and strategic airlift and air-to-air refuelling aircraft.
- At the highest levels, there needs to be greater mutual understanding between politicians and military commanders about the details that must be shared concerning the use of Air Power, once the political decision is taken to use it and political and military objectives and end state have been agreed.
- The role of the media on political and public opinion cannot be underestimated and we are acutely aware of the importance that collateral damage has in this debate. Kosovo in particular showed just how quickly collateral damage could raise questions about the legality and proportionality of an operation.
- The importance of emerging technology will be a key factor in overcoming many of these issues, in particular Command & Control and the front-end application of military power where we continue to strive to shorten the decision making cycle.

There are common problems facing all EURAC nations to a greater or lesser degree. Among them are the reduced size of standing forces post-Cold War, the associated reduction of the number of people required in the military (equally the number of people

seeking to join the military), reduction in national allocation of funding to defence, or enhanced environmental pressure affecting the ability to train. Closer to home, the proposed regulatory change to European airspace will see the need for detailed debate between the military, commercial air carriers and the EU.

These collective issues will be the focus for EURAC activity for the foreseeable future. Whilst we embrace change where necessary, our focus will remain sharply towards maintaining a strong Air Power capability by seeking cost effectiveness through joint operations in a multi-national environment. EURAC encourages and invites high level bodies and interested parties to join with us in this debate.

**In conclusion, there are significant challenges to be faced by military leaders today, out to 2015 and then beyond. We recognise that Air Power cannot solve all problems and we guard against making such claim. However, the ability of Air Power to respond rapidly and flexibly to the full range of tasks from humanitarian operations through operations in support of peace to combat operations should guarantee that Air Power remains the capability of first political choice in response to any such crisis.**



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