At the Critical Juncture

The Predicament of Small Air Forces

Sanu Kainikara

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For
Our Grandson
Ishaan 'Mishka' Sharma

In appreciation
Of the joy he brings
And the love he bestows

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About the Author

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Author's Preface

The end of the 20th century brought about a dramatic change to the strategic balance that had evolved after World War II—a balance that had so far been based on the realities of the bipolar world of the Cold War years. At the beginning of the 21st century the certainties of the previous half century have been replaced by a radically different strategic environment characterised by continuous change. This has led to altered national security perceptions.

The rapid globalisation of the economy and the proliferation of technologically sophisticated military hardware have made national security requirements extremely complex. In the latter part of the 20th century, localised socio-economic struggles crystallising in politically, ideologically and/or religiously charged armed conflicts, were becoming common in many parts of the developing world. The information explosion of the 1990s converted these challenges to being global in nature, affecting all nations in some manner or the other. The demarcations between domestic, regional and international security issues have become increasingly blurred, bringing into question and undermining the traditional concepts of national security. Further, the strategies being used and the conduct of conflicts have transformed into an undefinable state that appears chaotic when compared to the relative order of the Cold War strategies. In such an environment, conventional conflict as defined by international laws, has become less prevalent and seems to be gradually becoming an outdated concept. It is fairly certain that this situation will not change in the near future.

Although military forces are not the only means of assuring national security, their inherent ability to apply lethal force when required makes them an undeniably critical element of national power. Accordingly, the military forces have a crucial role, in

conjunction with other elements of national power, in ensuring the safety and security of the nation and its myriad interests. The revolutionary change in the character of conflicts, therefore, makes it imperative for the military forces to reorient their strategy at the highest level while ensuring adequate continuity to assure sustained effectiveness. Warfare has transcended the mere physical application of force to become a contest in the more ethereal level of the cognitive domain. Containing the behaviour pattern and altering the belief system of the adversary have always been foundational requirements for victory in conflict. The current trend merely reiterates this paradigm.

The indistinct character of the current security environment percolates through to the actual battlespace and makes that arena even more opaque. This situation places instruments of national power in an unenviable situation. The demands on them are incrementally increasing while the freedom to employ the full spectrum of capabilities, especially for military forces, is rapidly being curtailed. Most military forces are grappling with this distinct reality, while also having to come to terms with constraints in resources. In such an environment it is incumbent on them to be able to contribute meaningfully to all national security contingencies, operating across the full spectrum of conflict—from humanitarian assistance to high-end warfare. This requires a continual process of integrating and synergising doctrinal development, training and education, and personnel and logistics management with the national security and resource environments. This integration will only succeed when undertaken by a force with a highly developed and matured professional mastery resident within it. Only such mastery can align all developments with national security imperatives.

It is imperative for air forces to understand their nation's security environment and position themselves to provide the government with multiple response options to emerging crises. The relevance of small air forces to national security is directly proportional to

their capacity to evolve in synchronisation with national security imperatives. This monograph looks at the challenges that small air forces face in transforming to relevant strategic entities within the overall national security environment, and examines the ingredients to success. The real threat to small air forces, for a variety of reasons enumerated within this book, is the possibility of them becoming irrelevant at the strategic level. Air forces do not become extinct in a blaze of glory; they become irrelevant to the nation's needs and gradually decline into oblivion. A strong nation and an air force of calibre cannot afford to tread this path.

Sanu Kainikara
Canberra
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The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so must we think anew and act anew.

US President Abraham Lincoln
Address to Congress, 1862

If you don't like change,
you will like irrelevance even less.

General Eric Shinseki
Former US Army Chief of Staff

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Introduction

The status of a nation in the global security environment is determined very broadly by the size and resilience of its economy, overall military capabilities and its inherent capacity— which is a function of its willingness, moral standing, deterrent capability and ability to coerce—to engage with other nations both regionally and globally. This power equation is never static and is prone to being influenced by domestic and international politics, changing financial situations and other extraneous factors. In order to have at least limited stability and reinforce their positions in this shifting power equation, a number of middle powers maintain competent military forces. The overall calibre of such military forces is ensured by encompassing the capabilities of all three Services. Middle power military forces, therefore, tend to maintain proficient and skilled small air forces that are critical elements within the national security mechanism. These small air forces are crucial to ensuring not only the status of middle powers but also to underpin their security requirements. This monograph establishes the criteria for an air force to be classified as a 'small air force', examines the factors that directly or indirectly affect the development of air forces to this status, evaluates the ingredients for such air forces to be successful, and studies their relevance in the broader national security debate.

National security, in the accepted definition or concept of the time, has always been a primary concern for all nations. In a

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broader manner, security of the family, group, clan and tribe has been a preoccupation for human beings from the beginnings of human civilisation. This concern, real or perceived, has manifested in different ways throughout history, and has very often been the root cause of devastating wars. In fact, security concerns have also provided manipulative leaderships with acceptable reasons to attack and conquer other tribes or nations. War and the desire to subjugate divergent views are perhaps the most steadfast character traits that stand out in the evolution of mankind. This has made military forces integral to society and nations since the beginning of history.

There are three factors that affect the relationship between nations. First is that the highest goal of all nation-states is survival, which therefore becomes the paramount objective in all their external dealings. Second, it is extremely difficult to predict the intention of other states, which brings in an inherent fear of each other that underpins all bilateral and multilateral dealings, even with allies and friends. Third, all nations will have some amount of offensive military capabilities with the level of the capability varying with a number of factors, primarily the economic standing of the nation concerned.[1] Essentially, the three factors could be paraphrased as objective, intention and capability.

Bilateral issues only erupt into conflict when one party has the motivation, intent and capability to defeat the adversary. It is only natural that, if this is not so, the party would not initiate a conflict that it is bound to lose. The obvious conclusion from this is that if the means can be eliminated the belligerent would not have the wherewithal to continue the conflict. Neutralising the means—a predominantly military endeavour—would, however,

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[1]   Professor John J. Mearsheimer, 'Strategic Implications of the Rise of China', Army Land Warfare Studies Centre Seminar, held at ADF Headquarters, Canberra, 5 August 2010.

only create a temporary solution, since the motivation to continue the conflict would still exist. Such motivation resides in the cognitive domain of the group, individually and collectively. This can only be contained and gradually nullified by influencing the cognitive domain through the application of capabilities resident in a number of disparate government agencies. A whole-of-government approach to security interconnects these disparate agencies in a comprehensive manner. National security is no longer the sole preserve of the military forces.

Alfred Thayer Mahan, the noted maritime strategist, identified and laid down six primary inputs that are fundamental to the success of a nation—defined by military victory, national security, stability and prosperity through trade—in his monumental work, *The Influence of Sea Power Upon History 1660–1783*,[2] published originally in 1890. The six inputs are (in no order of priority) resources, size of the population, national borders, physical confirmation, character, and nature of government. Integration of a viable grand strategy with available resources, demography and other factors that affect the management of national security, in combination with the nature and vulnerability of the adversary, will be vital to the formulation of contemporary military strategy, operational art and tactics. The listed inputs are timeless and continue to directly affect national security. They also influence the development of military strategy that supports national security. Further, these inputs also affect the continued relevance of military forces through their impact on force structure and capability development, which is one of the primary discussion points of this monograph.

Under these circumstances it is not surprising that nations expend a disproportionately large amount of time, energy

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[2]   Captain A.T. Mahan, US Navy, *The Influence of Sea Power Upon History 1660–1783*, Sampson Low, Marston and Co., Ltd, London, 1890.

and resources towards ensuring their military forces are well equipped, trained and combat ready. Traditionally, a government derives its power from the 'consent of the governed'.[3] In modern history, particularly in democracies, the underlying covenant between the rulers and the ruled is the assurance given to the population of the nation of physical security within the bounds of the nation and the protection of national interests regionally and globally. Historically, the physical protection of the geographic borders of the nation was the predominant security role, almost completely dependent on the capacity of the military forces to defend it. However, in recent times the concept of security has evolved dramatically and now the protection of national 'interests' far away from the physical borders of the country has also become important to their security and stability. No doubt, military forces continue to be central in this situation—through their deterrent capabilities as well as through their demonstrated ability to apply lethal force and project power, when politically so desired.

In recent times, however, a subtle shift in the enforcement of national security imperatives can be noticed. While accepting the need to employ the military to secure the operating environment, there is also open acknowledgement that the lethal application of military force may not always produce the desired end-state in a conflict. This altered perception is the combined result of two factors. First is the changed appreciation of national security stemming from the interconnected international economy, which makes instability in one part of the world often of immediate concern to a nation thousands of miles away.

The second factor is far more involved. In some parts of the still-developing world, there is a silent dislike—at times bordering

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3   Michael Shaara, *The Killer Angels,* Ballantine Books, New York, NY, 2003, p. 65.

on hatred—for the developed world and all that it stands for, facilitated by the rapid availability of global information. This feeling is palpable irrespective of the financial status of the nation and is often aggravated by a sense that their deprivation has been brought about by the developed world through historic colonisation and exploitation. When this heady mix is combined with religious ideology that divides humankind into 'us and them' and, conjoint with a proclivity to resort to violent means to achieve their aims, the result is unprecedented chaos and instability in the international system. The second factor in altering the concept of achieving national security, therefore, is the understanding that pure physical subjugation of a group, nation or people will not bring about lasting peace and stability. Lasting peace requires the involvement of other elements of national power. The success of these operations will be dependent on the military forces being able to create a safe and appropriate environment for their conduct. The crucial role that the military plays in these operations reinforces their broad strength and creates added weight to the nation's efforts. The accepted term for this endeavour to exercise national power is a 'whole-of-government' approach to security.

Nations can be divided into four groups in terms of the power that they are capable of wielding—major, middle, small and minor. Currently there are only one or two nations that can stand apart as a major power above the status of a middle power. The United States and China are obvious examples. The convulsions within the international security environment are largely the effect of the major power manoeuvres for primacy. These manoeuvres also impact the status quo of middle and small powers, which in turn create regional ripples that may have global repercussions. It is within this turbulent environment that middle, small and minor nations jostle to ensure their national security and establish their position in the chain. This continuous manoeuvring for status is played out within each nation through

a constant reassessment and rebalance of the elements that constitute their national power. Within this broad approach to security the military forces of a nation play an important role.

The increasing breadth in the concept of national security has brought about a certain amount of ambivalence about the role of the military forces within it. This is manifest not only in the mindset of other government agencies, but within the military itself because the forces are often employed in non-conflict situations where the use of lethal force is perhaps relegated to a capability not to be used. The downside of this expanded spectrum of military utilisation has been an invisible dilution of traditional military capabilities, especially within smaller military forces. This could have grave consequences for the security of the nation when the force is required to operate at the high end of the conflict spectrum. There are three factors of which all strategic planners must be aware to avoid a gradual decline in 'military' capabilities.

First, the concept of national security as defined currently is a very sophisticated one. However, there has to be a tangible connection between this sophisticated vision and operational reality, which should be the basis for military capability development. Second, the military apparatus must be an integral part of the strategic and operational decision-making regarding all matters of national security. Third, all national security plans must be formulated in a proactive manner since a defensive doctrine or strategy that is reactive to adversary activities will face far too many challenges to be successful.

There is no doubt that military forces will continue to be at the forefront of national security endeavours for the foreseeable future. In fact, as long as humankind continues to have a proclivity to use force in order to establish their dominant status, military forces will continue to be elements of national power of the first order. Within this equation, the role of the air force has

dramatically increased in the past few decades, primarily because of the technology-driven improvements in its overall capabilities. Technology, as the prime mover in air power capabilities, brings with it three major issues. First, the sophistication of technology is such that air power availability will be restricted to those nations that have a matured aviation industry which could absorb the technology to the necessary level. Second, high-end air power and the technology required to maintain it are prohibitively expensive, bringing into question the cost-effectiveness of acquiring and sustaining such capabilities vis-à-vis its holistic effect on national security. Third, the ability to operate at the high end of technology is resident only in a few nations, making it impossible for a majority of nations to fully harness and employ the intrinsic capabilities of air power.

The manifestation of these three factors has been the gradual evolution of 'small air forces' around the world. In this monograph, the term 'small' does not mean in numbers and size alone, but is consciously used to indicate the combination of a number of characteristics, including size, capability, indigenous technology base and maturity of doctrine. Small air forces have the tough task of having to ensure balanced resident capabilities while dealing with the realities of the present security environment and preparing to meet the extreme uncertainty of the future. Flexible and sustainable force structure development, based on sound doctrine and effective employment underpinned by agility and flexibility enhanced through adaptive basic attributes, is the primary requirement to meet these challenges effectively.

Air Forces and Air Arms

The arrival of the small air force has also brought back the lingering debate regarding the independence of air forces as opposed to smaller organic air arms. This is a debate that should not now be entertained in any serious forum that is discussing military forces at the strategic level. However, it will be educative to look at the differences between air forces and air arms to reinforce this point.

An air force is an organisation that is distinct and separate from other Services and is bound by a focus on, and specialisation in, the air environment. An air force will have control of its capability development and management, will possess the full spectrum of air power capabilities and have the ability to operate at the high end of the spectrum of conflict at the required tempo and intensity. In the case of small air forces, the duration that this can be sustained may be limited by other extraneous factors. An effective air force will also have the ability to acquire and maintain the necessary level of control of the air and, if circumstances so demand, contest it with the adversary. Air forces will have dedicated professional mastery within the organisation with doctrine, operational efficiency and logistics expertise resident within the Service. Further, one of the most important factors is that the Service is responsible for raising, training and sustaining the operational force.[4] Essentially, an air force will have the built-in capability to generate, manage and sustain a nation's air power requirements.

An air arm resident within either an army or navy, on the other hand, is a distinct part of the parent Service, which retains the responsibility for the raise, train and sustain functions. Generally air arms are subordinate corps within a Service and assume the

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[4] Andrew Clark, *Air Force or Air Corps?*, Aerospace Centre, Canberra, 2002, p. 40.

culture, doctrine and identity of the parent Service, this shaping their long-term capability and force structure development. An air arm will not have a dedicated process to develop environmental professional mastery embedded within it and in almost all cases will not have the ability to acquire or assume control of the air, which is an immediate principal factor that paves the way for victory in other operations.

A small air force, as defined in this monograph, cannot be substituted by an air arm, irrespective of its resident capabilities. Unified command of air assets, exemplified in air forces, is a primary requirement to plan and execute an air campaign that obtains and maintains control of the air, and conducts the broader range of air power tasks synchronised with the overall joint campaign. The dramatic failure of the Polish Air Force in World War II, with its three autonomous command authorities, is an extremely illustrative example of the need for unified command. Of course, it is not being suggested that the Polish Air Force could have defeated the might of the Luftwaffe, but that the resistance that it put up would have been far greater if there was unity in command.

General Observations

There is no doubting the fact that air power has always been a technology-enabled military capability. Further, advances in technology have always had, and continue to have, a greater impact on the fundamentals of air power application in comparison to the application of land or maritime power. The resource requirements to field an air force with a reasonable all-round capability is very high. However, even financially strained nations attempt to obtain at least limited air power capabilities by acquiring sophisticated aircraft and systems in restricted numbers. Such developments cannot be construed as a nation creating a viable air force. The investment required to create

even a small air force of calibre is extremely high and gradually moving beyond the grasp of a number of nations. Therefore, it is clear that any further increase in the costs to obtain state-of-the-art air power capabilities will only worsen the situation. Under these circumstances there is a discernible trend in the militarily less advanced nations to view air power, and air forces, as disproportionately resource intensive vis-à-vis their direct contribution to national security. For air forces, this situation could be the beginning of a one-way slide to irrelevance.

In order to remain a relevant element of national power that brings critical capabilities to the pursuit of national security imperatives, air forces must balance three disparate issues— maintaining the necessary level of professional competence across the full spectrum of air power capabilities and the proficiency to apply it at any part of the spectrum of conflict; building and constantly evolving a force structure that permits the flexible employment of the capability spread, while retaining the adaptability to keep pace with the rapid changes in the international geopolitical and security environment; and achieving this within a finite resource allocation. This is a tall order for any force, let alone one that is considered 'small'.

Small air forces must carefully consider their employment options and choose the ones that would create the maximum strategic and long-term effects. This is a function of the air force and the government working in close harmony. Since the capabilities that can be brought to bear by a small air force are limited in quantum, duration and intensity, the application of such force must be done only with the assurance that it will be the optimum time to do so. Any other option is bound to dissipate the air power capabilities of a small air force.

Breakdown of the Monograph

This monograph looks at the predicament of small air forces in the current circumstances and suggests possible ways forward for them to continue contributing to national security and thereby stay relevant. As a background analysis, the first chapter looks at the historical development of air forces and elaborates on few milestones—events, battles, campaigns and concepts—that have shaped their development to explain how air forces have reached the current status. The second chapter examines the outlay required of a nation to ensure that it has an air force of sufficient stature and maturity that can contribute effectively to national security, within the national resource base. The third chapter defines and explains what is meant by a small air force in terms of its resident capabilities and the factors that influence the maintenance of such an air force. Perhaps the most important chapter in the monograph is the fourth one that details the challenges faced by middle power nations, and others, who aspire to maintain a small air force of calibre. There are some factors outlined in this chapter that may not sit comfortably with traditional thinking, but these are considered opinions and should be read and understood as such. The last chapter is the advocacy of the way forward for small air forces in order not only to stay relevant but also to ensure that the advantage that air power provides to a conventional military force is always available to the nation when it is needed the most—in times of threat to national security.

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Milestones in the History of Air Forces

The value of history in the art of war is not only to elucidate the resemblance of past and present, but also their essential differences.

Sir Julian Corbett, 1854–1922[5]

History is often considered to be a continuous narrative of events from antiquity to the here and now.[6] This is perhaps an accurate enough interpretation. History does not stay still, but continues to move forward with a constant stream of events that mark the progress of humankind. Above all, history is a chronicle of change. It is a record of changes that have taken place and a source of pointers to those that are to come. If the 'lessons of history' are to become of value to the present and the future, it is necessary to clearly define the context in which changes have occurred and the bounds within which events are analysed. Any study of the development of military forces, and the events that

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[5]   Robert Debs Heinl, Jr, *Dictionary of Military and Naval Quotations*, US Naval Institute Press, Annapolis, MD, 1966, p. 148.

[6]   Hilary Mantel, in 'Introduction' to J. G. Farrell, *The Siege of Krishnapur*, The Folio Society Ltd, London, 2008, p. xiii.

influenced the direction of their growth, is invariably drawn to the identification and analysis of key milestones that indelibly altered their capability development and brought about a change in the way the force was employed. For land and maritime forces, milestones stretch back almost as far as history itself. However, there are few such milestones that can be identified when viewing the developmental process of air forces.

The first powered flight is credited to the Wright Brothers at Kitty Hawk, USA in 1903. However, it was only in 1908 that the expression 'air power' was observed, in its first recorded use in H.G. Well's futuristic fiction, *The War in the Air*.[7] Further, it was only in the later stages of World War I that air power began to be considered a military capability that could influence the outcome of conflicts. Until then air power was relegated to being a topic for discussion for a few enthusiasts, and considered only 'a peripheral issue'[8] in the broader discussion of national security and military strategy.

Even though the use of balloons, airships and aircraft as weapons of war was considered before 1914, and basic plans for such employment formulated, there was no single concept of air power. However, there were a few visionaries in several different countries who understood at least the potential of air power and predicted the transformation of war that the development of greater aviation capabilities would bring. There were also a number of professional soldiers and sailors who identified the impact of aviation on their environments. This group, which also had few astute politicians in it, considered aircraft and this emerging form of military power purely as an adjunct to the traditional military roles and operations of their environment. This was perhaps germane to the subsequent disagreement

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[7]   H.G. Wells, *The War in the Air*, George Bell & Sons, London, 1908.

[8]   Air Vice-Marshal Tony Mason, *Air Power: A Centennial Appraisal*, Brassey's (UK) Ltd, London, 1994, p. 3.

over the most effective structure to manage the latest form of warfare—a question of the navy and the army not wanting the other to control air power and not seriously considering the independent status of air power.[9]

Two factors have affected the growth and development of air forces. Undoubtedly, both will continue to influence air forces and the application of air power. First, air forces undeniably are the products of technology—air power was born of technology, developed with technological advances and is technology-reliant for its effective employment. Therefore, there is an umbilical connection between technology and air forces, which is unlikely to change. From its infancy, technology has been the lifeblood of air power and it has been nurtured through innovation and far-reaching concepts of operations—often controversial—articulated by a minority of military personnel. Secondly, air forces have always tended to concentrate on their warfighting capabilities, such as high-technology weapon systems and firepower, and their immediate effect on the battle, rather than on determining their strategic contribution to national security. The combined effect of these two factors has been that air forces have normally excelled at the tactical and operational levels of combat while not being adept at optimising their strategic impact on the broader area of national security.

This chapter identifies and describes some milestones in the historical development of air forces, not air power per se. Perhaps reflecting the dynamic nature of air power itself, these milestones take many forms—since technology is an inseparable part of air power and, therefore, air forces, some of them are linked to groundbreaking technological developments; some are events in time that have had long-term influence on the development of air forces; and some mark important moments in air forces'

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[9]   ibid., p. 13.

development of employment concepts and designs for their command and organisation. While technological innovations like radar, stealth, and missiles, especially in the second half of the 20th century have increased the effectiveness of air power by a magnitude, their impact has been primarily felt at the operational level of air power application. They are not discussed in the chapter as separate milestones in the development of air forces but have been included in other, more strategic milestones that have been identified. The attempt here has been to flag the more important conceptual, organisational and structural developments, since they are often the most illuminating in a study of the development of air forces per se.

Milestone 1
An Instrument of War

The potential of aircraft was not recognized immediately. Their initial use was confined to observation ... until one day the full advantage of applying force from the air was realized, and the rest is history.

General Howell M. Estes III[10]
Commander-in-Chief USAF Space Command
1996–1998

Even though the effectiveness of attacks from the air was not demonstrated in any significant manner, their perceived destructive potential was considered in conferences on international law and disarmament. These debates culminated in the signing of the Hague Convention in 1907 which prohibited

[10] General Howell M. Estes III, 'Doctrinal Lineage of Space', address to the Air Force Association Annual Symposium, Los Angeles, CA, 18 October 1996, available at http://www.afa.org/aef/pub/la6.asp, accessed 21 March 2011.

air attacks on towns, villages, churches and hospitals.[11] However, these restrictions were placed mainly considering the potential of airships rather than aircraft-delivered attacks. The propagation of air power employment concepts that took place in the five years between 1909 and 1914 is the first defining milestone in the development of air forces. During this period, although no independent air forces existed, aviation was transformed from an esoteric pursuit of an elitist few to an embryonic instrument of modern warfare.[12] The acceptance of air power as an instrument of war, with its own concepts of employment, is the first milestone in the history of air forces.

The French Army was the first to employ aircraft effectively in the reconnaissance and liaison roles during manoeuvres in September 1910. However, powered flight was first used in war by the Italian military. In September 1911, the Italian War Ministry mobilised a flotilla of nine aircraft and 11 pilots for a war against the Ottoman Empire in Libya. In this colonial conflict the Italian military aviators carried out tactical reconnaissance, artillery observation, day and night bombardment, and propaganda leaflet dropping missions. In fact, all roles of air power in conflict, other than air combat, were undertaken in very small measures in Libya.[13]

In early 1912, the Hellenic Government formed the first Greek Army Air Company and employed it against the Ottoman Empire during the First Balkan War that lasted between 8 October 1912 and 30 May 1913. The Greek Air Service also

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[11] Ministry of Defence, AP 3000: *British Air Power Doctrine*, Third Edition, Her Majesty's Stationery Office, London, 1999, p. 3.12.3.

[12] John H. Morrow Jr., 'The First World War, 1914–1919', in John Andreas Olsen (ed.), *A History of Air Warfare*, Potomac Books Inc., Washington, DC, 2010, p. 4.

[13] John H. Morrow Jr., *The Great War in the Air: Military Aviation from 1909 to 1921*, Airlife Publishing Ltd, Shrewsbury, England, 1993, p. 25.

engaged in the first ever naval-air confrontation in this war during a reconnaissance flight over the Ottoman fleet in the Dardanelles in 1913. By 1912–13 all major and even middle-level European powers were developing military aviation capabilities, with the Moroccan Crisis adding impetus to the trials to fit machine guns and cannon to aircraft.

However, despite such innovative initiatives, at the outbreak of World War I in 1914, both the French and British Armies had no combat aircraft and were oriented primarily towards the use of air power in the reconnaissance role. This was in sharp contrast to the German belief that Zeppelins with their comparatively greater strike capability and accuracy would be effective weapons of war. The Germans were also the first to initiate the development of a viable command and control structure for aerial warfare assets, placing the dirigibles under the control of the overall high command and with subordinate army commands for mission execution. The origins of centralised control of limited but costly air assets may be traced to this arrangement.

Five nations—France, Germany, England, Italy and Russia— were at the forefront of military aviation and must be credited with the development of the concept of air warfare itself. Italy, in particular, led the way in focusing on operationalising the concept of strategic bombing. However, doctrine and concepts were not always in consonance with the realities of the technological state of aviation.

From the very beginning of World War I, aerial reconnaissance restricted the manoeuvre options of the armies. By the second half of 1915, in addition to reconnaissance, aerial combat, aerial photography and bombing also had been added as distinctive aviation specialities. Further, the Gallipoli Campaign added significant maritime dimensions to the employment of aircraft which carried out anti-shipping strikes, anti-submarine patrols and long-range bombing missions. While aircraft that

could carry sufficient bombs far enough were not available, the issues that would continue to challenge the concept of strategic bombing over the years—accuracy, target selection, the efficacy of daylight bombing, survivability—became apparent. Similarly, the basic characteristics of fighter aircraft, speed and manoeuvrability, also emerged. All these developments created an enduring foundation for the employment of air power and cemented air force's place as a critical element in the military forces of a nation. This indelibly changed the character and conduct of war.

Milestone 2
Air Supremacy

> *Control of the airspace over the battlefield became essential to victory in World War I, just as it would be twenty years later in the next world war.*
>
> John H. Morrow Jr[14]

The Battles of the Somme and Verdun in 1916 are also watershed events in military aviation because it was during these fiercely fought battles that the concept of air supremacy emerged as a prerequisite to denying the enemy the advantage of aerial observation. The acceptance of the critical importance of air supremacy, which subsequently became the raison d'être for the force as a whole, is the second milestone in the development of air forces. This necessitated the building and employment of large air arms, although the concept of an independent air force was still a number of years from realisation. Since air supremacy necessitated the arming of aircraft, it only needed a small step

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[14]   Morrow, 'The First World War, 1914–1919', p. 24

forward to conceptualise the use of aircraft with appropriate armament in the ground attack role. Although fighter pilots assumed responsibility for this role almost by default, it was generally dismissed as a lesser role than the more glamorous one of air combat, a trend that is visible even in today's fighter pilots. However, this also demonstrated the inherent flexibility of air power that would subsequently transform the air force into a multifaceted military force.

Military aviation did not determine the outcome of World War I, but the air arms of both sides established the indisputable fact that control of the air over the battlefield was a crucial requirement for the success of surface campaigns. Although aerial attacks on strategic targets were carried out, no decisive strategic results were achieved mainly because of the limitations of the weight of attack that could be brought to bear. However, the possible effects of strategic bombing and their impact on the outcome of the war were speculated upon and discussed. Development of theory, urged on by wishful thinking, made the focus of military aviation shift towards strategic bombing, diluting the most important lesson to come out of World War I—the need to control the air. Even though control of the air was relegated to a subsidiary status in the inter-war years, the understanding—at least amongst serious military thinkers—that it was crucial to the success of not only other air operations but also of the entire campaign, reinforced the status of air arms.

> *The country will some day pay for the stupidities of those who were in the majority on this commission. They know as much about the future of aviation as they do about the sign writing of the Aztecs.*
>
> James H. Doolittle, later a USAF general[15]

In January 1915, German Zeppelins commenced a series of strategic bombing campaigns against Britain, concentrating on London. The effectiveness of these raids was hampered by inaccuracy of the bombing and the vulnerability of the airships to inclement weather. In two and a half years, 196 tons of bombs were dropped in 208 raids, killing 507 people and injuring a further 1360. This result was achieved, however, at a cost of 80 Zeppelins and 1600 crewmen.[16] In June the twin-engine Gotha bomber took over the strategic bombing role and was slightly more effective. However, the total effects were minimal compared to the horrendous casualties suffered by the British Armies on the Western Front. Even then, strategic bombing had a disproportionate effect on the morale of the civilian population.

The German raids had a significant effect on the prevailing British thinking regarding the organisation, command and control of air power. The need to have a single agency responsible for the air defence of Britain was recognised by a special committee, headed

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[15] James H. Doolittle, commenting on the 1934 Presidential Committee of Inquiry which did not support establishing an air force separate from the Army, as cited in 'Great Aviation Quotes: Air Power', at http://www.skygod.com/quotes/airpower.html, accessed 21 March 2011.

[16] Larry H. Addington, *The Patterns of War Since the Eighteenth Century*, Second Edition, Indiana University Press, Indianapolis, IN, 1994, p. 152.

by Field Marshal Jan Christian Smuts, which recommended the formation of a separate Air Force, subsuming both the Army's Royal Flying Corps and Navy's Royal Naval Air Service. In 1918, Britain merged the two air arms to form the Royal Air Force (RAF) and created an independent Air Ministry. The formation of an independent 'air force' equal in status to army and navy is the third milestone in the development of air forces.[17] Since the fundamental reason for the formation of an independent air force was the need to protect the homeland from air attacks, the quest for air superiority as the primary focus of air forces was a natural extension.

Milestone 4
Function-Based Organisational Structure

Air warfare cannot be separated into little packets; it knows no boundaries on land and sea other than those imposed by the radius of action of the aircraft; it is a unity and demands unity of command.

Marshal of the Royal Air Force Lord Tedder, 1949[18]

The RAF was organised into specialised role-specific commands—initially home defence or pursuit squadrons, tactical squadrons to support the Army and Navy, and a bomber force. This functional focus foreshadowed the fighter and bomber commands of World War II. The function-based organisational structure adopted by

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[17] It is noteworthy that independent status was granted to the United States Air Force (USAF) only after World War II. Perhaps the inviolability of the airspace over continental United States, mainly because of geographical separation (as opposed to Britain which was subjected to Zeppelin raids during World War I), was a contributory cause to the delay in creating an independent air force.

[18] AP 3000: *British Air Power Doctrine*, Third Edition, p. 1.3.1.

the RAF, which became the blueprint for other air arms, is the fourth milestone in the development of air forces. While air forces have refined this structural arrangement and even gone on to create geographical divisions for ease of command, function-based organisation has stood the test of time for air forces.

It is only of academic interest whether or not the initial structure was formulated with sufficient forethought regarding the optimum manner in which air power should be commanded. It is, however, clear that the freedom that air power enjoys in terms of its ability to overcome the restraints of geography and terrain can only be exploited with an organisational structure that in itself is not tied down, but is dynamic and adaptable. This is particularly applicable to air forces that have limited assets to deploy at any given time. Today, even air forces that have geographical command structures tend to have centralised functional control over air assets. It is clear that only a function-based structure can provide the necessary flexibility in command and employment of air power that is one of the foundations for the effectiveness of an air force.

Milestone 5
The Concept of Breaking the Will of the People

I think it is well for the man in the street to realise that there is no power on earth that can prevent him from being bombed.

Stanley Baldwin[19]

The physical damage done by the bombing raids in World War I was minimal, but it had a disproportionate psychological impact on the morale of troops and the civilian population alike. This led air power theorists to presume that, if the weight of attack and therefore its physical effects could be increased considerably, the psychological effects would also be far greater. This in turn led to a firm belief that aerial bombing had the capability to break the will of the people and thereby make a nation speedily capitulate in war. It could be surmised that this laid the foundation for the development of theories on strategic bombing and the advocacy of its benefits.

The inter-war years saw the development of air power theory, at times with very limited relationship to the actual application of air power. In an effort to stabilise the precarious independent status of the air force, a number of influential and competent officers turned to theory and doctrine. The concept of bombing a nation into submission gained further ground by the prevalent belief at that time that 'future wars between civilised nations will be struggles for life in which entire populations, together with their industrial resources, will be thrown into the scale'.[20]

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[19] From Stanley Baldwin speech in the House of Commons, 1931, http://www.museumoflondon.org.uk/archive/exhibits/blitz/prepare/prepare.htm, accessed 21 March 2011.

[20] Sir Frederick Sykes, *From Many Angles: An Autobiography*, Harrap, London, 1942, p. 561.

It was believed, even though there was no tangible evidence to support it, that air forces would be able to meet the demands of such wars. This somewhat skewed and wishful belief in the efficacy of aerial bombardment as a panacea for the casualty-intensive ground campaign of World War I is the fifth milestone in the development of air forces. The veracity or otherwise of this belief would not be demonstrated until World War II. In the meantime, other milestones continued to shape the development of air forces.

Milestone 6
The Concept of Air Control

> *So far from the use of the aeroplane having tended to replace the intimate knowledge of the local Political Officer regarding his tribes, it has done an enormous amount towards increasing that knowledge and towards removing the risk of inflicting indiscriminate punishment on the innocent and guilty alike.*
>
> Sir Steuart Pears [21]
> Resident in Waziristan, 1924

An unforeseen fallout of the victory in World War I for Britain and France was the additional responsibility thrust on them to control areas of the former Ottoman Empire, a task which required enormous military resources and was financially very expensive. The first instance of what was subsequently called 'air control' was enacted by the Royal Air Force in Somaliland. Here, a *jihad* (holy war) had been waged against the British since

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[21] Sir Steuart Pears, as quoted in, *Military Airpower: A Revised Digest of Airpower Opinions and Thoughts*, compiled by Colonel Charles M. Westenhoff, USAF (Retd), Air University Press, Maxwell Air Force Base, Montgomery, AL, March 2007, p. 87.

1899, led by Sayyid Muhammad Ibn Abdullah Hassan, referred to as the 'Mad Mullah'. Ground campaigns had been unsuccessful in defeating the uprising. By 1919, Great Britain had decided to restore order, and its prestige, by defeating Hassan and his followers. However, the dichotomy was that the military effort would be excessively expensive. Air Chief Marshal Sir Hugh Trenchard saw this as an opportunity to demonstrate the usefulness of the newly formed Royal Air Force—struggling to maintain its independent status against the sniping of the other two Services—and offered to employ the Air Force against the rebels.

In January 1920, the RAF conducted a three-week campaign of leaflet dropping, bombing and strafing. At the end of this campaign Hassan fled to Ethiopia and fortuitously died a year later. The RAF claimed that the successful campaign cost only an estimated 77,000 pounds against perhaps 5 million pounds that would have been required for a ground campaign to achieve the same result.[22] There were also very limited casualties—collateral damage in contemporary parlance—although that was not a consideration at the time of the campaign. Air control was soon being employed in different parts of the British Empire to control intransigent tribesmen, in Mesopotamia (Iraq), Aden, Sudan, Transjordan and on the North-West Frontier in India.

The RAF described the objective of air control as disrupting the normal life of the enemy to such an extent that their continuing hostilities would be impossible. Sir John Slessor described it as blockading a people from entering their country rather than blockading them inside.[23] This concept of broader control from the air to contain the activities of a belligerent nation or group

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[22] Walter J. Boyne, *The Influence of Air Power Upon History,* Pelican Publishing Company, Gretna, LA, 2003, p. 178.
[23] Sir John Slessor, *The Central Blue*, Frederick A. Praeger, New York, NY, 1957, p. 62.

is the sixth milestone and has been invoked in different ways throughout the history of air forces.

Milestone 7
Centralised Control, Decentralised execution

> *The old fable of the bundle of faggots compared with the individual stick is abundantly clear. Its strength lies in unity.*
>
> Marshal of the Royal Air Force Lord Tedder[24]

With independence came the vexed question of command and control of assets that operate across the traditional environmental boundaries. The issue was, however, resolved by necessity rather than through any detailed or deep thought, at least in the initial part of the existence of air forces. The assets available to these forces, while numerically at times large, provided only a limited quantum of capability that could be brought to bear on the adversary at any given time. Therefore, the commanders had very little option other than to centrally control the assets to ensure the air force could produce the necessary effects wherever necessary and thus avoid the constant 'sniping' of the other Services regarding its capacity to be effective. While not articulated as such at this time, the concept of centralised control was the product of an almost natural progression of air forces, extremely wary of losing their hard-won independence.

Airmen are independent and adventurous by nature. The high commands of the fledgling air forces were almost completely staffed by pilots who had proven their mettle in combat and were considered by the younger generation to be 'heroes'. They

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[24] Lord Tedder, *Air Power in War*, Her Majesty's Stationery Office, London, 1948, p. 45.

understood the necessity to permit tactical level initiative and cultivated a different style of command ethos in comparison to either the army or navy. Having been innovative and aggressive field commanders themselves, they accepted the need to leave sufficient freedom for tactical level commanders to optimise the employment of their squadrons. Likewise, it was also realised that aerial combat is perhaps the most dynamic of combat encounters—no two engagements being the same—and therefore could not be pre-dictated, other than in the initial manoeuvring stages. This required the flight element leaders to be permitted to decide the optimum action without any interference or reach back to higher command. In any case, the swiftness of aerial combat did not permit, and does not permit even today, the luxury of obtaining command clearance for actions being initiated and being concluded in a few short minutes. Decentralised execution was also a natural progression of the characteristics of air combat.

For the same two fundamental reasons—limitations on the number of assets available and the swiftness of air combat or air attacks—the tenet of centralised control and decentralised execution continues to be the principal operating principle of air forces.

> *During the Battle of Britain the question, "fighter or fighter-bomber?" had been decided once and for all: The fighter can only be used as a bomb carrier with lasting effect when sufficient air superiority has been won.*
>
> General Adolf Galland, Luftwaffe [25]

The Battle of Britain has been rightly named the first turning point for the Allies in World War II. The inability of the *Luftwaffe* to render the RAF incapable of effective defence of the homeland was the first setback suffered by the German forces in the war. The significance in terms of air forces is much greater than the avoidance of an invasion. At the operational level, a number of lessons can be drawn and the campaign is still studied for its command and control, innovative use of technology, concept of employment of limited assets, etc. However, its strategic significance lies in two separate realities. First, since it was the RAF alone that laid to rest the prospect of a German invasion of Britain, the battle cemented the independent status of air forces in an unassailable manner. Second, it irrevocably demonstrated the need to control the air before undertaking a surface operation. Analysis of the battle irrevocably brings out the criticality of the independence of air forces in optimally combining the elements required to ensure control of the air—concepts, equipment, logistics and professional mastery.

The Battle of Britain is undoubtedly a milestone in the history of air forces. The effectiveness of technological innovations was also in evidence with radar and fighter control ensuring that the

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[25] Adolf Galland, *The First and the Last: The Rise and Fall of the German Fighter Forces, 1938–1945*, Holt, New York, NY, 1954, p. 332.

RAF Fighter Command was seldom surprised on the ground. During the six weeks of the Battle of Britain, one other factor of great significance emerged. While the losses were heavy on both sides, British factories were able to produce replacement aircraft almost immediately. Further, the RAF was able to return downed aircrew to combat duties within a short time, whereas the German aircrew who were shot down almost always became prisoners of war. However, it was realised that pilot replacement was not that easy and therefore was the biggest constraint. This remains true even today, when replacement of trained personnel—whether the attrition is through enemy action or voluntary redundancies—is perhaps the most critical part of sustaining operations. Air forces need strategic depth in trained personnel to ensure their wellbeing.

Milestone 9
The Concept of Strategic Bombing

> *The history of strategic bombing in the twentieth century is a history of the tension between imagined possibilities and technical realities. … Because its possibilities seemed far-reaching, … it formed a foundation for extrapolation, speculation and zealous advocacy.*
>
> Tami Davis Biddle[26]

The Combined Bomber Offensive consisted of coordinated air campaigns conducted by RAF Bomber Command and the United States Army Air Force (USAAF) bomber forces against

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[26] Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914–1945*, Princeton University Press, Princeton, NJ, 2002, p. 11.

Germany. This strategic bombing campaign was independently conducted and was never subordinate to the surface campaigns being waged simultaneously. Both Air Forces premised their strategic offensive on the belief that an enemy nation was more likely to capitulate through falling morale if the fielded forces were bypassed and their vital economic, industrial and military centres were directly attacked. This in turn was premised on the belief that was prevalent in the inter-war years that the next war would be a total war in which the entire enemy nation would be involved, making it a legitimate target to be neutralised.[27] While the aim or intention was not wanton destruction and killing of civilians but the disruption of the enemy's economic development, it was also believed that there would be social and political fallouts that would diminish their ability to resist. Collateral damage—damage to non-war effort related infrastructure and civilians—was not considered to be of any serious consequence.

The air forces placed a degree of reliance on the success of the strategic bombing campaign that was not based on any precedent or data, and which was therefore, unrealistic. In fact, the bomber offensive caused unparalleled civilian casualties in Europe, although the numbers were considered to be comparatively less than what would have been incurred in the event of a land invasion conducted without the benefit of a bombing campaign preceding it. Paradoxically, a concept that was believed to yield a much quicker result through direct action was more effective in an indirect manner. The focus on producing more anti-aircraft weapons and fighter aircraft to counter the bomber offensive distorted the German war effort and made invasion much

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[27]   Richard Overy, 'Allied Bombing and Destruction of German Cities', in Roger Chickering, Stig Förster and Bernd Greiner (eds), *A World at Total War: Global Conflict and the Politics of Destruction, 1937–1945,* Cambridge University Press, Cambridge, 2005, pp. 280–287.

easier for the Allied armies. However, the strategic bombing of Germany was still being pursued, with some successes, when ground forces were overrunning Germany and forcing its surrender. This gave rise to the perception that strategic bombing was a wasteful and ineffective effort and more importantly that the heavy loss of life was ethically unacceptable. The beginning of this popular belief, very often repeated in the media even now, that attacks from the air were somehow unethical and that they caused disproportionately high casualties can be traced to the bomber offensive of World War II. Air forces across the world continue to bear the burden of this miscalculation and are forced to constantly defend their actions. The strategic bomber offensive against Germany was a milestone in the development of air forces that forever altered the employment of lethal air power in war.

The large-scale collateral damage that was inflicted during the Combined Bomber Offensive was not an indictment of the concept of strategic bombing per se, but indicated the fact that during World War II the Allies had to resort to 'area bombing' because of the inherent inaccuracies of aerial bombing for which there was as yet no solution. Strategic bombing as a concept is still valid, as was amply demonstrated during the 1991 Gulf War and the campaign in Kosovo where precision guided munitions reduced the risk of collateral damage. However, collateral damage and needless civilian casualties continue to be contentious issues.

Give me fifty DC-3s and the Japanese can have the Burma Road.

Chiang Kai-Shek[28]
Nationalist Chinese Leader 1924–1974

From the 1920s, a lesser-known development in the employment of air power had been taking place. In late 1922, Air Vice-Marshal Sir John Salmond, Air Officer Commanding in Iraq, used all available bomber and transport aircraft under his command to lift out British servicemen and civilians from Sulamaniya to Kirkuk at the height of the Kurdish rebellion in the province of Mosul.[29] This was the world's first air evacuation and a potent indicator of the flexibility of air power. However, it was only during World War II that the concept of airlift gained greater acceptance.

There is no doubt that World War II brought acceptance of the critical role of air power—but not necessarily air forces—in winning battles, campaigns and wars, primarily predicated on the lethal capabilities resident in air forces. Almost simultaneously, transporting men and materiel quickly to faraway places, sustaining beleaguered garrisons and cities until external assistance could be brought to bear and assuring the supply of essential warfighting materiel to rapidly moving forces became the role of air transportation units. From these onerous responsibilities it was an easy step forward for strategic thinkers to create the concept of a parachute force of specially-

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[28] Quoted in Ministry of Defence, AP 3000: *British Air and Space Power Doctrine,* Fourth Edition, Air Staff, Ministry of Defence, London, 2009, p. 41.

[29] 'Air Control Doctrine – Myth or Reality', in *Pathfinder,* Issue 60, Air Power Development Centre, Canberra, February 2007.

trained soldiers. There are any number of examples of the refinement of this concept in World War II—Chindits in the Burma campaign, Operation *Torch* in Crete, Operation *Market Garden*, the resupply of the Chinese Nationalist forces over the Himalayas from India etc. Special Force operations are now almost completely dependent on air mobility for their insertion, sustainment and extraction.

Air mobility—a term that combines both airlift and airdrop of men and materiel—thereafter has come a very long way and become one of the fundamental capabilities of all air forces. Its importance as a core air force competency has only increased with the spread in the spectrum of conflict in recent decades. Essentially, today there are a number of air forces that do not have combat assets but retain a competent air mobility capability. In fact, air mobility is the first capability to be called on by governments to respond to natural or man-made calamities in distant places that need humanitarian assistance. The Berlin Airlift of 1948–49 could perhaps be counted as one of the earliest large-scale airlift operations. In an indirect manner, the air mobility capabilities of air forces have become one of the most visible parts of a nation's power projection capability.

Milestone 11
Nuclear Capability—Catastrophic Force

... with the 1946 establishment of their postwar long-range bomber arm, Strategic Air Command (SAC), American airmen proclaimed triumphantly that, with nuclear weapons, the airplane was "the greatest offensive weapon of all times".

Tami Davis Biddle[30]

American B-29 Superfortresses dropped two atomic bombs on Japan in August 1945, thus ending World War II. The Soviet Union tested its first nuclear weapon in August 1949, marking the arrival of the nuclear era and, more importantly, the beginning of the Cold War between East and West. The devastation that an atomic bomb could bring about changed all concepts of warfare. Initially it was thought that the possession of nuclear weapons would avert conflicts but the Korean War (1950–53) demonstrated that it would only constrain the scale and characteristics of a conflict.

The introduction of nuclear weapons brought about a few noteworthy consequences for air forces. Two of them impacted on air forces only indirectly while another two had immediate and direct consequences for air forces. First was the development of the concept of 'mutually assured destruction' (MAD). This had profound influence on the development of air force capabilities. The American strategist Bernard Brodie wrote, 'Thus far the chief purpose of our military establishment has been to win wars. From now on, its chief purpose must be to avert them. It can have almost no other useful purpose.'[31] It was felt that the

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30   Biddle, *Rhetoric and Reality in Air Warfare*, p. 293.
31   Bernard Brodie (ed.), *The Absolute Weapon: Atomic Power and World Order*, Harcourt Brace, New York, NY, 1946, p. 76.

prospect of assured destruction would also deter nuclear powers from entering conflict. It brought into question the role of all military forces and the entire approach to the conduct of conflict. MAD also brought into sharp focus some of the foundational functions of air forces, like control of the air, with debates regarding its necessity in the nuclear environment. However, the development of the bomber aircraft as the delivery mechanism for nuclear weapons was an event of significance to air forces.

Second was the altered understanding of deterrence. The enormous destructive power of nuclear weapons led to their use being viewed as unethical, which was further emphasised by the concept of assured destruction. This brought about a different idea of deterrence while engaged in conflict—that of restricting the kinds of weapon systems that could be used. The deterrence value of nuclear weapons therefore manifested in a slightly different manner and facilitated the gradual settling down of air forces into primarily conventional military forces. Another interpretation of deterrence was the concept of the two superpowers being involved in military conflicts by proxy through third-party participants or groups not directly linked to either of them. This ensured that a conflict could be monitored and if necessary controlled, thereby avoiding unnecessary escalation. It also led to a situation wherein the belligerents, other than superpowers, were not allowed to indulge in long drawn-out conflicts, necessitating the build-up of forces that could be employed swiftly to create maximum damage. A potent air power capability was the obvious solution, making air forces a necessary component of all military forces. The role played by air forces in the short and swift Arab-Israeli conflicts and the Indo-Pakistan wars are indicative of this concept. This further cemented the independent status of air forces as a crucial capability.

Third, and perhaps most important from an air force perspective, was the fact that until intercontinental missiles were demonstrated to be operational in 1959–60, the only means

of nuclear delivery was from a manned airborne platform. This situation provided the senior air force leadership with an unprecedented voice in all matters of national security and specifically in the development of military strategies at the apex level. At this stage, the status of air forces was very high.

The fourth was the fallout from the pre-eminence placed on strategic bombers as the primary delivery platform for nuclear weapons. The belief that nuclear wars may not warrant the use of conventional forces made the development of concepts for the employment of conventional air power and battlefield tactics somewhat irrelevant. The foundation for air forces, the need to obtain and maintain air supremacy, seemed to wither in importance. This warped the development of air power assets for more than a decade. The US Air Force, by now holding the mantle of the most advanced air force in the world, led this somewhat skewed development of air forces, even ones with no nuclear capability.

MILESTONE 12
AIR WAR OVER VIETNAM 1965–1973

The changing bombing policy and changing leadership of the United States encountered a remarkable consistency in North Vietnam's policy and leadership.

Wayne Thompson[32]

Even today, nearly 40 years and innumerable books after the Vietnam War, there are two distinct viewpoints regarding the

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[32] Wayne Thompson, 'Operations Over North Vietnam, 1965–1973', in John Andreas Olsen (ed.), *A History of Air Warfare*, Potomac Books Inc., Washington, DC, 2010, p. 109.

efficacy of air power in that conflict. That debate is somewhat outside the purview of this analysis. From an air force perspective this conflict clearly proved a few theories that are applicable even today. First, it was seen that the optimum way to employ an air force was to make use of its enormous firepower rather than employing it incrementally and contextually. Second, technology in the form of precision guided munitions forever changed the way that air forces fight. Third, the need to have a direct and tangible alignment between target selection and the operational aim of a battle or campaign was demonstrated. With the US President personally approving targets to be attacked from the air, it was only a matter of time before the campaign objectives got completely confused, greatly decreasing the effectiveness of the air campaign.

Fourth was the implementation of rules of engagement (ROE) for the air force. ROE had been placed on air operations during the Korean War, but they were merely geographical limits of operations. The ROE imposed on air operations in Vietnam were extremely restrictive, not only in laying down the geographical limits but also in prohibiting attacks on some targets and the use of certain weapon systems. They were also subject to constant arbitrary changes. This diluted the effectiveness of air power at the operational level. In most conflicts thereafter, a combination of law, ethics and morality has constrained the employment of air power. The necessity to factor these considerations into all operational planning has made air campaign planning more challenging. Restrictive rules of engagement are a reality and air forces have to tailor their operations accordingly.

The most enduring impact of the Vietnam War on air forces was the realisation that air power could not effectively contain a 'guerilla war.' The same lesson was taken on board by other insurgent groups which had to contend with the conventional military forces of nation-states. The fact that the air force or air power was not able to bomb the communist forces into submission was not lost on any strategist and the primacy of

the air force in the national security apparatus was somewhat diminished. A number of lessons were derived from the war and there also emerged a clear appreciation of the complexities of employing air power effectively. In combination, these two factors make the Vietnam War stand out as a milestone in the progress of air forces.

Milestone 13
Boyd's Concepts

> *Actions must be taken over and over again and in many different ways. Decisions must be rendered to monitor and determine the precise nature of the actions needed that will be compatible with the goal. To make these timely decisions implies that we must be able to form mental concepts of observed reality, as we perceive it, and able to change these concepts as reality itself appears to change.*
>
> John R. Boyd [33]

The Korean War demonstrated the need for air superiority for the effective employment of air power in a joint campaign. Colonel John Boyd of the USAF studied this situation and postulated a few theories that changed the way in which air forces conceived future wars. He made three major contributions to the efficacy of air forces. First was the formulation of what is today called the OODA Loop (OODA standing for Observe, Orientate, Decide, Act). This was derived from Boyd's experiences in air combat as a fighter pilot, but it is a concept that also has application in the decision-making process at the strategic level of war. The second

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[33] John R. Boyd, 'Destruction and Creation', as quoted in, Robert Coram, *Boyd, The Fighter Pilot Who Changed the Art of War*, Little, Brown and Company, New York, NY, p. 452.

was more at the tactical level, wherein he propagated what is now accepted as energy manoeuvring of fighter aircraft in combat situations. This laid the foundation for the study and comparison of aircraft performance in air combat, changing the face of aerial combat forever. Third was his advocacy of small and agile aircraft to ensure air superiority that led to the design of the F-15 Eagle and the F-16 Fighting Falcon.

The OODA Loop demonstrated the impact of time on outcomes. The main point that was demonstrated was the importance of relativity in terms of timeliness of decisions and their execution. From the tactical to the strategic levels, it became clear that better decisions made earlier than those of the adversary would become a battle/war-winning factor. Boyd also advocated the creation of strategic paralysis of the adversary through disorientation by relatively faster decision-making and implementing capability. By directly connecting air superiority and aircraft design, Boyd changed the way in which air power systems were conceived and designed.

Milestone 14
Irregular Wars

The tenets of AirLand Battle apply equally to the military operations characteristic of low intensity war.

US Army Field Manual 100-5, Operations, 1986[34]

As early as the 1920s and 30s, Mao Zedong had developed the doctrine of 'people's wars' in which insurgents would wage guerilla war and wear down the government forces through

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[34] Department of the Army, US Army Field Manual 100-5, *Operations*, Department of the Army, Washington, DC, 1986.

irregular actions. In the post–World War II era, the concept of people's wars was adapted to suit the context and situation, and such wars were waged in a large number of countries. The employment of air power in these wars had varied results and impacted on the further development of air forces.

The insurgency in Greece in 1946 was the first such postwar conflict. This was closely followed by insurgencies in the Philippines from around 1947 to 1954 when the insurgents were fully defeated, in Malaya from 1948 to 1960, Indochina from 1946 to 1954, and Algeria from 1954 to 1962. The common thread in terms of air force involvement in these 'small wars' was the provision of heavy firepower in a responsive manner. The air forces, by and large, accepted this supporting role but did not consider it necessary to either alter their concepts of operations or develop a doctrine for their employment in irregular wars. Considering the manner in which this pattern of conflict has evolved, it would have been fortuitous had they considered the implications of such wars and cultivated at least the rudiments of doctrine.

There is a distinct difference between insurgencies during the Cold War and ones that have erupted since. While the insurgencies of the earlier era were primarily motivated by anti-colonial nationalism, the later ones have been primarily motivated by longstanding ethnic and religious tensions. These conflicts are normally conducted among the people, which is inimical to the optimum employment of air power. The diffused nature of the command structure of these groups further diluted the effectiveness of precision strikes against the insurgents' command structure, training camps and other infrastructure. The disappointing performance of the Israeli Air Force in 2006, when it was used as the primary force in the campaign against Hezbollah in Lebanon, highlighted the quandary of air forces confronting an elusive and adaptive adversary who is willing to accept heavy attrition and casualties. In this instance, the

Hezbollah claimed moral victory and, despite suffering heavy casualties, proclaimed 'victory' over the military forces of Israel.

Contemporary irregular wars demand that conventional military forces conduct comprehensive joint operations for success. Effective jointness is, at best, a very difficult task to achieve for the Services operating in different environments. The success of the combination of air strikes and Special Forces in irregular warfare being conducted in inhospitable and impenetrable terrain is an innovation that has changed the way in which air forces operate. The need for and vital importance of air-land integration in achieving battlefield domination that could lead to campaign victory has been repeatedly demonstrated. The result has been a concerted attempt by all modern military forces to ensure that the synergy between ground forces and air forces is exploited to the advantage of conventional forces.

Involvement in irregular warfare is a milestone for air forces because these engagements have made it obvious that the optimum employment of air power is to create the desired effects at the strategic level in an effects-based approach while the ground forces normally persevere to create effects at the operational and tactical levels of the campaign. When combined effectively in a joint campaign, this will ensure that conventional forces have the advantage over their irregular adversaries.

The characteristics of war have changed remarkably and most strategists are in agreement that conventional state-on-state wars are increasingly unlikely to take place, other than in isolated cases in the more volatile regions of the world. Therefore, air forces are now confronted by irregular warfare wherein

the warfighting capability required is somewhat different to conventional wars. This has resulted in protracted debate regarding capability development, force structure planning and concept of employment in almost all modern air forces.

The Current Status of Air Forces

Not to have an adequate air force in the present state of the world is to compromise the foundations of national freedom and independence.

Winston Churchill[35]
House of Commons, 14 March 1933

Air forces, irrespective of their size, are now at a decisive point in their development.

In the 2002 overthrow of the Taliban regime in Afghanistan, the USAF played a leading role and facilitated victory without the commitment of conventional ground forces in significant numbers. Precision air strikes enabled by Special Forces were touted as the 'New American Way of War' in which swift victory could be achieved with minimal use of ground forces.[36] However, the universal applicability of this method of conducting a war needs to be questioned on two counts. First, if this way of conducting a war is to become universal, then it needs to be analysed as to how many modern air forces would have the resident capacity to replicate the assured capability demonstrated by the USAF? Second, even if great persistence can be achieved

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[35] 'Great Aviation Quotes: Air Power', at http://www.skygod.com/quotes/airpower.html, accessed 21 March 2011.

[36] Major General Charles Dunlap, Jr., 'Making Revolutionary Change: Airpower in COIN Today', *Parameters*, Summer 2008, pp. 52–66.

by air elements, how will it be possible to permanently contain an adversary—meaning altering their cognitive domain—through the presence of air power alone without having to resort to large-scale strikes? It is therefore felt that the euphoria of 2002, regarding the ascendancy of air power as a panacea to limit or contain own force casualties, was premature and not justified.

Technology-enabled intelligence, surveillance and reconnaissance (ISR) requires a high degree of coordination of the collation, analysis and dissemination processes to be successful. The drawbacks of less than optimum coordination of such an ISR process were almost immediately demonstrated in Afghanistan in 2001–02 when more than half the Taliban elements were able to evade detection and move to safe havens to continue the fight on another day.

Air forces favour a high-tech approach to facing and defeating threats. In conventional conflicts this does provide them with a 'technology edge' that can be exploited to advantage. However, when the conflict revolves around influencing a target population and eroding the power of intangible adversaries, this technology edge does not easily translate into a clear benefit. Devoid of a technological advantage, air forces find it difficult to be effective in irregular wars when pursuing their traditional campaign objectives. Concepts of operations built around sophisticated technology tend to lose their primacy when confronted with a conflict being waged among the people. Yet this technology, if properly utilised, can be applied to employing air power innovatively to create significant effects. This is the current situation in which modern air forces find themselves and with which they are struggling to come to terms.

Although irregular forces do not normally operate at the high end of technology, over a period of time, they have understood the advances that air forces have undergone and have become adept

at adapting to this increased sophistication.[37] Further, they often absorb some sophisticated technology themselves in an effort to increase their operational capacity. To a certain extent, the belief that technology will always prove to be infallible in creating the necessary superiority over the adversary has been a continuous source of irritation for air forces that are now confronted with challenges that are not readily resolved in the traditional manner.

Air forces bring great advantages, most of them technology derived, in all kinds of warfare. However, only when air force capabilities are aligned to and directed by sound strategy will they provide a war-winning edge to the joint force. This is applicable across the board to all wars, conventional or irregular.

Air forces, large and small, now have to decide on their future development, the direction of which will determine their future employment, force structure and, most importantly, their relevance. A careful analysis of emerging milestones and pointers could be one of the clearest guides to the future of air forces.

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[37] James S. Corum, 'Air Power in Small Wars: 1913 to the Present', in John Andreas Olsen (ed.), *A History of Air Warfare*, Potomac Books Inc., Washington, DC, 2010, p. 349.

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The Outlay on Air Forces

The 1991 Gulf War is viewed as a turning point in the history of warfare, mainly because air power produced such astounding results in reducing the effectiveness of the Iraqi ground forces that it was heralded by air power enthusiasts as the primary war-winning element. The contribution of air power to the coalition victory is undeniable. However, neither did this experience automatically create a dominant place for air power on the modern battlefield, nor did it put an end to the debate regarding the efficacy of air power.[38] It required further conflicts and the overarching employment of air power to bring reluctant acceptance of air power's primacy in a contextual manner. NATO's air campaign against Serbia and the peace operations in Kosovo in 1999 were perhaps the defining moment in this acceptance. The seeming ease—made evident through negligible casualties and limited collateral damage—with which air power achieved its objectives led to the development of a new methodology of war, prosecuted through the employment of high-precision weapon systems.

With the advent of these sophisticated weapon systems, it was felt that if a military force is employed optimally and the war is prosecuted effectively—meaning that it is well planned and

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[38] Christopher Clark, 'Air Power Finds Its Ascendancy, at Last', in Malcolm H. Murfett (ed.), *Imponderable but not Inevitable: Warfare in the 20th Century*, Praeger, ABC-CLIO,LLC, Santa Barbara, CA, 2010, p. 115

efficiently executed—it could lead to decisive success.[39] However, the anticipated success of this warfighting methodology did not eventuate. Although air power was able to finally realise the available technological developments into visible warfighting capabilities, it was denied ultimate 'victory'. This was primarily because the understanding of victory in the contemporary security scenario has changed considerably and now is almost diametrically opposite of its traditional definition. Today, an irregular force considers itself victorious if it can evade being annihilated to an extent where it ceases to exist as an entity. For conventional forces, engaged in unconventional warfare, victory is a distant chimera since it is not dictated by the outcome of the physical battlefield but won or lost in the cognitive domain of the adversary and relevant population. In these circumstances, defeat of an adversary is only possible when society is reconciled to it.[40] Under these circumstances, conventional military forces of a sovereign nation face the possible decline in their importance at the strategic level of national security.

National security is being redefined. The traditional concept of security based on ensuring the sanctity of the geographical borders of the nation has been radically overhauled by the global phenomena of interlinked finances and trade facilitated by rapid information flow. In effect, national borders have now taken on a virtual meaning, being defined through the spread of national interests that transcend geographical boundaries. At the base level, national security still revolves around protecting the physical borders of the nation. However, the contemporary interpretation of borders includes what could only be termed

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[39] General Wesley K. Clark, *Winning Modern Wars: Iraq, Terrorism, and the American Empire,* Public Affairs, New York, NY, 2003, p. xi.

[40] Christopher Coker, 'The Future of War: What are the New Complexities?', in John Andreas Olsen (ed.), *On New Wars,* Oslo Files on Defence and Security – 04/2007, Norwegian Institute of Defence Studies, Oslo, 2007, pp. 88–91.

'virtual borders' that often overlap those of allies and even adversaries. This is not conducive to peace and stability.

This change in perception demands expanded capabilities of the security elements of a nation. Military forces have therefore had to evolve towards creating expeditionary capabilities to project power as required. Further, the globally distributed nature of national interests has brought to the fore the need for a nation to possess adequate deterrent capability—within the military and in a whole-of-government approach—since it may not be possible to physically protect the extremes of national interests at all times. In such circumstances, the deterrence inherent in competent military forces could enhance the impact of the actions of the non-military elements of national power in the larger security envelope.

The fundamental effect of these changes has been that ensuring national security, in its new-found broad interpretation, has become far more expensive; in the requirement for financial and personnel resources, in expending political capital, in the demands placed on indigenous industry and in responding to environmental factors. This increased demand on the resources of a nation translates to the need for it to part with more of its inherent capacities to ensure its security. In addition, various other elements of security, including government-supported aid agencies, will also need to be resourced from within the broader security outlay. This extra expenditure will have a commensurate impact on the ready availability of resources for the military forces. However, military forces will continue to be the first line of defence—in a metaphorical sense when the threat is non-military and in the physical sense against conventional attacks—for the foreseeable future. The onus of responsibility to provide the nation with viable deterrent capabilities will also continue to be resident in its military forces. This creates a dichotomous situation wherein there is a gradual increase in the

responsibilities of military forces while there is a simultaneous reduction in resource availability.

Air forces form an indelible part of a modern military force. Therefore, the factors that impinge on national security will have a salutary effect on air forces while thrusting the responsibility to ensure security of the nation also on to it in an equal manner.

The Deterrence of Air Power

> *Deterrence is not just aircraft on alert and missiles in the silos. It is not defined by the size of the defence budget. It is a product of both capability and credibility.*
>
> General Jerome F. O'Malley[41]

A nation employs its air force to achieve three distinct effects—to deter, to defend or to coerce. The differentiation of the three is that, to deter, the threat of the use of force is normally sufficient, whereas to defend and to coerce the actual use of force may be necessary. Further, to defend would mean a reactive use of force, whereas to coerce would be to initiate an action to stop the adversary from continuing what is being done or to instigate the adversary to commence an action.

Deterrence has been defined in many ways. However, the following is the most comprehensive:

> Deterrence is the state of mind brought about by a credible threat of retaliation, a conviction that the action being contemplated cannot succeed, or a belief that the costs of the action will exceed any possible gain. Thus, the

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[41] General Jerome F. O'Malley, quoted in Air Force Space Command, *High Frontier*, vol. 5, no. 2, February 2009, p. 10.

potential aggressor is reluctant to act for fear of failure, costs, and consequences.[42]

Deterrence is the prevention of hostile acts by others through the threat of retaliation. Essentially the opponents must be made to understand that any act on their part will cause a response that will greatly hurt them and their interests.[43] There is also a viewpoint that deterrence also includes the concept of reward as opposed to threat. However, from a military perspective, deterrence is always conceived with the backing of the threat of the use of force.

It is at the grand strategic level that the necessity or otherwise of a nation possessing sufficient deterrent capability should be discussed. Such a discussion could be further elaborated to encompass a nation's perception of itself and its national security and whether or not the concept of deterrence has a viable position within this equation. It is felt that in the contemporary global security environment, a nation completely subscribing to a pacifist security policy will be at risk almost continuously. Deterrence, therefore, assumes a 'must have' mantle, with only the level of resident deterrent capability varying between nations and with a number of other factors that impinge on national security.

Essentially, deterrence is predicated on creating an effect in the cognitive domain. However, for deterrence to be effective it is necessary to be able to carry out the threat that has been issued in situations where the adversary does not heed the warning. This instance is where air power can take the lead. Major technological advances in weapon system effectiveness

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[42]   US Naval Doctrine Publication 1: *Naval Warfare*, Department of the Navy, Washington, DC, March 1994, p. 17.

[43]   Ian MacFarling, *Air Power Terminology*, Aerospace Centre, Canberra, 2000, p. 38.

through precision guidance, stand-off range capabilities and greatly improved intelligence have brought about a shift in the appreciation of air power capabilities. There are two advantages in the employment of these precision stand-off weapons. First, their precision limits collateral damage and the associated moral and political dilemmas that result from the loss of non-combatant lives and destruction of civilian property. Second, the stand-off capability reduces the likelihood of own casualties. Other than in wars fought for the direct defence of the nation, the likelihood of own casualties is often one of the primary determinants of military involvement in the Western world. The low risk of collateral damage and the capability of precision weapons make it 'easier' and more acceptable to make a political decision to employ them, considerably increasing the credibility of the deterrent capability resident in air power.

Outlays to Ensure Adequacy of Air Forces

It is customary in democratic countries to deplore expenditure on armament as conflicting with the requirements of the social services. There is a tendency to forget that the most important social service that a government can do for its people is to keep them alive and free.

J. C. Slessor[44]

Developing and maintaining technologically sophisticated military capabilities requires the nation to expend significant resources. No nation has unlimited resources and, therefore, allocation of its available and finite resources will almost always

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[44] Marshal of the Royal Air Force Sir John Cotesworth Slessor, *Strategy for the West*, Cassell & Co., London, 1954, p. 75.

be contentious. By virtue of its characteristics, military forces are expenders of resources with very little visible return for the investment unless the nation is physically threatened. In times of comparative peace, military forces are sometimes seen as a necessary but 'wasteful' entity and the normal tendency among politicians is to limit the expenditure being incurred by the military. This trend is further exacerbated by the emerging broad definition of national security that encompasses the contribution of all elements of national power, thereby diluting the contribution of military forces from their traditional primacy in national security. In such a whole-of-government approach to security, the military forces are often equated with other agencies that may or may not contribute to security and are therefore in competition for budgetary and other resources allocation.

In this contest for budgetary allocation, military forces sometimes come out second best. Within the military, the further division of resource allocation can also become lopsided dependent on a number of factors, some of them extraneous to the immediate security needs. Under these circumstances there is no assurance that the air force will always be provided the outlays necessary to operate at the desired level of capability, competency and capacity. In democracies, this is a distinct possibility. In contrast to the possible reduction in outlay on the military, there is continued acknowledgement of the critical and continued role of the military, and air force within it, in the national security strategy. There is an inherent contradiction in this situation.

The outlays that are needed to ensure the continuing capability development of an air force can be grouped under four major areas. They are: the requirement for financial and personnel resources, political capital, demands on indigenous industry, and responding to environmental factors.

Financial Outlay

Air power is cost-intensive in that systems that create the necessary air power capabilities are very expensive per unit. Per unit cost comparison to land or maritime power will not provide a realistic assessment of the outlay necessary to create the necessary quantum of force, essentially because the different modes of operations and methods of sustainment of the three Services would make such a simplistic comparison meaningless. The per unit cost of air power assets in combination with the minimum numbers needed to create a viable and independent force makes air forces generally the most expensive to acquire and maintain. This would almost automatically lead to an analysis of the necessary capabilities and their affordability vis-à-vis the national economy. Ultimately the question of affordability will be the determining factor in almost all cases other than in circumstances when the nation is either on the brink of war or already engaged in one. In determining the financial outlay for an air force, the cost of technology, the state of the aviation industry and the actual running cost of the air force are the three major factors that have to be analysed in detail.

Cost of Technology. It is now an accepted maxim that air power is technology-reliant. There are two aspects to this reliance. First is that air power and air forces need technology to fly and fight, in other words to exist as entities. Second, they also need access to the latest and most sophisticated technology in order to optimise their effectiveness and ensure their relevance. In financial terms this double-reliance translates to the cost of air power being directly proportional to the cost of technology. When extrapolated to an air force, this proportionality would mean that an increase in technology sophistication required to create a particular capability would automatically make the air force more expensive. Similarly, the larger the quantum requirement of capabilities in a force, the larger will be the necessary financial outlay. Individual system capabilities will normally improve

with increased technological sophistication. However, there is an inherent dichotomy in this relationship from an air force perspective. Even though capabilities improve, there will still be an absolute minimum number of systems necessary within the air force to ensure that the overall capability required is available with sufficient redundancy. Therefore, increasing system sophistication does not always mean that the number of systems can be reduced, thus effecting financial savings. In most cases the financial impact is the other way round, sophistication increases system cost but does not reduce the required numbers sufficiently to effect total capability cost reduction. The cost of technology invariably drives up capability costs.

Aviation Industry. The aviation industry is technology intensive and requires heavy capital investment to mature into self-sufficiency. The technology-intensive nature demands a ready supply of an educated and technically qualified workforce, while investment requirements need large and multifaceted economies. A combination of these two factors has led to the concentration of aviation industry in a few highly 'developed' nations, who dominate it. For economically smaller nations this has meant that developing and maintaining an air force at the required level of competence always has an overarching political aspect to it. In some cases, heavy dependence on outside sources to meet the requirements of the air force could lead to a dilution of national sovereignty itself. The reality is that the majority of air forces will be dependent, in some way or the other, on source nations to maintain adequate levels of capability. Therefore, a great deal of importance must be placed on building and maintaining strategic alliances with nations that have adequate aviation industry to sustain the air force.

Running Costs. Even after adequate assets and capabilities have been acquired, air forces need continuous training to maintain their combat edge at the required level. This is true of the other Services also, but the costs involved in training to maintain their

fighting ability at the necessary level is the highest for air forces. This requirement is complicated by the comparatively short life cycles of individual air power assets that necessitate replacement at a much faster pace than in the ground or maritime forces. This is normally true of individual assets even though the longevity of air power systems, when regularly upgraded, would compare favourably with naval assets. A high through-life maintenance cost and a faster replacement cycle lifts the average running cost of an air force far above other comparable forces. Governments generally view this with concern and in peacetime may sometimes attempt to curtail what is considered unnecessary expenditure. However, such short-term measures would have broader and long-term consequences for the efficiency of the air force.

There are other sub-factors that influence the financial outlay required to acquire, maintain and operate a modern air force. In fact, all the other major factors that are discussed have indirect financial implications to the state. Unfortunately, this is an issue that is going to be more prominent in the years to come. As the cost of aviation technology and air systems increase, more nations find it increasingly difficult to afford the financial cost of air power while also justifying the maintenance of a cost-intensive capability that is only one, essential but small, part of the national security apparatus.

Personnel Resources Outlay

Irrespective of the technological improvements that reduce the labour intensiveness of aviation on the whole, air forces require a minimum number of people to function effectively. This number will vary with the resident capabilities of the air force. A majority of air forces today are operating at what could be termed as the 'critical mass' in terms of personnel. There are a number of other elements that influence the point at which the entire air force can be considered to be functioning at critical mass. However, from

a purely personnel management viewpoint, critical mass is the minimum number of personnel that are necessary to generate the air power capabilities required to meet all its responsibilities. Any reduction of this figure is likely to start a downward spiral in terms of the capability of the force, ultimately leading to its overall failure. A nation must accept the necessity to have a certain minimum number of personnel in order to have an assured, standing air force.

There are three major factors that affect the capacity of a nation to afford the personnel outlay required to maintain an effective air force—education, recruitment and retention, and government commitment.

Education. Air forces have a requirement for higher education levels in their personnel because of their technological nature. Surface forces also have to operate at a high level of technology, but the core warfighting competencies of an air force are almost completely technology-enabled, operating at or near the leading edge of technology to create the desired effects. Maintaining and operating technologically sophisticated equipment requires dedicated technical training. However, to benefit from such training, the fundamental educational base of the nation needs to be technically oriented and of a standard that can easily meet the base requirements of aviation technology. A lack of an indigenous aviation industry, which in turn would not provide employment opportunities in that sector, could reorient the national education system away from this basic requirement of the air force.

Recruitment and Retention. Other than in times of direct threat to the nation, the military forces have to compete with civilian occupations to recruit and retain personnel of the required calibre. Air forces are particularly affected by this since employment in the alternative civil aviation sector is not only more lucrative but also less strenuous and more stable.

This one single factor affects both recruitment and retention in the air force. The technology intensiveness makes air force training regimes longer and therefore more expensive. There are two drawbacks that emerge from this situation. First, for an air force operating at critical mass, the ability to surge during high-intensity operations is very limited since adequately trained additional personnel is a luxury most air forces can not afford. Second, a long-term vision and plan are essential to meet the raise, train and sustain function of the air force. Both of these indicate the need to have a standing force of the necessary calibre for the air force to meet its national responsibilities.

Government Commitment. Military forces can only meet the personnel outlay needed to function effectively with direct governmental support to their recruitment and retention program. A lack of commitment or even an ambiguous attitude towards the military forces will have a disproportionately negative impact on the ability of an air force to maintain its workforce numbers at the required level. For an air force based almost completely on long-term planning for its sustainability this could have a debilitating effect. In democratic nations with volunteer forces, wherein the status of the military forces can be easily undermined, demonstrated government support is of vital importance for the air force to recruit and retain high-quality personnel who can provide the necessary high-end capabilities on an as-required basis.

Ensuring adequate outlay in personnel for the air force to function efficiently is not an easy task, especially when the force is an all-volunteer one and situated in a developed democracy. But this is the price that has to be paid if the nation desires a flexible and competent air force to be part of its security umbrella.

Political Capital Outlay

The need to expend political capital to ensure that the air force retains a credible status supported by adequate capabilities is an indirect and nuanced concept that needs to be explained. An air force's capabilities, competence, efficiency and relevance hinges on the government's willingness to expend political capital in exchange for assured performance of the air force at the time and place of the nation's choosing. However, the willingness of democratic governments to do this is affected by a number of factors, some that the air force can influence and some completely outside the ambit of air force's control. The political capital of a nation has both international and domestic components. Both have direct impact on the sustainability and employment of air forces.

International Political Capital. A nation is judged by other nations according to how it is internally governed—a democratic structure being held as the best form of government. The political capital of a nation increases with its adherence to international law, positive human rights history, religious and ethnic tolerance, and a host of other factors. On the other hand, a cynical viewpoint that all these intangible factors are often overridden by economic realities can not be fully disproved and therefore taints the appreciation of international political capital. By being a responsible 'international citizen', that is by observing internationally accepted societal norms, a nation can develop sufficient political capital to trade when required to obtain technology or arms transfers and international assistance in times of crisis. At the very basic level, international political capital is inexorably connected to the type of government that a nation has and its demonstrated observance of international law. With aviation technology being the purview of a few well-established economies, almost all air forces are dependent on external assistance to maintain the necessary technical

sophistication of their capabilities. International political capital is the currency that is prevalent in obtaining this.

Domestic Political Capital. In a democratic nation, the quantum of capital that can be expended is prone to be affected by the vagaries of the political party in power. In addition, the available political capital of the government will often have to cater to mutually exclusive contesting priorities. These priorities also do not remain constant for any length of time and are directly affected by the prevailing domestic situation and by virtue of the nature of electoral cycles. These two variables make it extremely difficult to predict the direction in which a government will move in terms of investing its political capital. Under these circumstances, air forces normally have only a tenuous hold on the domestic political capital of a government.

There are two factors that determine how much capital the air force, and the military, can expect to receive. First is the threat perception of the nation as a whole. Normally this perception changes gradually with demographic changes and other factors that affect the national character. However, even if the prevailing perception is one of ambiguity, it can change rapidly if the nation is threatened with imminent danger. In times when national security is neglected by the general public, the political capital available will be the lowest and the need to maintain an 'expensive' standing air force will come under scrutiny. The second factor is an offshoot of the first, being the perception of the nation regarding the usefulness of an air force. This is a difficult issue that must be clearly addressed by air forces if their relevance is to be assured. Air forces must consciously make themselves visible to the nation as proactive elements of national power. In this the air force has an advantage. Being able to rapidly provide assistance to civil authorities in times of natural or man-made disasters is a classic example of being visible in a positive manner. Carefully nurtured good will amongst the

people will always influence domestic political compulsions, concerns and behaviour.

Astute governments nurture their political capital and only expend it when absolutely necessary. For an air force to ensure that this highly regarded entity is available to it when necessary is a challenge. By being effective when involved in all aspects of national security and performing flawlessly when participating in the broader nation-building activities, an air force will be able to obtain for itself, with adequate assurance, sufficient political capital. This is perhaps the most important outlay that an air force must make, because political calculations will always affect the decisions on other outlays that are being discussed.

Indigenous Industry Outlay

> *An air force is always verging on obsolescence and, in time of peace, its size and replacement rate will always be inadequate to meet the full demands of war. Military air power should, therefore, be measured to a large extent by the ability of the existing air force to absorb in time of emergency the increase required by war together with new ideas and techniques.*
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> General 'Hap' Arnold [45]

A number of factors—mainly cost and technology intensiveness—precludes the wide spread of aviation industry, especially that related to military aviation. The majority of air forces are therefore constrained to dependence on the

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[45] General 'Hap' Arnold, as quoted in, *Military Airpower: A Revised Digest of Airpower Opinions and Thoughts*, compiled by Colonel Charles M. Westenhoff, USAF (Retd), Air University Press, Maxwell Air Force Base, Montgomery, AL, March 2007, p. 128.

manufacturing nations for their operational efficiency in terms of obtaining the appropriate systems. These 'recipient' air forces can be further categorised into ones that have an indigenous aviation industry sector of some significance and ones that do not. The air forces of nations that do not have any aviation industry base have to accept total dependence on outside sources for their effectiveness. This in turn has a number of far-reaching repercussions for the security of the nation.

Air forces of nations that have indigenous aviation industry capability are in a slightly better situation. However, in order to maintain the air force at the required level of readiness and also retain a minimum level of self-sufficiency in operations, the indigenous industry will have to meet some demands of the air force, some of which could be stringent. In doing so, the industry will face some challenges that must be carefully considered and ameliorated if the air force is to be sustained. There are three primary challenges at the national level that must be addressed before issues at the operational level and other detailed issues can be resolved. The three are technology acceptance and absorption capacity, technology sustainability and financial sustainability.

Technology Acceptance and Absorption. The aviation industry is at the highest level in the spectrum of technology spread. While this provides air forces with an enviable technological edge, it also demands a minimum level of educational base in a nation for such technologies to be readily accepted. The sophistication of aviation systems places an inordinately high demand on the technical competence of the workforce in the industry. Many nations will find this difficult to meet. There are several examples of air forces becoming redundant because of their inability to maintain the high-tech assets that were acquired by the nation. The first requirement therefore is the inherent capacity of the industry to accept the transfer of highly sophisticated technology. The second stems from the first in that, after acceptance, there is a necessity to 'absorb' the technology so that the industry can

start to investigate indigenous solutions to minor issues that occur in the routine operation of advanced systems. This is a necessary step in retaining the technology base that is essential to operate high-end capabilities effectively. Absorption of technology requires the indigenous industry to be able to create certain depth in the technology capability resident within it. Acceptance and absorption both have foundational requirements in terms of the nation's capability to reach and maintain the necessary standards in technical education and training. The maintenance demands of the air force, which are heavily oriented towards high-end technology, can only be met if these conditions are fulfilled. Technology acceptance and absorption are two sides of the same coin and are, in a cyclical manner, interdependent.

Technology Sustainability. Flowing on from the acceptance and absorption of technology is the next step in ensuring the air force's wellbeing—technological sustainability. This is a more difficult status to achieve and requires not only the industry's efforts but also support from both the air force and government. The normal life cycle of an air force system is counted in decades rather than in years. This long in-service life makes sustained and assured technology support essential to optimise their employment. In this context, technology sustainability assumes critical importance for air forces. Further, technological competence is a quality, which if allowed to lapse, will result in the rapid decline in overall capability of the industry. This could be exacerbated by the fast pace of developments taking place at the cutting edge of aviation technology that forces step changes in technology. In fact, the resources necessary to maintain the indigenous industry at the necessary level itself are very large. This requirement indicates that if technological competence is allowed to lapse, even slightly, building it up to the original level and then improving it to keep pace with ongoing developments will be a difficult task, needing additional resources. This is a self-defeating cycle. It is in this sphere that government support for

indigenous industry is crucial. If the intent to maintain a viable air force is serious, then government should maintain a close oversight of the indigenous aviation industry, providing financial and infrastructural support when necessary and even expending some political capital to ensure that adequate technology transfer from manufacturing nations takes place. This is vital to the survival of an indigenous aviation industry.

Financial Sustainability. All aviation industry, even the military sector, is a commercial undertaking and has all the hallmarks that underpin such enterprises to ensure its viability. Since smaller indigenous aviation industries function at the periphery of larger manufacturers, mostly in a support role, the profitability of such ventures could become difficult to ensure at times. This can be alleviated if the air force being supported is large enough to sustain at least a minimum level of industry within the nation. In a majority of cases this may not be the situation. Considering that the long-term efficacy of air forces is dependent on the continued support of indigenous industry, their sustainability cannot be made optional. The government has a responsibility to support indigenous aviation industry through ensuring that alliances with larger manufacturing nations are carefully managed and political influence is used at the appropriate time to stabilise the industry. Financial sustainability of the industry underpins all other factors that have to be considered when developing indigenous aviation industry towards self-sufficiency in a limited manner.

The necessity to have an indigenous industry capability to support the air force and make it more robust is not in question. The issues that have to be confronted to assure such a capability are not military alone, but encompass a wide range of other areas. In a nation with a comparatively stable and large enough economy it will not be difficult to maintain such an industrial capability, especially if the benefits in terms of employment opportunities, wealth generation and possible spread of high technology can be positively leveraged. Once again the baseline

is that the government—which means the people of the nation—must have the definitive will and aspiration to maintain a viable air force to ensure the nation's security. If the attitude is one of neglect, this may not come to pass—to the long-term detriment of national security.

Environmental Outlay

Modern military forces have to take into account and deal with a number of issues when conducting training exercises and peacetime operations. Environmental factors represent a major issue that has to be dealt with and one that requires a great deal of outlay—both financial and political—from the government. From an air force perspective, the environment by itself could be subdivided into two separate parts, one that deals with the physical and another that deals with the virtual environment. The physical environment is the geographic and atmospheric surroundings within which an air force physically operates, whereas the virtual environment is the ethereal and intangible areas, like the Laws of Armed Conflict (LOAC), media, morality, domestic support and civil-military relations, within which an air force functions.

Physical Environment. The physical environment and the environmental protection activities that are part of it impact air forces in their operations in various ways. Air force operations are sometimes viewed as having a negative impact on the environment in three major ways. First, the large quantity of fossil fuel that air forces consume on a daily basis. Second is the issue of 'noise pollution' associated with military aircraft operations, in contrast to the noise reduction procedures being adopted for civil aviation activities. Third is the possibility of environmental

damage through the practice delivery of live weapons.[46] In addition to these, there is also the inconvenience caused to the general public when scheduled civil flights are disrupted during air force exercises and operations. This has the potential to adversely affect public opinion if comprehensive and advance information is not made available. Environmental pollution is a concern and most air forces acknowledge it, initiating steps to minimise the impact. However, complete mitigation while maintaining the desired operational efficiency of an air force are unfortunately incompatible priorities. Government has to balance the two needs in a manner that is acceptable to all parties. This could entail detailed negotiations and even legislative initiatives to ensure an equitable arrangement. The debate regarding environmental protection and the impact of air force activities is bound to continue as long as democratic nations are not directly faced with an existential threat that is clearly visible to the general public. A proactive government would ensure that the necessary outlay—through commitment to maintaining a capable military force, engagement with the public on environmental issues that affect the military and the possible creation of alternative infrastructure for military training—is made available ahead of such a situation.

Virtual Environment. It is difficult to quantify the impact of the virtual environment on the air force as well as to quantify the outlay required of the government to ensure that these do not create debilitating effects on the air force's ability to carry out its responsibilities. However, it is certain that governments have to be cognisant of the impact of these virtual areas on the efficiency of air forces and must make continuous attempts to ensure that mitigating outlays are made available whenever required. In addition, certain factors cannot be completely mitigated and will

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[46] Sanu Kainikara, *Seven Perennial Challenges to Air Forces*, Air Power Development Centre, Canberra, 2009, pp. 24–26.

always impinge on the operations of an air force. There are no short-term solutions to the impact of the virtual environment. Further, most of the factors that affect the virtual environment are equally applicable to the entire military force and their impact varies between its elements dependent on the particular campaign or operation.

- *Laws of Armed Conflict.* The constituted military force of a sovereign nation that has ratified the LOAC is duty-bound to adhere to them, even when they are extremely restrictive. Such adherence is an indication of a nation's international responsibility as well as a measure of retaining the moral high ground in all instances when force is being applied. In the application of force, doing and being seen as doing the 'right' and 'proper' thing, especially in the contemporary security scenario, is extremely important for the nation to be favourably viewed in the comity of nations. While violating the LOAC is not an option, less than optimal use of the air force may have the unforeseen result of the overall force not being able to achieve victory at the tactical and operational levels. However, the government should be able to gain advantage for its forces' strict adherence to the LOAC in international forums and councils. The outlay from the government—clear policy guidance to the military—and the return—improved international status—are not perceptibly visible.

- *Media*. In nations that subscribe to the notion of freedom of information, the mass media has enormous influence over the ideas and beliefs of the general populace. In fact, a vibrant democracy requires a free media to ensure that national values are not corrupted or sidelined in any way— for example in efforts to sustain national growth or ensure national security. However, when reporting and analysing military operations, the media can become a double-edged sword in that reports that are based on partial information may not only affect ongoing operations, but also paint a less

than complimentary picture of the military forces and their operations. Avoiding this self-defeating situation is not easy, especially in the fast-moving and intense operations that air forces traditionally conduct. The air force and government should ensure that adequate information is made available to the media, without compromising security, and also that civilian reporters are sufficiently informed to understand the nuances of operations. The outlay will be miniscule compared to the return on investment.

- *Morality*. The concept of morality is directly affected by the media, academics, politicians and other interest groups, which in turn can influence a nation's understanding of right and wrong. Acceptable morality varies in different parts of the world and is dependent on culture, upbringing and a host of other factors. However, there are some commonalities when morality in the application of force is considered. For example, knowingly targeting non-combatants is considered illegal universally. Collateral damage is a point of contention between the media and the military, with such damage caused by aerial attacks gaining maximum negative media coverage. This has been the primary reason for collateral damage from air strikes becoming totally unacceptable in contemporary conflict. Further, the humanitarian impact of collateral damage can have unintended strategic ramifications for the nation and result in damage to the reputation of the force. The outlays required of both the government and air force— national moral correctness, clear policies, robust doctrine, decisive leadership, to list a few—to dilute and contain the impact of collateral damage are very high.

- *Domestic Support*. Domestic support for military campaigns is vital for their success. This is a factor that is heavily influenced by the media, especially because of the natural reticence of military forces to make operational details public. Domestic support has a direct impact on the morale

of the forces in operations and the political standing of the government. Committing the nation to war must therefore be carefully examined and the various distinctions and shades of reasoning clearly understood before military forces are deployed in operations. Domestic support is perhaps one of the touchstones that will indicate to the government the correctness or otherwise of committing to war. In either case, the outlay—clear, morally acceptable, rationale for the government initiating military action—to ensure domestic support cannot be denied.

• *Civil-Military Relationship.* The military forces of a democracy are subordinate to the elected government. This is one of the fundamental pillars on which the concept of democracy rests. However, the specialisation required to excel in the profession of arms makes it difficult for individuals with no experience within the military to fully comprehend the vagaries of war. When military demands are not met in times of operations, the potential to have a civil-military rift is high. While the government should rightly be the apex body deciding on national security issues and the employment of military forces, a prudent government will cautiously involve the leadership of the military forces in all relevant deliberations and decision-making. Similarly the military will consciously provide the necessary inputs to the apex body and thereafter adhere by the national decision. These two actions are complementary and will ensure a compatible civil-military relationship built on mutual trust. Here again the outlay required is from both the military and the government in terms of investment in trust-building measures in times of comparative peace.

The government plays a key role in ensuring that air forces have the necessary outlay to function efficiently as an entity and contribute fully to national security. Shaping the environment—both physical and virtual—is the responsibility of

the government. The air force plays only a minor and selective role in this effort and that too within the ambit laid down by the government. Therefore, the outlay that will be done or made available to shape the environment will be a direct function of the government's belief in the importance of the air force and the larger military forces to national security. In non-quantifiable and conceptual areas like morality and domestic support, the commitment of the government towards maintaining a competent air force can become tenuous. A truly viable air force will have the capacity to foresee and avert such a situation.

An air force is the articulation of a nation's belief in the necessity to be able to exploit the advantages of the third dimension not only for warlike activities but also to further economic and technological progress. Logically, therefore, any withdrawal of support from the nation should be analysed to find the cause for such an action. It is more than likely that in most such cases the air force would not have been able to retain its relevance to the nation. A mature nation does not arbitrarily cull its air force because of increasing pacifist influence. If such a move is undertaken, it will certainly be a deliberate act which means that the air force in question was unable to articulate its contribution to national security and justify its existence when viewed against the nation's strategic priorities. The indications of such failure will be noticeable much earlier and with sufficient time to put remedial measures in place to improve the situation. Therefore, an air force that is sidelined by the government has only itself to blame for the loss of its influence and status.

4

Small Air Forces

Air forces have a short history compared to navies and armies, military aviation only now celebrating a century of existence. However, air forces have filled this one century with a number of innovations that have brought about more significant changes in the conduct of warfare than during any comparable time frame in the past.

From their coming of age during World War II, air forces have altered the perception of military forces from the traditional view of two-pronged Services to that of a triumvirate, each of equal importance. In the latter half of the 20th century, developments in air and space technology, in combination with parallel developments in the global socio-politico-economic make-up, inexorably pushed air power, and air forces, into a position of primacy when the use of military power was being contemplated. In fact, the so-called 'Revolution in Military Affairs' itself was comprehensively linked to air power projection and denial capabilities.

The 1991 Gulf War and the operations in Bosnia and Kosovo through the mid to late 1990s were primarily built around air power systems. Subsequent conflicts have endorsed the fundamental air power capabilities necessary to win wars. While there is consensus that in contemporary conflict air power by itself cannot win a war, the corollary that it would be impossible to win a war without adequate air power capabilities is also an

unassailable truth. Undeniably, air power is technology-born and continues to be technology-reliant for its effectiveness. In fact, air power is indelibly linked to the two major technological revolutions that have transformed the basics of everyday life—computers and electronics. The information explosion that these two technologies have brought about is therefore inexorably linked to air power.

Air power has always been a resource-intensive capability and with continuous improvements being brought about by cutting-edge and invariably expensive technology, the cost of maintaining effective air forces has increased exponentially. At the same time, the demands on a nation's economy and other resources have become more disparate, insistent and urgent. This is particularly the case in democracies, especially during times of long-lasting peace. Air forces now have the unenviable task of fielding adequate capabilities from within a finite and at times shrinking allocation of resources. Air forces around the world are grappling with these issues.

The pace of change in the international geopolitical and security environment has complicated the concept of national security. The inherent instability brought about by change has made middle-level powers aspire for sufficient military capabilities to ensure their national security without having to seek external assistance as far as possible. Similarly, smaller powers feel more ill at ease and threatened. In both cases, it is a logical progression for them to strive for the stability of their security and allocate priority to their perceived security needs. In these circumstances, air power with its deterrent effect and ability to project power over long distances in a responsive manner becomes an attractive and visible military capability.

The dual pressures of introducing high technology and politico-security imperatives have forced a number of air forces to build all-round capabilities—at the cost of ensuring sufficient

'weight' to each capability—in an effort to maintain a baseline air power capability. There are two pitfalls in this approach. First, the viability of such an air force is questionable and therefore its effectiveness as a solution to security issues can at best be considered short-term. Second, since self-sufficiency in air power capability development is beyond the reach of most nations, these air forces evolve into entities that are constrained in the length of time that they can effectively operate at the desired tempo and intensity.

The reality is that the current geopolitical and economic conditions demand a commensurate return for investment from all areas of government expenditure. This has directly impacted the processes of acquisition and maintenance of military capabilities. The visibly high capital expenditure required to obtain air force capabilities makes them prone to greater scrutiny and the inevitable enforcement of financial stringency. For a force reliant on high-end, innovative, cutting-edge technology for its effectiveness, this is a delicate situation.

The result has been that a majority of air forces are being forced to redefine their role vis-à-vis national security leading to the gradual evolution of a large number of small air forces. The term 'small' is used not to denote limitations in numbers and size alone, but also to indicate a number of distinct yet interrelated characteristics of a force—overall capability, access as well as capacity to absorb high-end technology, strategy for its employment, concepts of operations, resource availability and maturity of doctrine, to name a few.

Categorisation of Air Forces

The true measure of air forces is their capability spread and ability to be employed effectively when and where required. However, the technological developments that create and continuously improve air power capabilities require in-depth research which initially needs a disproportionate allocation of resources to sustain them. This fundamental requirement has led to a situation wherein independent air power capability development is confined to a few nations in the developed world. The resource-intensive nature of cutting-edge developments is such that some of these nations pursue them in a collaborative manner to ensure sustainability. Such efforts tend to form exclusive groups of air power capable nations. Membership of these groups—predicated on a number of factors and underpinned by political circumstances—is essential to ensure an adequate air power capability spread in their air forces. This has further increased the disparity and emphasised the distinction in air power capabilities between the industrialised and developing world.

Essentially, in contemporary terms, it is a truism that the air forces of the world fall into two categories—one, that of the United States and the other, that possessed by other nations.[47] It has to be acknowledged that there is a distinct separation between the air power projected by the United States and that projected by the rest of the world.

The air forces of the rest of the world can be further categorised into three major groups by evaluating the noticeable distinctions in air power capabilities. The first is a small group that has the status of large air forces. These air forces have genuine overall competencies across the entire spread of air power capabilities
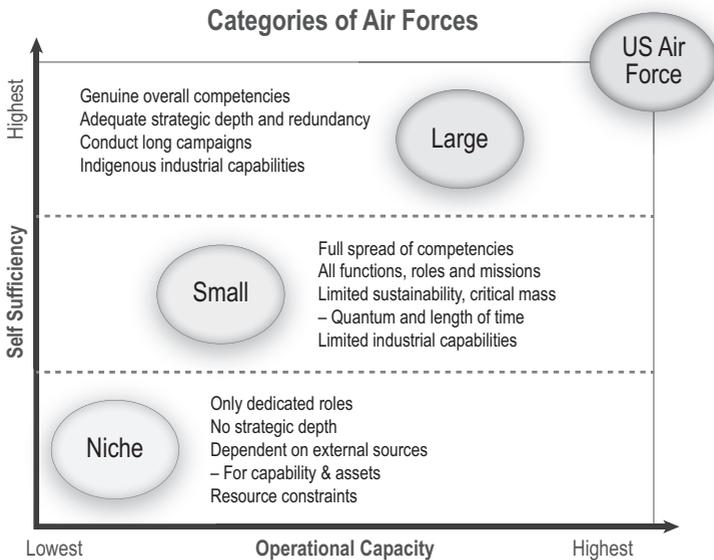
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47   Dr Alan Stephens, *High Noon of Air Power*, Paper No. 71, Air Power Studies Centre, Canberra, 1999, p. 7.

in sufficient quantity. They also have adequate redundancy to conduct major long-drawn campaigns independently without having to avail themselves of assistance from allies. These air forces are well supported by indigenous industrial capacity, even if completely independent research, development and manufacture may not be available. It is possible that the industry would be in multinational collaboration thus ensuring sustainability.

In comparison, air forces that do not have the full spread of air power capabilities and are able to carry out only a few dedicated roles and functions in limited quantum are termed niche air forces. The reasons to restrict the capability spread to a few chosen ones are many and varied, and could include conscious political decisions or a straightforward lack of resource capacity to acquire and maintain sufficient numbers of sophisticated airborne systems. Normally, such niche air forces are almost completely dependent on external sources to meet even their limited air power needs and in most cases indigenous industry support is unlikely to exist. Obviously, niche air forces have only limited influence at the highest level of decision-making on national security issues.

A small air force, on the other hand, is one situated between the two extremes of the large and niche air forces. These are air forces that bridge the gap as a continuum between the two and are highly capable in both global and regional contexts. Small air forces have resident capabilities to undertake the full spread of air power operations independently. This means that they have the systems, processes and the inherent capacity to deliver all air power functions, roles and missions and are, as such, balanced forces. However, even though they have all-round capabilities, their sustainability is limited—both in terms of the quantum

of air power that can be produced at any one time and also the length of time that the air force can operate at the desired level. The national technological, industrial and infrastructural support available to these air forces is also limited in both capacity and sustainability. By virtue of their all-round capabilities and balanced structure, these air forces make very capable allies and coalition partners. They can bring significant capabilities to bear and can be critical partners under the umbrella of a USAF- or large air force–led coalition.

Categories of Air Forces

Self Sufficiency (vertical axis): Highest ... Lowest

US Air Force

Large
Genuine overall competencies
Adequate strategic depth and redundancy
Conduct long campaigns
Indigenous industrial capabilities

Small
Full spread of competencies
All functions, roles and missions
Limited sustainability, critical mass
– Quantum and length of time
Limited industrial capabilities

Niche
Only dedicated roles
No strategic depth
Dependent on external sources
– For capability & assets
Resource constraints

Lowest — **Operational Capacity** — Highest

Small Air Forces Explained

There can be no one definition for a small air force. The factors to be considered are many and multifaceted, making it necessary to explain them and examine the conditions that make an air force to be considered small. There are four key factors that should be analysed to categorise air forces into the three broad categories that have been discussed.[48] They are: size, capability, indigenous technology base and maturity of doctrine. Any of these factors, independently or in combination, would give a clear indication of the status of an air force.

Size

Possession of a large fleet of aircraft and other systems or having very large numbers of personnel in the standing force does not automatically elevate the status of an air force. However, an air force that has insufficiency in numbers leading to limited sustainability and marginal ability to bring sufficient weight of attack will inevitably be considered small or even niche. Air forces cannot be categorised purely on their size and it would be extremely simplistic to look at numbers alone. Numerical strength should be considered in a relative manner in terms of the quantum of air power that can be produced and the effects that it can generate. Lenin's famous dictum, 'Quantity has a quality all its own', although conveying the importance of having sufficient numbers, has to be qualified when applied to air power. In this case the quality of the 'quantity' will only become apparent if the assets and systems are of a minimum capability.

Another issue that complicates the categorisation of air forces is that an air force considered highly capable, based on size and numbers in a regional context, may not be able to achieve the

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[48] In this discussion the USAF has not been considered as a 'category'.

same status in a global context. Therefore, the assessment of an air force in terms of numbers would be one-dimensional if it is not dealt with in a relative manner in comparison with other air forces. The importance of size in categorising an air force rests on the fact that, all other factors being equal, numbers would be the prime consideration in ascertaining its overall capability.

There is a definite continuum between the three types of air forces based on their size. In defining the status of an air force it would therefore be ideal to identify two distinct numbers as the changeover points between the three categories. Unfortunately, such a clear-cut distinction cannot be made. There are far too many integral and extraneous factors that impinge on the influence of numbers on air power capabilities and therefore size, both actual and relative, cannot be used as an independent benchmark to determine the categorisation of an air force. Size will remain a crucial determinant in only a very few cases of comparative analysis, being a contributor in all others.

Capability

The capability of an air force is dependent on the context of the operation being undertaken and the ability of the force to carry out its directed tasks. Therefore, assessing the capability of an air force should take these factors into consideration. For example, a small air force may be very effective in a regional context, but may only perform in a peripheral manner when operating as part of a coalition with large air forces. Context is more applicable to the assessment of capabilities of small air forces.

There are a number of features that differentiate air forces in terms of their capability spectrum and development infrastructure. The major ones that must be considered are equipment, sustainability, training and attrition tolerance.

Equipment. The ability to possess air power systems of adequate sophistication in sufficient numbers is critical to being able to

produce the necessary mass, both physical and virtual, to apply air power effectively. Since the level of indigenous industrial capacity necessary to sustain air forces is limited to only a few nations, for most air forces this is normally a function of the availability of resources within the national economy and the status of the nation within the global political environment. A weak national economy or inadequate influence in the international political scenario will limit the quantity and quality of the systems that a nation can acquire and operate. Even if a nation obtains sophisticated air power systems, smaller economies may find it difficult to bear the maintenance and operating costs of even small numbers. The operational efficiency of individual systems and the overall effect that they can produce at any given time will be a clear indicator of the status of an air force. Essentially, an air force must be able to demonstrate balanced operational capability of a high order in a sustainable manner, even if limited in time, to be considered a small air force. Sustainability in this case could be measured even in days rather than months.

Sustainability. Sustaining the necessary operational tempo, across the spectrum of conflict, for the desired duration is a clear measure of an air force. For a small air force, this duration could be measured in days and weeks rather than months. Sustainability is a fundamental capacity to be measured in the categorisation of air forces. While small air forces are built to sustain a certain anticipated operational tempo, a number of disparate elements influence this capacity, at times making even the slightest constraint an insurmountable issue. Producing the necessary quantum of air power and sustaining its delivery are two of the biggest challenges to small air forces and a shortfall in either impedes their transition to the large air force category. Sustainability can be assured by ensuring the correct balance of resident capabilities in the force and availability as well as sufficiency of the national support infrastructure. This is the

culminating achievement of developing and nurturing refined air power competencies. Analysis to ensure a balanced force is an involved process that must take into account both tangible and intangible elements that contribute to holistic air power capabilities. However, accuracy in such an analysis is an essential component in the overall assessment of an air force and lends credence to the process.

Training. The increasing technological sophistication of air power systems has made training in all aspects of their operation and maintenance more intensive, technology oriented and expensive. Continuous, long-term and ongoing training regimes are also necessary to optimise the performance envelopes of systems that are routinely upgraded. A small air force's training regime should be tested and flexible, with the ability to function efficiently both during operations and in peacetime, so that its operational efficacy is not affected. This requires careful planning of the recruitment of personnel and their initial as well as in-service training. Since the number of personnel is limited in small air forces, this function takes on added importance in maintaining the necessary level of operational competency. Such training is resource intensive—in both financial and personnel outlay—and also adds to the overall operating costs of an air force. The effectiveness of training, however well conducted, depends on the capacity of the trainee to understand and assimilate the intricacies of the systems. This capacity is a direct function of the level of national technical education base as a whole and plays an important role in ensuring the competence of an air force.

Attrition. In recent times attrition has become a political and moral issue that is often publicly debated through the news media. There is an increased sensitivity towards attrition in democratic nations that is equally applicable to all categories of air forces. From an academic air power point of view, attrition has two facets to it, both equally important—attrition absorption

and attrition tolerance. Both these facets have a direct bearing on differentiating air forces.

- *Attrition Absorption.* An air force's attrition absorption capability is a function of numbers in that it analyses the percentage loss that an air force can accept and still sustain operations without diluting its warfighting capabilities. It is possible to calculate, with reasonable accuracy, the losses that an air force can absorb before its operational efficiency starts to deteriorate. This is the critical point when an air force becomes strategically unviable. The size of the force has a direct impact on attrition absorption. A force with a large number of systems operationally available will clearly have a greater percentage attrition absorption capacity in comparison to one with limited numbers. In an indirect manner the critical point is influenced by training and the efficiency of the air systems being operated. A small air force faces a dichotomous situation in this aspect. On the one hand, it must have a certain degree of assured attrition absorption capacity that permits it to sustain effective operations for the planned duration. On the other, by virtue of its limited size, a small air force would be hard-pressed to absorb more than a small loss rate without these losses rapidly manifesting as a declining capability spread. Further, the need to continue regenerating the force simultaneously while conducting operations will strain small air forces. Attrition absorption is also affected by factors such as the strength of alliances that could ensure assured resupply of systems and indigenous manufacturing capacity. In effect, attrition absorption encompasses losses viewed from a purely operational perspective.

- *Attrition Tolerance.* An air force's moral and psychological reaction to human casualties is encompassed in attrition tolerance. While this will have operational impacts, it will only be indirectly felt at first. The acceptability of attrition to

a force and to the nation would be a function of a number of non-quantifiable factors that include the force's attitude to casualties, national ethos towards war, the contextual domestic support for the conflict being fought, and other extraneous inputs. Loss of trained personnel will incrementally reduce the operational efficacy of small air forces and adversely impact on morale. While it may be possible to make good system losses through immediate resupply from allies, the loss of trained personnel will be more debilitating for small air forces. Small air forces must retain the ability to operate at the required tempo and intensity for a minimum duration—specified by national security imperatives—irrespective of loss, to retain their status.

An optimum combination of attrition acceptance and tolerance is necessary in a small air force. The critical point in attrition for an air force will also be influenced by both these facets. In fact, both these facets are intertwined and powerful indicators of the status of an air force when considered together.

National Technology Base

There are three aspects to be considered when assessing the technology base of a nation as a benchmark to determine the status of its air force. First is the technology acceptance capability of the nation that is a product of the education system and its capacity to provide a technically oriented workforce, both for the aviation industry and the air force. This aspect affects the research and development capabilities of a nation and impinges indirectly on national industrial development.

Second is the state of development of the indigenous industry. The capability of the local industry to support the operation of

technologically sophisticated systems will influence the air force's operational effectiveness. Subsidiary factors such as availability of raw material, production and logistical adequacy and the level of self-sufficiency in industrial development will have a salutary effect on the state of the industry.

Third is the availability of adequate resources. Most nations have finite resources to allocate to industrial development and such constraints impact directly on the ability of a nation to develop self-sustaining high-tech industries with the necessary infrastructure to cater to domestic demands. The development of technologically advanced air power systems requires long lead times. This means that the lack of resources to sustain the necessary infrastructure for the duration necessary to make it self-sustaining will lead to failure. Careful consideration of the national resources available and the requirements of the industry is a primary factor in determining whether an air force can achieve self-sufficiency. If an air force can be self-sufficient, the balance between resource availability and requirement will be an indicator of the capacity of the nation to sustain that air force.

A nation will need to have a defined level of technology acceptance, a sufficiently developed industrial base and adequate resource availability in order to support a small air force. The sustainability of such an air force will depend on the robustness of these three factors within the national socio-economic environment. Further, even a slight decline from the necessary level in these factors would rapidly relegate a small air force to the ranks of niche air forces. While moving down from a small air force and becoming a niche air force is relatively easy—but nationally significant—it must be understood that the reverse is not true. For a niche air force to become a small air force

requires dedicated and long-term effort from the entire force with assured support from the nation.

Doctrine

The importance of doctrine lies in its central role as the statement of a force's fundamental beliefs and philosophies. At the operational level it often acts as the link between defence policy and national strategy on the one hand and the operational capabilities of the armed forces on the other.[49] The history of the development of air power theory and the lessons from air campaigns are open to all air forces to assimilate. An analysis highlights a number of absolutes regarding air power competencies and the efficacy of its employment that are unchanging, having stood the test of time. Doctrine is essentially derived from an analysis of the past and formulated by a holistic application of the relevant information in an intelligent and cohesive manner to the current situation. Therefore, there is a clearly visible thread of commonality between the philosophical level doctrine of different air forces, despite cultural and other differences that have significant influence on their development. The dissimilarities and divergence in strategic doctrine between different air forces are functions of the deviations in individual national security goals and threat perceptions. The national ethos in regard to security issues will always influence the philosophical approach to the application of air power.

Philosophical air power doctrine can be considered to have two distinct components—one that is universal and the other that is specific to an air force. It is within the second component that the basics get adapted and adopted, and variations between air forces become clearly apparent. It is also from this component that

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49   Ariel Levite, *Offence and Defence in Israeli Military Doctrine*, Westview Press, San Francisco, CA, 1989, p. 10.

an air force derives its own operational concepts and doctrine. An air force of calibre, irrespective of its status, should be able to evolve its own doctrine based on unassailable foundational tenets and adapting the basics to the nation's specific, and at times unique, requirements.

Maturity of strategic doctrine can be high, intermediate or low depending on its development and status within the national security environment. In fact, the level of maturity of the strategic doctrine is indicative of the nation's understanding of the need for an air force and the costs associated with it. Only a high level of maturity in doctrine will create the necessary environment for the force to be effective, irrespective of its status and capability spread. The level of doctrine development and its maturity therefore assumes great importance in measuring the status of the force. Well-balanced and strong conceptual development for the operational employment of the force will not be possible from an underdeveloped and immature doctrinal platform. Only a confirmed high level of doctrine maturity can confer small air force status and create an environment for a steady improvement in its operational capabilities.

Imaginative doctrinal ideas will always underwrite operational successes and flawed doctrine will generally bring tactical defeat. Therefore, the conduct of actual campaigns must be shaped by doctrinal concepts even if they are not formally endorsed.[50] Serious and ongoing doctrinal thinking is essential for small air forces to retain their conceptual edge, which is an essential component for them to be effective at the appropriate level. Such practices broaden the doctrinal foundation, by inculcating both formal and informal precepts, beyond the customary usage of written manuals and even institutional practices. It is essential

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[50] Lieutenant Colonel Barry D. Watts, USAF (Retd), 'Doctrine, Technology and Air Warfare', in Dr Richard Hallion (ed.), *Air Power Confronts an Unstable World*, Brassey's (UK) Ltd, London, 1997, pp. 19–20.

for small air forces to form such an expansive understanding of doctrine—encompassing past ideas, new concepts, experiences of the force and lessons learned—in order to have the flexibility required to move forward from a matured strategic doctrine.

Concluding Thoughts

Explaining a small air force and categorising air forces as large, small or niche is not a simple process. Not only are there many factors to be considered but they are also prone to being affected by other indirect developments. The unpredictable interaction between these factors makes any judgement qualitative and susceptible to considerable contextual variations. However, an analysis of size, capability, technology and doctrine will provide a fairly straightforward indication of the status of an air force. While assessing air forces, it must also be borne in mind that the three categories of air forces that have been indicated are not watertight, exclusive to each other. In fact, the opposite is true. There is a continuum from the top end of large air forces to the niche air forces at the other end of the spectrum that cannot be severed without the risk of losing the credibility of any analysis.

Dependent on contextual circumstances there is also the possibility that air forces can and will move from one category to another, although upward mobility will normally be difficult and expensive. Among the three, small air forces are the ones more prone to becoming niche air forces because the very constraints that force nations to accept a small air force as part of their defence mechanisms are themselves invariably susceptible to further weakening the national capacity to support an air force. Small air forces, therefore, must continuously monitor the political, social and economic developments within the nation to identify any detrimental changes that might take place. Further, they should consciously match their capabilities and developmental needs to the perceived threats as accepted at the grand strategic level of the nation. These external factors

have to be confronted and overcome for the force to function effectively. In addition, by virtue of being a 'small' air force, there will always be perennial tension in the need to recruit, train, sustain and retain the necessary number of personnel without the loss of operational efficiency. These disparate factors all point to the need for a small air force to have very strong strategic foundations based on well-developed long-term plans.

5

CHALLENGES TO
SMALL AIR FORCES

Airmen look at problems differently; thus, finding alternatives may require that we restate the problems we are attempting to resolve.

Lieutenant General Robert J. Elder, Jr,
USAF (Retd)[51]

Air forces have existed as independent entities for more than 90 years and yet still find that they have to periodically justify the need to retain their independence, both as an organisation and in terms of operational planning and execution. There are multiple perspectives regarding this paradigm and they vary from air force to air force. Even if the necessity for an independent air force is debated, there is acceptance of the need for air power to ensure national security. This is a paradox and can be considered one of the challenges that air forces routinely face. However, the question of the independent status of air

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[51] Lieutenant General Robert J. Elder Jr., USAF (Retd), 'Air-Mindedness: Confessions of an Air Power Advocate', in *Air & Space Power Journal*, vol. xxiii, no. 3, Fall 2009, http://www.airpower.maxwell.af.mil/airchronicles/ apj/apj09/fal09/elder.html, accessed 20 July 2010.

forces is not germane to this paper and, therefore, is considered as an accepted reality.

Irrespective of their status, all air forces face challenges, the difference being only the impact that these challenges have on the operational efficiency of the force. A particular challenge could be debilitating for a small or niche air force whereas a large one would be able to absorb the same challenge and continue to function at the required level, while remedying the situation. This sort of strategic depth is resident only in large air forces. Small air forces will find it difficult to contain extreme challenges and yet continue to operate effectively unless the possibilities of these challenges and their solutions are analysed in advance. In effect, a small air force will have to be proactive to emerging challenges rather than being reactive and facing them after they have manifested themselves.

The possible challenges materialise from the volatility of the emerging security environment, strategic issues that impact the employment of air forces, air campaign planning requirements and the underlying need for small air forces to assert their relevance in the broader national security equation. Further, a number of unrelated sub-factors, some of them purely operational in nature, will influence the performance of small air forces but all of them can be grouped within one or the other of these three broad areas.

Emerging Security Environment

> *We will, however, see changed strategic power relativities and an increasingly 'multipolar' global order, driven by changing patterns of underlying economic power and political influence.*
>
> Defending Australia in the Asia Pacific Century: Force 2030[52]

The status of any power projection capability is dependent not so much on its own capacity to project power, but is directly reliant on the impact that it can create on the environment within which it is employed and the effects it can create within the overall security environment. Therefore, an analysis of the emerging security environment—both independently and within the context of developments in the international geopolitical, economic and security concepts—is fundamental to understanding the challenges that small air forces are likely to face.

The future is always linked to the present, which in turn is superimposed on the past for clarity in analysis. By drawing a line that joins the past and the present it is possible to project the direction of future developments with some degree of certainty. This link from the past to the future, drawn through the present, provides the continuity necessary to comprehend the complexities of the future. While understanding the emerging security environment itself is a challenge, clarity in foreseeing strategic directions and possibilities into the future environment is critical for small air forces to operate effectively as independent air forces.

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[52] Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009*, Department of Defence, Canberra, 2009, p. 30.

Developing an accurate model for the future is almost impossible, the only certainty being that it will continue to be unpredictable. However, the future will encompass major breakthroughs and advances in the development of weapon systems, achieved through the application of emerging technologies. While this would greatly increase holistic military capabilities, it will also create major disruptive effects in the implementation of national security imperatives. Adapting human thinking and perceptions to accept the emerging and uncertain security environment will remain a major challenge.

Uncertainty and volatility in the political, social, religious and economic spheres in the more unstable regions of the world are likely to create crises that are unpredictable in their nature, timing, location and intensity. Further, if such crises transition into armed conflicts, they are unlikely to be defined by international law in their actual conduct. Such conflicts will tend to be waged in the grey areas of humanitarian law and conventions where clearly demarcated laws will not be all encompassing.

The emerging security environment will be directly influenced by five major issues that individually and in different combinations determine the concept of national security. The perception of national security—while not static at any given time—in turn will determine the nation's assessment regarding the level to which elements of national power should be built up. Obviously this has a direct bearing on the status of a nation's military forces as a whole. The considerable outlay required to sustain a viable air force makes this a particularly crucial issue for the viability of small air forces. The five issues that should be studied and analysed are the impact of economic globalisation, the state of alliances, international power imbalance, the complexity of future wars and the impact of technology.

Economic Globalisation

> *At no time in human history has a nation of diminished economic vitality maintained its military and political primacy.*
>
> President Barack Obama [53]

The future geostrategic environment will be directly influenced by the ongoing economic globalisation, which is in itself a double-edged sword. On the one hand, globalisation provides the more established economies of the world the ability to exert a certain amount of stabilising pressure on faltering economies through both political and diplomatic means. On the other hand, such pressures themselves could exacerbate the situation within a nation thereby increasing the speed of deterioration of a near-failing state. It is therefore necessary to analyse individual situations in a contextual manner before economic interference is attempted in a fragile state. A further effect of economic globalisation of equal consequence is that a number of developing nations have leveraged off the phenomenon to rapidly reach close to economic independence. However, this successful growth has not been necessarily associated with political freedom for the people or respect for the rule of law, increasing the probability for such nations to become 'rogue states' with the potential to destabilise their region.

The development of an interdependent global economy has also led to the globalisation of security concerns for most nations. The outcome has been an altered understanding of national

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[53]   President Barack Obama, in a speech at West Point, quoted in *Air Force Magazine*, Arlington, VA, July 2010, p. 4.

security wherein it is considered in a very broad manner that transcends the traditional concept of geographical boundaries and their rigid defence. National security now encompasses the protection of national interests, which is an intangible, ethereal concept making it a complicated issue. In the emerging security environment, ensuring national security is a complex undertaking.

The changed international economic state creates an inconsistent situation. A strained economic condition combined with speedy economic progress has the potential to create instability. When this strain is combined with other factors, such as population growth, political instability or internal dissentions that become violent, the instability so generated is more than likely to spill well beyond the immediate neighbourhood and affect regions that may be vital to global prosperity. Under such circumstances there is likelihood of a requirement for some sort of intervention by the international community—economic, diplomatic or military—to ensure continued stability of a volatile region. In certain cases there may even be the necessity to undertake pre-emptive and preventive intervention in the primary state from which the instability emanates.

It is more than likely that the emerging security scenario will be dominated by unconventional conflicts originating from comparatively safe havens perpetuated by non- or quasi-state entities who tend to redress real or perceived grievances through violent means. One of the primary grievances of a population would be economic deprivation, and a majority of the safe havens would also be economically failed or failing states. Essentially this means that economic instability is a powerful catalyst for regional volatility. Globalisation of the economy will automatically make the ripples of such destabilisation spread and could even affect more stable nations further afield than it would otherwise have in a more isolated economic environment.

Along with the benefits that globalisation of the economy brings to the international socio-economic environment there is also a definitive downside to it, if the security aspect is not fully understood. The more stable economies have to be cognisant of this and use their influence to counteract any negative fallout that may occur. From a small air force perspective, instability brought about by economic factors will increase the chances of having to cope with more nebulous situations. The conflict in this case will never be a straightforward one entailing the conventional use of air power but will be nuanced, with even the objectives of the intervention becoming blurred with time. The complexity in ensuring the 'correctness' of the application of air power, in kinetic or non-kinetic modes, will be significant.

State of Alliances

It is almost a cliché that the international security environment has become more complex, uncertain and dangerous than ever before. When viewed through the prism of national security this transforms to continuous, and at times unfathomable, changes in the international geopolitical scenario. Changes that are inimical to the security of one nation but do not necessarily affect another can directly affect existing alliances and emerging coalitions. This situation will bring greater visibility to bilateral and multilateral tensions that would otherwise not have been of any great significance.

A critical change in this sphere has been the acceptance of a broader definition of national security which now encompasses global national interests, not only those that are internal or regional. This altered perception has increased the importance of internal domestic politics in determining the direction and formulation of foreign policy. In essence, domestic compulsions have now become critical inputs to a nation's reaction to external stimuli, especially in matters concerning security. Another noticeable change in the behaviour of nation-states has been

their increased proclivity to use military forces to ensure national security, defined in the broadest possible manner. It is also a matter of fact that almost all nations prefer such interventions to be carried out by coalitions to increase the acceptability of these actions. This penchant for coalition operations has the capacity to strain traditional alliances, when the employment of military forces by one partner does not stand up to the requirement of unity of purpose of another. While the use of military forces is on the increase, it is noteworthy that the chances of a conventional state-on-state conflict have progressively reduced—a clear indication of a dynamic security environment.

Small air forces, by virtue of their status, would normally be configured for adaptable employment within a coalition founded on traditional alliances. However, coalitions are determined through current political processes and therefore it is possible that the air force may not always be operating with formal allies in a coalition. Having to cater for even unlikely coalition partners in some operations would place a direct strain on the interoperability capacity of the force, indirectly affecting its flexibility. Flexibility is one of the foundational requirements for a small air force to be a viable entity. Therefore, careful forward planning—taking into account the geopolitical situation that will dictate partner forces—is essential for the ability of small air forces to participate successfully in coalition operations in the prevailing and emerging security scenario.

International Power Imbalance

The military forces of the developed world have significant inherent power resident in them. This increases by a magnitude when they operate in coalition and almost completely precludes the use of conventional military capabilities against them by lesser capable adversaries. Further, the high probability of international intervention—far higher now than just three decades ago—in the case of conventional state-on-state conflicts

between smaller nations acts as a clear deterrent for such nations to desist from military operations, even under extreme provocation. The chances of such conflicts occurring are now remote, but not impossible.

These are two fundamental factors that contribute to a noticeable shift away from conventional conflicts by smaller powers in both confronting the political, economic and military power of the developed world and in the conduct of warfare between themselves. The advent of asymmetry is not new; it is as old as warfare itself. However, instances of the use of asymmetry to neutralise the overwhelming advantages that larger and more capable conventional forces possess are becoming increasingly common in contemporary conflicts. This trend will continue to be further emphasised in the emerging security environment. The downside of the adversary's reliance on asymmetry is that the conventional forces have had to rapidly adapt their concepts of operations and tactics to cater for the operational implications and changed character of conflict. The situation makes it difficult for military forces to anticipate future events, thereby becoming more reactive and ceding the operational initiative to irregular or asymmetric adversaries.

Faced with this insurmountable power imbalance, the weaker side in a conflict is likely to resort to irregular warfare and/ or asymmetric strategies such as insurgency, terrorism, cyber attacks etc. Less structured non-state actors are more likely to initiate terrorist activities. On the whole, future conflicts are far more likely to be irregular wars that involve a range of operations, most of them reliant on asymmetry for their success. Porous borders, cheap and anonymous travel, and a vibrant black market in weapons make the strategy of asymmetry easier to employ and, therefore, the first-choice option for almost all contemporary conflicts. Such an environment will promote the emergence of irregular forces—state-owned, state-sponsored or non-state. Although such forces will, for the most part, lack high-

technology weapon systems, they will be amorphous, constantly evolving, highly adaptive and extremely difficult to eliminate.

In irregular warfare a small air force will find itself stretched to meet the myriad demands placed on it. The versatility required to cater for the full spectrum of activities within the realm of irregular warfare, within the limited assets and system availability of a small air force, is of a very high order. Only small air forces that have carefully considered the requirements and orchestrated their developments without in any way diluting the foundational underpinning of optimised flexibility will be able to achieve the necessary competence in this situation. The intractable power imbalance resident in modern military forces also creates challenges for small air forces that will have significant negative impact if not cautiously monitored and comprehensively addressed.

Complexity of Future Wars

The character and conduct of war is continuously changing, reinforcing its unpredictability and the complexity that brings. Conversely, it is the same unpredictability that provides an enduring continuity to the conduct of conflicts. The continuity is further emphasised by the intricacies of war accentuated by the ever-present fog and friction and the lethality of armed conflict. In addition, the human dimension will, for the foreseeable future, continue to be central to the successful conduct of war. This human factor, in combination with evolving technology, constitutes one of the fundamental factors that bring about the constantly changing character of war. These are universal truths that will not change, irrespective of the contestants and type of war being waged.

The unpredictability of war and the transformation in its conduct necessitates the formulation of a flexible and adaptable philosophical doctrine and operational strategy that can at all

times maintain the primary aim of military forces sacrosanct—that of providing national security.

The characteristics and conduct of war and its comparative complexity will be affected by the physical environment in which it is fought. It has been forecast that by 2025–2030, greater than 60 per cent of the world's eight billion people will be living in and around cities that have grown into megacities. This in turn means that a majority of conflicts of the future will be fought in urban areas. The obvious conclusion is that military forces will have to develop and embrace doctrine and concepts of operations to apply force in and around megacities and heavily populated urban areas. The legal, moral and ethical issues that arise from operations in the urban environment, where the risk of collateral damage—both human and infrastructure—is very high, will have to be addressed clearly before such operations can be successfully undertaken.

In such a complex environment, the quantum of force required and the methodology of its application will depend on the context of the operations and the desired end-state. Domination of the battlespace in and around megacities—which will become a necessity in the not too distant future—cannot be achieved by a single environmental military force. It will only be possible by the development of concepts of operations that subscribe to a combined arms approach to warfare and the conduct of multiple axis joint operations.

The tenaciousness and other adversary characteristics in combination with the extreme complexity of operations in urban areas indicate that only military forces with a high level of joint operational capability will prevail in the future. Such joint capabilities will have to originate from strategic level doctrine and percolate to the tactics on the battlefield in a continuum of joint thought and concepts. The inherent flexibility and adaptability of a balanced, small air force is invaluable in these

conditions. A versatile, small air force must be able to bring to bear a number of characteristics that, when innovatively and appropriately employed, will have the capacity to transform the military into a cohesive whole. This is a crucial contribution to the effective to development of a joint force and its further progression to becoming a seamless force. Balanced air power capabilities, available at the right time and place in adequate quantum, will be critical to the success of operations in the emerging environment.

The employment of military forces, now and into the future, will always straddle a range of operations from the provision of humanitarian assistance in response to natural or man-made calamities on one end of the spectrum to the conduct of high-intensity state-on-state conflict, all the way to wars of national survival at the other. This is a very broad spectrum of possible employment and would, in extremis, stretch even the USAF. This demand on military forces is further complicated by the random variations in the tempo and intensity of operations at any given point in the spectrum. The necessity to conduct operations at the desired level of competency places an immense responsibility on the military forces of a nation. Small air forces will be required to employ their capabilities across this entire spectrum in a manner that creates the maximum effect. Adding to this is the distinct possibility that air forces would be required to undertake concurrent operations of different intensities and at different points of the conflict spectrum. The sustainability of small air forces will be challenged and come under stress in these circumstances. Considerable preparedness and flexibility are needed to respond adequately to these demands. Small air forces must undertake substantial and targeted training on a

continuous basis to achieve the necessary level of competence in these trying circumstances.

All wars have been extensions of the political process. However, the political context within which a conflict is conducted has become extremely complex in recent times, thereby imposing constraints that impinge on the operational employment of military forces. This has direct and detrimental effects on the way in which military forces conduct operations. The reality is that this trend is unlikely to be curtailed and will become increasingly strong. In clear contrast, the demands on military forces will be to respond rapidly to emerging challenges to national security in a proportionate, discriminate and precise manner. Further, the military would be expected to manage the effects these actions create to counter their becoming further threats to national security. This is a focused requirement with no margin for error in the application of force. The increasing constraints being laid in the application of force increases the difficulty in achieving this. Small air forces are critical elements in responding with proportionality and precision to threats and in managing the effects—both kinetic and non-kinetic—that are created to achieve campaign objectives. The discrimination demanded in the application of force in modern conflict makes air forces the natural choice for first employment. This situation, while bringing small air forces to prominence, also places inordinate responsibilities on them.

Two of the major determinants that can be used to grade the complexity of future conflicts are the level of technology being used in a particular conflict and its intensity. The lowest complexity will be in conflicts that are fought at low intensity with the use of low technology and the highest at the other end of high technology and intensity. In a majority of cases, combat employment of small air forces is likely to be in the mid- to high-technology levels of conflict of medium complexity. At the lower end of the complexity spectrum, small air forces will

be employed in the more benign areas like air mobility and non-intrusive intelligence, surveillance and reconnaissance.

Air power has been critical in achieving success in most of the recent conflicts. This has led potential adversaries who do not have the benefit of adequate air power capabilities to devise and adopt strategies and tactics to overcome this deficiency. Air power's technological edge has been identified as crucial to its success and has accordingly been targeted for neutralisation. A clever irregular adversary will resort to mobile operations of small groups, dispersion, signature management, deception and the adaptive exploitation of complex physical terrain and social structures to neutralise the inherent advantages of air power. Adversary strategies will confront small air forces with direct and indirect challenges to their perceived, and at times actual, vulnerabilities—finite sustainability and limited concurrent operational capacity.

Awareness of the challenges that face small air forces and the very thin line that separates success and failure in their employment is the first step to ensuring that they do not fail. However, ensuring success requires constant updating of the threat scenario, doctrine and concepts and, most importantly, consciously harbouring their capabilities through rigorous training regimes and ensuring adequacy of resources. In circumstances of national constraints—economic, political or social—this is an extremely difficult proposition to manage.

Impact of Technology

Throughout history, technology has significantly impacted on the character and conduct of war, being a primary driving factor in the evolution of tactics, strategy and doctrine. It remains one of the major defining factors in the conduct of war, a trend that is unlikely to change. If anything, this overarching influence of technology will become even more pronounced in determining

the character of a conflict. The emerging security environment will be heavily influenced by developments in technology.

There are two conflicting details that are highlighted by this situation. First is that conventional military forces, especially of the developed world which has an almost complete monopoly on innovative technological developments, will become more effective and competent. This will further increase the already large capability gap between them and the forces—both state military forces and irregular non-state organisations—operating in the more volatile regions of the world. Second is that such developments will facilitate the proliferation of cheap but effective weapon systems. This situation assumes critical dimensions because of the seeming ease with which states and organisations that have a destabilising influence, both regionally and internationally, can readily access high-end technologies.

Technology indirectly affects the security environment. Currently the threat to stability posed by irregular forces, some covertly supported by sovereign states, who subscribe to disparate ideologies and struggle to achieve ill-defined goals has assumed centrestage in the security debate. Such groups are not historical novelties, having been in existence through the ages. The difference now is that easy access to sophisticated technology and military hardware, especially for groups with state or other wealthy benefactors, has increased the potency of these groups by a magnitude, making it difficult to neutralise or contain them. Indications are that this situation will only worsen with time. Technology explosion and its uncontrolled proliferation have combined to indirectly make the security environment volatile and dangerous.

Improvements in technology bring to the fore an issue that will always trouble small air forces. Technological breakthroughs increase the capability of individual systems, in turn facilitating, to a certain extent, the reduction in numbers necessary to enable

a given function. Technology also acts as a catalyst for savings to be initiated by downsizing the force structure. The perennial resource constraints under which small air forces operate gives excessive credence to this concept without a robust analysis to ascertain its veracity. In small air forces, which operate under high resource constraints, the increased efficiency of individual systems is almost always viewed as a counterbalance to decreasing the numbers of systems that need to be procured and operated. However, it has to be borne in mind that reducing personnel strength and the number of systems, irrespective of the improvements in personnel efficiency and individual system capability, can only be done up to a certain level. There is always a minimum number of systems that are required to ensure that necessary capabilities are always available to the force in adequate quantity. The quantum of air power that a small air force is required to produce and the number of systems to produce it has a delicately balanced relationship. Maintaining this balance is essential to the overall efficacy of the force and is a challenge, especially to air forces operating in an environment of resource competition. However, achieving that balance is critical to small air forces being able to deliver the necessary air power— both in quality and quantity—at the desired time and place.

Over the past few decades, dramatic developments in computer technology have 'swiftly and radically changed the social, cultural and technological elements of modern societies' and enabled them to 'trade and exploit knowledge'[54] through information dissemination. Information superiority has always been a key input to the conduct of military operations, providing a disproportionately high assurance of success to the force that possesses it. This is a requirement that straddles all levels of conflict—from the strategic to the tactical. Advances in

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[54] Alvin and Heidi Toffler, *War and Anti-War: Making Sense of Today's Global Chaos,* Little, Brown and Company, New York, NY, 1993, p. 23.

technology now permit the dissemination of vast quantities of information at great speed and modern military forces have become almost completely reliant on the superiority and availability of information for efficient conduct of operations. This has been identified as a vulnerability of modern forces, even though the contemporary irregular adversary still does not possess adequate countermeasures to neutralise information assets. The physical assets and systems necessary to ensure information superiority operate at the high end of the technology spectrum and are expensive to acquire, maintain and operate. Therefore, even large air forces have only limited assets. In the case of small air forces, the situation is obviously worse, highlighting two major drawbacks. First, from an operational perspective, adequate numbers of assets will never be available, which could mean a less than optimum access to information. Second, these systems become centres of gravity for the air campaign and critical vulnerabilities for the overall joint or national campaign. Small air forces will need to expend a disproportionate effort to defend them at all times. Considering the limited number of systems and their vulnerability, the loss of even a single asset could be debilitating to the entire campaign.

Within the information domain, cyberspace—although a comparatively new realm of warfare—is already being accepted as an independent operational environment like air, land, sea and space in the physical domain. This means that assets to conduct information warfare are already functioning in both the physical and informational domains. This trend will increase into the future, making their control and coordination a complex activity. However, information assets—both physical and cognitive—will have decisive impact on the outcome of all military operations and, therefore, will be priority targets in all operations. Small air forces will have to be cognisant of this vulnerability. The reliance on information superiority cannot be reduced; and the limited availability of these assets and the enhanced need for

their protection are likely to be constraining factors in the overall operational effectiveness of all air forces—particularly amplified in the case of small air forces.

Space will play an increasingly important role in information warfare, with a large number of the necessary assets already being space-based. This makes space an integral part of the information domain. Weaponisation of space is a matter that is being discussed and debated in international forums and a decision is unlikely to emerge. However, it may be prudent to consider that such a progression is bound to take place in the near future. Technology and development associated with space will grow at a faster pace than other terrestrial ones and conceivably by around 2030 a large number of nations will not only be regular space-users but also stakeholders in dedicated space-based assets and capabilities. As a corollary, the ubiquity of space-based systems will also subject them to high levels of direct and indirect threat from emerging attack systems such as directed energy weapons. To deliver high calibre air power, small air forces are highly dependent on space-based capabilities, mostly shared with, or leased from, allies and partners. This dependence could prove to be their Achilles heel in an unstable international politico-strategic environment wherein the robustness of alliances can not always be assured. While the definitive solution to this issue would be to possess dedicated space assets, this is not viable either in the current state of small and middle power economies or in the near future—a challenge with no solution in sight.

One of the emerging characteristics that will define warfare in the information age will be the technology-enabled capacity for a force to ensure the coordinated application of numerous

weapon systems in geographically distant theatres to create synergistic effects. Currently military forces are only starting to leverage of this advanced capability. When this capability is fully optimised, it will fundamentally alter the traditional concept of clearly defined battlefields or battlespaces, further convoluting the complex demands on small air forces.

Existing high-end technology is being inexorably overtaken by more sophisticated emerging technologies that will soon become the accepted norm. These advances cannot be stopped, nor can their effects be ignored. Air forces—large and small—by virtue of their umbilical connection to technology can only ignore these developments at the peril of rapidly becoming redundant. When superimposed on the current and possible future conflict scenarios, this produces an almost insurmountable challenge for small air forces. The spectrum of conflict has broadened to an extent wherein the operating environment at one end will be at a very low level of technology assimilation and on the other at the highest level of technological sophistication. Small air forces will have to operate across this spectrum with the distinct possibility of having to operate at both ends, if not concurrently, at least in very close time frames. This would require small air forces to be able to technologically ramp up and down at will at a very fast pace. Flexibility is the key in such circumstances since small air forces will not have the mass required to maintain independent elements that operate at different levels of technological sophistication. In fact, small air forces almost always operate at critical mass, which makes adequately meeting this complex requirement itself a challenge. Operating under these exacting circumstances will be one of the major tests that will confirm the status of a small air force.

Situational awareness that can augment the responsiveness to emerging threats is one of the major factors that determines the overall capability of a force and hence its status. The innovative use of technology can enhance the level of situational awareness

and create a tangible advantage to fielded forces. This is one area of warfighting that is continually being upgraded in terms of speed of information dissemination, robustness of data analysis and the variety of collection assets. The rapid evolution of technology in these spheres of activity very often leads to a situation where it becomes difficult for existing doctrine, strategy and tactics to completely absorb the technology and leverage off the advantages that it provides. Small air forces, because they operate at critical mass, will find it simultaneously difficult and vital to leverage off this advantage and optimise operational efficiency.

Along with greater sophistication, proliferation of high technology is also to be expected in the years to come. In addition to providing greater capabilities to the military forces of sovereign states it also provides the wherewithal to adversary irregular forces to master and employ disruptive technologies. This will evolve into major challenges that are difficult to counter completely, as the technologies mature and become easily available and simple to use.

> *The Air Force has long worshipped at the altar of technology ... This is the catechism: If the Air Force is to have a future of expanding horizons, it will come only from understanding, nurturing and applying technology.*
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> Carl H. Builder[55]

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[55]   Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the U.S. Air Force,* Transaction Publishers, New Brunswick, NJ, 1994, p. 155.

Summing Up

Security perceptions have undergone radical changes in the past few decades. Today economic wellbeing is one of the main security paradigms that a government promises its citizens. Along with the globalisation of economic interests this has influenced security perceptions, moving them away from the traditional geographically defined understanding of security to one of securing national interests beyond the borders of the state. There is now universal acceptance that threats to security are truly transnational and multidimensional, not merely military in nature.

The emerging security environment is one of unpredictable threats emanating from nations in the throes of partial failure and/or non-state forces with state support operating in irregular groups. The delineation between the two is becoming progressively more blurred, further complicating an already multifaceted challenge. Even when two nation-states are involved in a conflict, overt or covert, the issues of moral correctness, legality and international repercussions cloud the clarity of the situation. In the future, circumstances where the demarcation between war and peace is clearly visible, as in the past, will be rare occurrences.

Conflicts in the emerging security environment will not conform to the traditional concepts and will not be conducted within clearly identifiable boundaries. Conflicts of the future will have no specific battlespace, and will not be in any way bound by time and space. The fluidity of the situation will exert enormous pressure on all elements of national power. Small air forces will be no exception and will have to prepare themselves for the onslaught of enlarged demands and shrinking resources.

Strategic Issues That Impact the Employment of Small Air Forces

> *The ghosts of Trenchard et al will have approved of Hallion's judgement that air power execution caught up with air power theory, as evidenced by the conduct and results of the 1991 Gulf war, and yet the point, is that classical air power theory often, though not invariably, postulated the wrong requirement of the air weapon—that it be capable of winning wars on its own.*
>
> Colin Gray[56]
> Explorations in Strategy

Contemporary conflicts have developed some peculiar characteristics that tend to obscure the continuity in the strategic nature of war through increased focus on some tactical aspects of immediate concern. A long-term strategic view of contemporary conflict clearly indicates these are merely temporary innovations employed by an intelligent and adaptive adversary attempting to neutralise the preponderant power resident in modern conventional forces. Their success is visible in the inability of conventional forces to fully overcome these tactical actions and the reactive nature in which they conduct a campaign. A strategic analysis makes it apparent that the fundamental nature of war has not changed. What has changed are the tactics and responses used in specific conflicts; the character and conduct of war. These changes, in their own way are ongoing, but are also tactical aberrations that do not leave indelible marks on the broader strategy or philosophical doctrine of a force.

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[56] Colin Gray, *Explorations in Strategy*, as quoted in, Royal Air Force, *Air Power Review*, vol. 13, no. 1, Spring 2010, pp. 61–62.

Air forces have been particularly affected by this conceptual debate to redefine the basics of warfare, especially since they resist such moves. Air Forces' reluctance to make short-term or temporary changes to their doctrine or operational concepts is primarily based on the fact that they are fundamentally strategic arms because of their basic nature. This means that their tactical actions, and therefore operational training, are not different in separate circumstances and do not change with the altered character of the adversary or conduct of a campaign. This is distinctly different from the approach of the army whose tactical training has to be tailored for individual conflicts, mainly dictated by necessity.

The strategic nature of air forces makes them more stable in terms of the development of strategic doctrine and higher level operational concepts. However, by the same token, air forces must adapt the ways in which they apply this stable doctrine in order to keep pace with the rapidity of change in the international geopolitical and security environment. Add to this the ongoing evolution of air power capabilities—mainly technology-enabled—and small air forces reach a situation where adaptability becomes a critical sustaining factor.

Today the world's air forces are coming to grips with the ever-increasing outlay required to field even the baseline level of true air power capability. This venture is beset with issues that have to be clearly identified and then carefully ameliorated if an air force, especially a small one, is to become a viable force. In a very broad manner there are three areas that could produce challenges to the efficacy of small air forces and therefore need to be analysed in order to understand the nuances involved as well as to identify solutions. These three are also the most difficult to address effectively. Particularly for small air forces, the manner in which these areas are understood and managed will have a determining effect on their relevance to national security. The three areas are: understanding the current status of air power well enough

to gauge its possible future position, the connection between national grand strategy and air power strategy, and political imperatives that impinge on the air force's capabilities.

Status of Air Power

There has been a noticeable change in the way nations perceive their security and also the accepted modus operandi employed to ensure it. Today the military is only one element of a host of national power elements that contribute in different ways to achieving and maintaining security. All elements of national power combine in different proportions in a contextual manner to achieve the primary objectives that ensure national security.

There is another subtle change that has taken place in this arena, which is often glossed over or not clearly understood. Even just a decade ago the acknowledged process of ensuring national security was for the military forces to engage and 'win the war' and then demonstrably move out to let other, more benign agencies come in and 'win the peace'. In the current, and emerging, security environment military operations assume a more enduring nature and are ongoing even as other elements of national power commence and carry out functions like the diplomatic and rebuilding activities necessary to alter the behaviour pattern and belief system of the adversary. This change to the military mission has become pervasive as a result of the rapid changes that have taken place in the strategies and operational tactics being employed by modern adversaries. Their complete disregard for internationally accepted norms of combat has led to a situation where there is no assurance of security or safety of the other government agencies that operate in the arena. A constant military presence therefore becomes an unavoidable necessity to ensure the physical safety of the personnel and infrastructure of these agencies. This has significantly increased the responsibility and sustainability requirements of the military forces without a commensurate increase in their sustainment

capacity. The result has been that military forces so engaged are becoming overstretched.

From a contemporary military perspective, all operations will be joint in nature with each of the three environmental arms either supporting or being supported by the other two dependent on the context of the campaign being conducted. All three Services have individual environmental operational theories and concepts that optimise their fundamental strengths. In joint operations these concepts of operations ideally fit into a seamless whole permitting the military force to operate in a unified manner. By virtue of air power enveloping the entire theatre of operations, irrespective of terrain and geography, it becomes a critical binding agent that permits the advantageous application of joint force. This places an added responsibility on air forces and compels them to have a higher than normal understanding of joint operations.

The primary mission of all air forces is to obtain and maintain the necessary level of control of the air over all domains. Assured control of the air is a fundamental requirement for the efficient conduct of all other operations, irrespective of the environment. Even so, the opposite is not necessarily true—control of the air does not by itself assure either efficiency or success in other operations. This maxim has, however, always made the importance of control of the air a contested issue. In the perception of the developed world, two factors tend to dilute the implications of not having adequate control of the air. First, the military forces of the developed world have easily won control of the air in all conflicts that they have engaged in since the late 1950s. In fact, the Korean War was the last fully contested battle for control of the air fought by Western forces. This has tended to relegate the critical need for a dedicated campaign for control of the air to the background in campaign planning. Second, there is a lack of understanding of the dangers of taking control of the air for granted. Even an attempt to contest such control by the

adversary is fraught with the possibility of creating debilitating effects on the execution of a joint campaign. There is a need for joint campaign planning staff to be cognisant of both these possible pitfalls.

A comprehensive air force strategy is based on the concept of effects-based targeting within the overarching military strategy. The success of the strategy hinges on four cardinal and unique characteristics of air power—reach, responsiveness, discrimination and precision. These four characteristics are complex combinations of a number of lesser air power traits that embody not only their own individual essence but also combine to mitigate perceived drawbacks and enhance strengths. Innovative combinations in the application of these characteristics place air forces in an unassailable position in terms of their ability to respond effectively in a time sensitive manner to emerging threats. This is one of the fundamental reasons for air forces to be considered the first-choice option as a strategic level response to emerging challenges to national security across the full spectrum of conflict.

In the contemporary international socio-politico environment, the physical presence of troops—or 'boots on the ground'— is normally far from being politically acceptable. However, the instances where the need to intervene in volatile regions of the world has been clearly evident has only increased in the recent past. This is a paradox wherein air power with its ubiquitous yet generally non-controversial presence assumes greater importance. In the current conflict scenario, irregular adversaries are pursuing calculated asymmetry meant to inflict personnel casualties and lower the morale of the surface forces. This trend is likely to become more intense into the future. Extensive employment of air power for all purposes other than for situations that can only be resolved by ground incursions can effectively mitigate this situation.

The use of force, irrespective of the objective and the 'correctness' of the action, is always a double-edged sword. It can create untenable strategic situations even as the military is winning battles at the tactical and operational levels. The discriminate use of air power can ameliorate this situation to a great extent and contribute to the overall success in the conflict. In the current international political environment this advantage should be zealously guarded. An efficient air force, employed within the mandate provided by the state, can create strategic advantages in the conduct of a conflict and also establish ascendancy in ensuring national security. Conversely, its indiscriminate use can rapidly lead to escalation and indefensible strategic situations that could have long-term political ramifications.

While there is still some debate regarding the ownership and control of air power assets, as well as the need for an independent force to wield them, its ubiquitous usefulness has never been in doubt. The debate—especially regarding the control of air assets—is perhaps an acknowledgement of their extreme usefulness in all areas of national security. The efficacy and effectiveness of air forces, when appropriately employed in the pursuit of national security, have been repeatedly demonstrated far too many times for air power to be considered a superfluous capability or dismissed lightly.

There is still a certain tendency in some quarters to denigrate air power capabilities and deride their contribution to neutralising non-traditional threats in contemporary conflict scenarios. This emanates from a blinkered focus on the tactical aspects of the conflict that completely ignores the strategic advantages that air power brings to all aspects of contemporary conflict and the

broader national security equation. A holistic understanding of national security is necessary to fathom these aspects. It is ironic that most of the thinkers who advocate the reduction in air power capabilities, mainly in an effort to emphasise the importance of surface forces, are from developed nations that have almost always employed their military forces with the complete assurance of control of the air. This has now not only been taken for granted, but in a sardonic manner also been twisted around to make the argument for the same force that provides this assurance to be made irrelevant. Initiating surface combat, even against an adversary with limited air power capabilities, without assured control of the air, can rapidly lead to unsavoury situations and unwanted outcomes.

Air power is crucial for victory and success in conflict. There is no doubt that the status of air power as a primary tool of national security has been unequivocally established.

Air Power and National Strategy

The current global politico-strategic environment is volatile and ambiguous. In these circumstances it is even more important for nations to have an articulated national grand strategy that forms the foundational base of national security as compared to times of reasonable stability. Only from such a base can a functional national security strategy and a well-conceived military strategy be developed. This process is critical and the alignment of these strategies is a cardinal requirement to define the status and position of the military forces within the national security apparatus. Failure to adhere to this hierarchy in developing appropriate strategies will invariably lead to unbalanced national security strategies and contextually unsuitable military strategies.

Air power strategy, developed within the ambit of this involved process, will have to take into account not only the resident capabilities of the nation's air force but also consider 'national air power' in terms of the indigenous aviation industry and civil aviation sector. It will also be heavily influenced by the broader strengths and vulnerabilities of the nation in a number of interconnected as well as disparate areas. One of the major considerations in developing an air power strategy will be the national ethos regarding the employment of force to achieve national strategic objectives. This factor will have a preponderant effect, especially in determining the offensive use of the military, and is particularly important in nations with well-embedded democratic traditions. Since air power is an inherently offensive force projection capability, the development of air power strategy is particularly susceptible to this factor.

Offensive utilisation of air power has a very high visibility and when indiscriminately used it can create disproportionate levels of damage to infrastructure and cause high levels of casualties. For these reasons air power, more than any other type of military power, is prone to concerted media attacks when unforeseen and unfortunate incidents of collateral damage, however minor, occur. The ready visibility of such damage and the political sensitivity attached to it, in combination with the media reports that influence the general public, often lead to very restrictive constraints on the use of air forces. Such constraints will normally have a restraining effect on the free development of air power strategies.

There are other equally important and extraneous factors that must be carefully considered in the formulation of air power strategies since they in turn indirectly affect the optimum employment of military forces. Needless to state, the development of air power strategies and the process to ensure their contextual suitability is complex and needs constant

refinement to ensure its broader alignment with the national grand strategy through the larger military strategy.

Political Imperatives

Political factors, stemming from both domestic and external issues, impinge on all aspects of an air force—from the initial acquisition of air power assets, to training, maintenance and sustainment, and the effective operational employment of its capabilities. There are two major domestic political issues that have a direct bearing on the development of a nation's air force. First is the prevailing socio-economic condition of the nation and the predicted future progression, both of which will have a salutary impact on the acquisition of air power capabilities. Air power capabilities need a long lead time to mature from the identification of a requirement to acquisition, and its operational induction. Further, the capabilities themselves and the long process involved in their acquisition are both resource intensive. Assured long-term funding availability—a direct function of the nation's economic and social strength—is therefore critical at all times.

The second domestic political factor is the status and consideration accorded to diplomacy in the broader national security debate. The level of reliance on diplomacy and consideration of the role of deterrence will determine the kind of air power capabilities that a nation will invest in, as well as the type of strategy that will be developed for their employment. For example, if a nation is inclined to employ diplomacy as a primary tool to ensure national security, it is more than likely that it would develop a deterrent air power strategy based heavily on a demonstrated defensive stance but augmented by carefully selected offensive capabilities that could emphasise deterrence.

Alliance cohesiveness is a primary external political factor that is critical to a nation's air power capabilities and the development

of its air power strategies. It also has a direct bearing on the employment of its air force. The perception of possible threats and their immediacy, in combination with the robustness of a nation's alliances and the strength of its allies, will determine the acquisition, development and sustainability of air power capabilities. Indirectly, this will impact on the role that the air force will be asked to play in national security.

The irrefutable fact is that political concerns and compulsions— both domestic and international—will always be crucially influential in deciding the importance and status of the air force in the national security equation.

Air Campaign Planning

An air campaign is the controlled conduct of a series of interrelated air operations to achieve specified objectives.

Dr Sanu Kainikara and Wing Commander Bob Richardson[57]

The conduct of effective air campaigns is a distinguishing feature of successful air forces. Air campaign planning requires a clear understanding of the interface between the air force and other arms of the military, as well as between the military and other elements of national security that may be involved in separate security operations. Carefully planned and executed air campaigns that optimally employ flexible and responsive air assets will be able to deliver timely mobilisation, rapid

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[57] Dr Sanu Kainikara and Wing Commander Bob Richardson, *The Air Campaign: The Application of Air Power,* Chief of Air Force Occasional Papers, Paper No. 2, April 2008, Air Power Development Centre, Canberra, 2008, p. 1.

deployment, decisive firepower, comprehensive situational awareness and other essential support to the joint campaign when and where required. The disproportionately high political and public attention that air power operations attract requires the air force to be skilled in conducting an air campaign to ensure its precise and discriminatory application in contributing to the national strategic objectives.

Air campaigns are inherently complex mainly because of the dual requirement for them on the one hand to be part of a joint operation and on the other to conduct independent air force operations that may only have indirect and long-term impact on the joint campaign. In addition, air forces also have to plan and execute effective control of the air campaigns concurrent with other demands. Air campaign planning and the allocation of limited air power resources are therefore of great importance to the success of an air force within a joint operation, and indeed the joint campaign itself.

Air campaigns can also form part of a wider range of non-military operations, undertaking both lethal and nonlethal actions conducted in a multi-agency environment. Air campaigns deliver two key outcomes. First, they aim to obtain and maintain the necessary level of control of the air for the duration and space required for friendly forces to operate unhindered. Second, they create a wide range of decisive effects that contribute to the achievement of joint, coalition and multi-agency objectives.[58]

The veracity of air campaign planning is challenged by three major factors of equal importance. They are avoiding force overstretch, accurate assessment of force level capacity and understanding weapon system capabilities.

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[58] ibid., p. 41.

Avoiding Force Overstretch

Force overstretch is a condition wherein the entire force has been operating at full capacity for a period of time leading to a very gradual, and normally unnoticed, decline in its overall operational capability. The manifestation of force overstretch becomes apparent only when a demonstrably capable force performs below its accustomed level of competency, even when there are no tangible reasons for it to do so. Since continuous operations do not provide the necessary opportunity for detecting signs of overstretch, its consequences will surface at the most critical moment in conflict, leading to the force's inability to create decisive effects. An overstretched force will invariably face a decline in its ability to prevail over adversaries through the employment of sophisticated concepts of operations supported by adaptive and innovative tactics.

The reasons for a force to become overstretched are many and commanders at all levels must understand them and their nuances in relation to the peculiarities of their own force. Further, a competent commander will be able to recognise the reasons at their onset and be able to initiate remedial actions before the consequences manifest themselves. Constant vigilance is the only solution. The major reasons for a force to reach an overstretch situation could be one, or a combination of any, of the following:

- Long-term deployment fatigue.

- Simultaneous conduct of multiple campaigns that could lead to cascading detrimental effects on operational preparedness and personnel morale.

- Resource constraints that impinge directly on ongoing capability development projects.

- Maintaining long-term combat readiness posture that leads to increased stress in personnel.

- Gradual erosion of overall operational capability brought about by long-duration deployments and combat losses.

- Unforeseen escalation of the conflict in one or more theatres.

- Random changes in tempo and intensity of operation, especially if they are dictated by the adversary.

Small air forces are extremely susceptible to force overstretch. The necessity to maintain the necessary operational tempo and intensity, with the limited resources at their disposal and their inadequate strategic depth, makes them prone to being unaware of the spread of fatigue that rapidly dilutes operational efficiency. Continuous operations further create a situation of this discrepancy going unnoticed for long periods till it is brought to light dramatically in terms of failure. Much more than in large air forces, it is critical for small air forces to institute rigorous procedures that provide commanders with a realistic appraisal and evaluation of their capabilities and the actual operational competency of the force at regular intervals, even during ongoing operations. Small air forces, which lack adequate strategic depth, will not be able to recover quickly once a force overstretch condition has set in. Avoiding such a condition is of cardinal importance to maintain a small air force's performance at the desired level. Realistic campaign planning must take these factors into consideration to ensure its robustness.

Accuracy of Force Level Capacity Assessment

The assessment of force level capacity is one of the most important inputs into campaign planning. It influences the very basics of the plan in terms of what can be achieved and how capability is assessed against what needs to be achieved.

It is obvious that any plan based on an inaccurate assessment is bound to fail. While accuracy is absolutely essential, there are three major factors which make accurate force capability assessment a very difficult process. The factors themselves are vague and hard to define, increasing the overall difficulty in ascertaining the correctness of the process.

First, during times of extended peace, armed forces are likely to develop a slightly more accommodating attitude to diminished operational preparedness than when conflict is imminent. The assessments will tend to overlook deficiencies and discrepancies that would have an overall impact on the force's performance in actual operations, but could be almost irrelevant to routine peacetime functioning. The responsibility for such inaccurate assessments has to be shared by both the force being assessed and the assessment agency. The force is culpable for allowing the lowering of capability standards without remedial actions being instituted. The assessment agency perhaps is more to blame for succumbing to the complacency of peacetime evaluations that are slightly removed from operational paradigms and tend to perpetuate a false sense of adequacy in the force.

Second, governments are normally reluctant to admit, at least in public, existing shortfalls in the nation's military capabilities. The prevailing uncertainty of the security environment, domestic political compulsions and the short span of election cycles, when combined with the civilian leadership's general lack of knowledge of the military and unawareness of the long lead time needed to develop military capabilities, tend to exacerbate this situation. In a broader analysis, the perpetuation of a feeling of adequacy within the military and the political desire to not acknowledge deficiencies is a deadly combination that can spiral out of control if not contained in the very beginning. An unbiased appreciation of resident military capabilities is a foundational requirement for a nation's security and associated wellbeing.

Third, air power is derived from technology and its application has always been technology-enhanced. However, this reliance on technology can also become a drawback. Stemming from acceptance of the advantages that technology provides, there is a visible tendency within air forces towards over-reliance on technology to mitigate any performance shortfalls. Technology is also commonly used to bridge short-term requirements and overcome poor planning. This over-reliance on technology is a pitfall unique to air power and a trend that is often overlooked. Technology can provide short-term solutions to emerging capability gaps. However, if the gaps are not addressed with a view to long-term containment, they will become even more entrenched in the force. Campaign planners must have a clear understanding of these variables and challenges that affect the accuracy of force level assessment—a factor that is pivotal for the reliability of campaign plans.

Understanding Weapon System Capabilities

Realistic planning and successful execution of an air campaign is essentially centred on force level assessment matched with an understanding of weapon system capabilities. The understanding of weapon system capabilities—positives and negatives—has assumed greater importance in contemporary conflicts. This is because of the changed character of conflict wherein the adversaries choose to employ non-traditional techniques for the application of lethal force and conventional forces are compelled to restrain their responses to avoid collateral damage. The issue of collateral damage, when it is the result of the actions

of military forces, now has strategic political consequences and is almost outside the purview of the military. This situation demands that all commanders have a clear understanding of all weapon systems that are being employed in a theatre in order to minimise the likelihood of collateral damage and the potential impact it would cause.

Today the employment of air power capabilities has to be carefully orchestrated. Intelligent adversaries resorting to irregular warfare can and do blunt the effectiveness of technologically superior conventional weapon systems. In the recent past, air forces have inherently relied on precision strikes for achieving the desired effects in conflict. This had led to an overemphasised belief in the ability of potent, sophisticated, high-technology weapon systems to counter asymmetry, evident in the early phases of the ongoing conflicts in Afghanistan and Iraq. However, there is now a clear appreciation that this may not always be the optimum response in a low-technology environment. A clear understanding of air weapon systems and the effects—lethal and nonlethal—that they can create when applied optimally is a primary requirement for all campaign planning staff. What used to be traditionally a simple 'weapon-target match' has now been refined to a process requiring in-depth knowledge of not only the target and the weapon system but also the operating environment. A successful campaign plan will always incorporate sufficient checks and balances to avoid mission creep, escalation and unforeseen increases in force requirements by factoring in the limitations and advantages of available weapon systems.

Operational Challenges

In addition to the three major issues that influence all aspects of air campaign planning, there are a number of operational level challenges that are already apparent, which make the efficient application of air power an even more complex process than it

was in the past. These are bound to become contentious in the future, making them important enough to start investigating now. Each of these challenges has the capacity to create a totally debilitating effect on not only the air force but the entire joint military force. The more influential challenges include:

- the lack of warning time before a crisis erupts and the unpredictability of its characteristics;

- the definitive increase in the military command spectrum and its complexity;

- the surety of the operational use of artificial intelligence and robotics, and the associated implications for the laws of armed conflict;

- the possibility of information overload on commanders, especially at the strategic level of decision-making;

- the disruptive capacity of unconventional warfare on traditional power projection capabilities; and

- the need to be able to influence the cognitive domain, particularly the belief system of the adversary, in order to achieve the desired end-state.

Irrespective of the character of the conflict and the type of adversary, air power will be required to achieve a range of effects with discrimination, proportionality and precision. Air campaign planning is critical to achieving this. In all cases, the effects will be the benchmark on which the capability and relevance of air forces will be judged. It is therefore imperative for small air forces to comprehend this and incorporate robust planning processes into their strategic ethos.

Relevance of Small Air Forces

The challenge for air power is to maintain its relevance in a changing world.

Air Chief Marshal Sir Brian Burridge, RAF[59]

Within the broader framework of the history of warfare, even incremental improvements in warfighting capabilities have needed long gestation periods to mature. In comparison, the advent of aviation and its almost immediate employment as a military system was a far quicker process. Therefore, the rapidity with which air power brought about quantum changes in the conduct of war and the improvements in war-waging capability, while simply astounding, should not by themselves be surprising. Air power radicalised established warfighting concepts at a rate never before experienced.

Barring a few nonbelievers, the independence of air forces and their contribution to national security have been universally accepted. Further, at least for most of the 20th century, there has not been any serious doubt expressed regarding the long-term viability of these forces. However, in the changing global security environment and the uncertainty that it brings, this cannot be taken for granted. This situation has necessitated an unbiased analysis of the continued utility of air forces, especially ones that operate under constraints of resources that diminish their potential. There are a number of reasons that clearly indicate the need for an air force in the broader capability spectrum of military forces. These, however, need to be examined in detail

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[59]   Air Chief Marshal Sir Brian Burridge, as quoted in, Royal Air Force, *Air Power Review*, vol. 8, no. 1, Spring 2005, p. 20.

for two reasons. First, to establish the veracity of the reasons and therefore the continued existence of small air forces; and second, to debate and establish their relevance within national security, if only to establish the ubiquity of air power.

The relevance of an air force to national security is primarily dependent on its status. A large air force does not normally have to struggle to ensure that it is always considered an element of national power and considered at the strategic level of security planning as a critical instrument of the nation's power projection capability. The dilemma is with small air forces, buffeted by resource constraints that directly reduce their operational capabilities and in turn their contribution to national security. There are a number of factors and capabilities that small air forces must consider and attempt to achieve in order not only to stay relevant, but also to ensure that their relevance to national security is not questioned in the long term. Air forces are strategic arms of the nation and need long-term nurturing to be optimally efficient. Air forces that are only capable of producing short-term effects are likely to have their relevance at the strategic level of decision-making questioned.

The relevance of small air forces is predicated on a number of factors that have different levels of influence in lifting the status of the force. A majority of them are within the control of the air force itself, which means that if an air force slips into irrelevance it must itself carry most of the blame. Only the allocation of resources that directly affect the capabilities of an air force can be considered external to the force itself, although an effective air force should be able to influence even this function through indirect means. Some of the major factors that affect the relevance of small air forces are discussed below.

Instrument of National Power

Air power—and, therefore, the air force—will remain a major instrument of national power well into the 21st century.[60] However, this can only be achieved if the air force is able to correctly assess the changing national security requirements and adapt itself accordingly. In effect, this will have to be a continuous evolution of capabilities, functions and force structure in keeping with the nation's overall security needs. This evolution will also have to be carefully balanced against availability of resources since all small air forces will be operating within finite and at times strained resource allocations. In order to remain relevant as an element of national power, small air forces have to undertake the delicate task of providing adequate air power to national security—when, where and for the duration required— while keeping within the bounds of an often finite national outlay on the acquisition, maintenance and operations of its air power assets. By any standards this is a high benchmark, but one that small air forces will have to achieve if they are to stay relevant in the long term.

Flexibility

Air forces, irrespective of their status, have to be able to operate effectively across the broadest spectrum of conflict if they are to be considered a significant and potent element of the national security posture. This will require an air force to possess a broad range of capabilities and also the capacity to operate across the full spectrum of technology from the highest to the lowest end. This requirement will have to be contained within a realistic

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[60] Air Marshal Angus Houston, 'Key Note Address: 'The Future of Air Power – RAAF Response to the ADF Roadmap', in Keith Brent (ed.), *Network Centric Warfare and the Future of Air Power,* The Proceedings of a Conference held in Canberra by the Royal Australian Air Force, 16–17 September 2004, Air Power Development Centre, Canberra, p. 20.

capability spread. The answer to these conflicting requirements lies in ensuring that more than adequate flexibility is embedded within the force so that all built-in capabilities can be tailored on an 'as and when required' basis to suit emerging contexts.

High-end air power capabilities will continue to play a crucial part in shaping the nation's security environment, especially on a regional basis. The assimilation of high-end technology into the force and further having the capacity to operationally employ such technology optimally is by itself a challenging task, one that is not easily surmounted by all small air forces. The necessity to be able to ramp up or down across the technology spread of air power, as circumstances dictate, makes this almost reach the point of being impossible. Small air forces will often succeed or fail based purely on their flexibility.

Coalition Operations

The steady globalisation of the security environment directly impacts on the character and conduct of war. There is now a perceptible shift towards pre-emptive military campaigns that would normally be carried out by coalitions in an expeditionary mode. This shift directly influences the employment concepts of small air forces. In the future it is highly unlikely that a small air force will undertake any large-scale operations on its own, other than in a narrow regional context. The majority of operations that they would undertake would be as junior partners in a coalition led either by the United States Air Force or by a large air force. From a national security perspective, participation in such operations will be the primary and most important contribution—however minute the capability input of the small air force.

In order to operate within a coalition, of allies or partners, an air force needs to be sufficiently interoperable with other forces. This comes with sufficient peacetime training and participation

in multinational exercises. Interoperability therefore has a political side to it which a small air force must manage to ensure that, when the requirement arises, it is able to operate alongside allied air forces with minimum effort. Further, the small air force should be able to contribute a meaningful capability of the required standard to the overall coalition air effort. The nation will not only be proud of such an air force but consider it extremely relevant in the national security equation. At the air force level, mutual understanding and interoperability—in doctrine, concepts, tactics and rules of engagement—remain the foundation for the strategic relevance of small air forces.

Effectiveness

The relevance of all air forces is built around their paramount responsibility to provide the government of the day with first-rate air power. This involves being effective in operations across the full spectrum of conflict, ranging from provision of humanitarian support to high-end warfighting. Any failure to meet the government's basic requirements will push the force into irrelevance fairly rapidly. The capabilities to meet these demanding requirements are the same in large and small air forces. However, small air forces face the additional challenge of operating at or very close to critical mass, making it difficult for them to operate at the necessary tempo, intensity and concurrency for extended periods. They also have to contend

with the geostrategic reality of their individual nations that will require the independent tailoring of overall capabilities.

The effectiveness of a small air force is therefore dependent on a number of factors that in combination can overwhelm a force that is not constantly vigilant. On the other hand, only demonstrated effectiveness in all its undertakings will convince the government of the relevance of a small air force and ensure its continued status as an instrument of national power.

Joint Operations

Historically, joint forces have been found to be more successful than others who do not follow a joint approach. A joint force synergistically leverages off the individual environmental forces' competencies to produce a flexible multidimensional capability. There is little doubt that future campaigns will almost always be 'joint' in nature. This will be more the case with small military forces, since even in the current environment no single force will have the mass or resident capabilities required to achieve the strategic end-state in a campaign. Military forces of a nation will, out of necessity, have to encompass the concept of joint operations and move towards becoming a seamless force—one that in combining, produces effects that are larger than the sum of its parts and presents a seamless exterior to the adversary by minimising potential weaknesses in the links between participants. This is the only sure way to underwrite military success.

Air forces have the greatest impact of the three Services in making the military force truly joint in nature. By its ubiquitous nature, enhanced perspective and inherent flexibility, air power easily assumes the role of the binding element in joint operations, permitting effortless combination of disparate capabilities in a cohesive manner, focused on achieving strategic objectives. It is obvious that only a joint force will be able to prevail in a conflict,

and joint forces are heavily reliant on air forces for their ability to operate jointly. This underlines the relevance of air forces, small and large, within the context of military operations.

Technology Transfer

Air forces, being technology-driven and technology-sensitive, have a direct and indelible connection to the nation's industry base. While the aviation industry, especially the military developmental sector, is the monopoly of a few highly developed nations with large economies, nations that operate competent small air forces also have to nurture a minimum level of aviation industry to support them. Developing and operating a competent small air force is dependent on the nation's international standing as a responsible power. This makes it easier to import the necessary assets. However, their operational efficiency is dependent on a large number of factors, one of which is the availability of an adequately developed technology base to support air power capabilities.

Developing even a very limited aviation industry capability will entail the transfer of technology from the more advanced industrial base of the larger economies that sell air power systems. This is a positive move forward for the nation from all aspects. However, technology transfers by themselves do not constitute the improvement of indigenous industry. If the nation has a small air force of calibre, it will have the infrastructure necessary to absorb technology. Such transfers can have enormous effect in raising the standard of the receiving industry and indirectly the technical skills and educational levels. While this cannot be considered as directly affecting the relevance of small air forces, it definitely reinforces the need to maintain them, as a long-term positive influence on the industrial and educational prospects of the nation.

Conclusion

Small air forces, despite their operational excellence, will always face challenges that, if not addressed immediately and completely, will diminish their capabilities. Therefore, it is imperative not only to have clear visibility of current challenges but also to have the capacity within the force to anticipate oncoming challenges. In this chapter, four fundamental challenges have been identified and analysed. All of them exist now and will continue to challenge the wellbeing of small air forces into the future. All of them also have, individually and in combination, the capacity to debilitate even large air forces if allowed to spread without any tangible countermeasures being adopted.

The emerging security environment presents a multiplicity of threats and challenges, ranging from regional instability brought on by the actions of 'rogue states', to terrorism in all its guises, and conventional wars between states. In short, the environment is complex and uncertain. Recent history has graphically demonstrated that if stable nations are unwilling or unable to shape this complex environment, then the intelligent and adaptive irregular forces of insurgents, international terrorists and criminals will shape it to their advantage. This is neither desirable nor permissible in the larger global interest. It is in the collective interest of the community of nations to ensure that the emerging security environment is shaped into a peaceful, prosperous and stable one. Air forces—large and small—can and should play a vital role in this endeavour.

In the past two decades air power has added a hitherto unknown dimension to the concept of 'jointness' in the new air-land dynamics, facilitating a much more detailed integration of the two elements. Further, innovative employment of emerging technologies provides the capabilities for air power to dominate the entire spectrum of modern military operations. However, this comes with the caveat that only a full-spectrum capability

will enable an air force to perform at this level at the required tempo and intensity. In turn, this capability is neither easily procured nor is it easy to maintain in the long term without assured availability and access to adequate resources. This may not always be the case for middle power nations aspiring to maintain competent small air forces. There is an inherent dichotomy in the situation. To be competent, a small air force—with limited resource availability—requires a certain capability set; however, the same capabilities are expensive and not easily available. This will remain an eternal struggle for small air forces.

The challenges discussed in this chapter may not all be insurmountable. However, the degree of difficulty in ameliorating them will vary with each challenge, the particular circumstances and context of the air force addressing them, and the resources that a nation is willing to provide to ensure the good health of its air force. These are intangibles that could, and at times do, change on even a daily basis. Considering that successful air forces require long-term strategic outlook and planning, this extremely short-term demand brings a surrealist element into the whole process. For small air forces, already functioning under a myriad of constraints and struggling to meet their ever-increasing responsibilities, this could become the breaking point. Therefore, the wellbeing of small air forces can only be assured through their ability to appreciate even the most minute change in their circumstances, close monitoring of their ongoing performance and the built-in capability for immediate remedial intervention to ensure adequacy of performance.

6

Small Air Forces of the Future: Ingredients to Success

What do I see for air forces in the future? Quite frankly I see from the viewpoint of an air force commander, a very rosy future: smaller air forces certainly, driven by budgetary, demographic and arms control pressures, but air forces covering the full-spectrum of tactical roles; air forces packing tremendous punch with sufficient reach to be able to react in whatever region of NATO or theatre of the world required, with high quality crews trained to a very high standard and used to operating multinationally and globally; and all backed by lean but highly cost-efficient logistical support organisations. In short, I would argue that the era of tactical air power with strategic reach has arrived.

Air Marshal Sir Roger Palin [61]

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[61] Air Marshal Sir Roger Palin, AOC-in-C, RAF Germany and Commander NATO Tactical Air Force, at the Royal United Services Institute, London, 5 June 1990, quoted in Air Commodore Jasjit Singh, 'Into the 21st Century – Smaller or Larger Air Power: A Regional View', in Alan Stephens (ed.), *Smaller but Larger: Conventional Air Power into the 21st Century*, The Proceedings of a Conference held by the Royal Australian Air Force in Canberra, 25 March to 27 March 1991, RAAF Air Power Studies Centre, Canberra, 1991, p. 107.

The world today is volatile, even if there are large areas of comparative peace and stability. The reason for this is the ease and rapidity with which instability can spread from one area to another, primarily because of the globalised nature of economy and trade that interconnects the security interests of nations even if they are geographically distant. Stemming from this, there is an ongoing reappraisal of what constitutes the safety and security of nation. Most stable nations have already replaced, or are in the process of replacing, the philosophical doctrine of national defence with that of a broader concept of national security. In this rather amorphous situation, the role of military forces in ensuring national security is changing dramatically.

It becomes obvious, even in a casual analysis, that the move away from the traditional concept of national defence has also brought about a corresponding change away from the manner in which the military forces had so far conducted themselves. Even though the military continues to remain the primary instrument of national security—even within its modified definition—its employment practice and means of achieving the desired end-state have altered considerably. The traditional practice was for the military high command to seek political directions on the end-state that was being sought, plan the campaign accordingly and then efficiently execute it on their own. Other elements of the government did not contribute to the defeat of the adversary in any direct manner.

This has changed dramatically in the contemporary security environment. Today national security is viewed as an issue that should be addressed collectively by all elements of national power in what has come to be termed a 'whole-of-government' approach to national security. In this approach, although the military is still a critical element and also the first option of choice in most cases, the lead in the overall campaign may be another government agency. In effect, the military will have to function within a system comprising all elements of the state to

achieve an end-state that may change during the course of the campaign itself. Challenges to national security have not only become complex, but are intertwined with political paradigms more than ever before.

As enduring and critical elements of national power, military forces and air forces within them will also be faced with all the challenges that any military force will have to overcome. In addition, air forces will also have to address issues that are unique to them. The overlap and interplay between these two sets of challenges will be varied and make the solutions complicated to apply. However, they have to be addressed and nullified to first guarantee the efficacy of an air force and thereafter for it to remain a potent element of the national security apparatus. Successful air forces will always be aware of this need and will meet it comprehensively.

There are many characteristics—some easily discernable and others that are obtuse and nuanced—that distinguish a successful small air force from others that struggle to establish not only their status but at times also their independence. Being a successful small air force involves dedicated and continuous effort that will normally consume most of the force's primary, and even reserve, capacity. Therefore, small air forces that struggle to obtain such a status face an unfortunate situation. A major proportion of their overall capacity would be diverted to ensure that their current status is not degraded. This could mean that, being small, they may not have the spare capacity to utilise towards improving the force's capabilities. However, constantly upgrading the resident capabilities of the force is critical to its success. It is necessary here to understand the very thin line that separates the successful and not so successful small air forces and appreciate the delicate balance that has to be maintained in the allocation of capacity—to retaining current capabilities and to future improvements—for these forces to retain their status. Small air forces do not normally have any spare capacity and

are reliant on the inherent flexibility of air power to meet all the demands placed on them. The conundrum is that the very lack of spare capacity also curtails the built-in flexibility of a force. The balance between adequate flexibility and constant improvement is very delicate.

The primary characteristics that have the maximum influence on the capability of a small air force can be identified as doctrine and its development, professional mastery, logistics, training, personnel management and quality of air power. Within these six major characteristics a number of minor traits can be identified. However, failure in any of these six areas would automatically lead to strategic failure and make the position of a small air force untenable. Carefully moulding these characteristics will lead a small air force to success, the indication of which will be its ability to create strategic effects in the national security arena.

Doctrine and Its Development

An articulated and well-understood philosophical doctrine is the foundation on which the success of a small air force is built. There are two aspects to analysing the influence of doctrine. First is the doctrine itself and its reliability, which is of the utmost importance to the success of the force. A number of core functions of the air force will be directly influenced by extant doctrine—making its correctness and applicability to the force-in-being critical. The second aspect is the doctrine development process that is followed in a force. Reliability of doctrine is directly dependent on adhering to a laid down and viable development process. Since all air forces operate in conditions that are unique to their nations and their security environment, it is necessary for the development process to be aligned correctly with these extraneous factors. Doctrine and its development process are two sides of the same coin and are both equally critical to the success of small air forces. This is because

small air forces neither have the capacity to absorb failure nor do they have the ability to rebuild rapidly from failure. The necessity to get both doctrine and its development process right is a paramount consideration in ensuring the success of an air force.

Doctrine

Philosophical or strategic doctrine underpins the development of operational and tactical level doctrine. The operational success of a small air force—an absolute necessity for it to be strategically effective—is a function of high calibre operational level doctrine, well aligned to national security objectives through a robust strategic doctrine. This is a connection that must be ensured at all times and can only be lost at the greatest risk of failure at the operational level of conflict. Doctrine provides the mechanism to keep the operational level objectives aligned with the broader campaign aims and grand strategic security imperatives of the nation.

A comprehensive and time-tested doctrine will provide a set of principles that can be used to create possible solutions to issues that are likely to arise in the course of operations. The probability of previously unknown issues emerging in the course of a conflict has increased with the complexity of the current security environment and also because contemporary conflict throws up a large number of uncertainties. Some of these could have been considered in planning but a majority will surprise even the most prepared force. It is in these circumstances that a robust doctrine will be able to provide some direction to the course of action to be adopted. A small air force well versed in doctrine will be better able to react to unforeseen circumstances than one with inadequate doctrine. While it cannot ever completely mitigate all unknown issues, doctrine provides the essential background to the force to deal with the uncertainties of conflict. Success is dependent on rapid adaptability to emerging situations, which is a capability that good doctrine inculcates in the force.

High-quality doctrine is the product of a number of inputs, one of them being the historical experiences of the force. While doctrine by itself is not a 'lessons learned' analysis, it does take cognisance of the force's experiences in all aspects of its operations and strategic decision-making. In effect it distils the overall experience of the force—operational, personal, procedural, equipment, logistics and a host of others—to assimilate the lessons as a guide for the current force and a foundation for the force's future. This will indicate the best practice possible under the contemporary conditions and provide the force with an opportunity to adapt it. For small air forces this will lead to the optimal employment of their limited assets, increasing efficiency and their chances of success.

Doctrine examines and defines the responsibilities of a small air force that in turn lead to the delineation of its roles in relation to the military and national security campaign. With the understanding of the functions, in the classic 'form follows function' convention, the force's structure is developed and the necessary capabilities identified and acquired. Doctrine, therefore, is the starting point for the cohesive development of an air force of calibre that will be able to contribute effectively to national security—a primary requirement for success. Essentially, doctrine provides the fundamental basis for creating the right organisation for the force to think and fight its way to victory.

Doctrine is also one of the foundational requirements for an air force to achieve professional mastery. Professional mastery is a combination of a large number of factors, some that can be clearly measured and some that are almost totally elusive and indefinable. The proficiency with which any activity is conducted in an air force is generally indicative of the level of professional mastery resident in it. However, an accurate assessment of the professional mastery of a force as a whole is difficult to carry out. Professional mastery, or the lack of it, will only be displayed conspicuously in times of crisis and conflict, when it may be too

late to initiate remedial measures in order to overcome shortfalls. Well-defined doctrine is the first step towards a holistic approach to professional mastery which is a cornerstone for success of small air forces.

Doctrine Development Process

Getting the doctrine development process right is as important as having reliable doctrine. Doctrine, even at the strategic level, is a dynamic entity that needs almost constant finetuning to stay aligned with constantly evolving national security priorities. This requirement manifests in two different ways, each equally important and in need of constant monitoring. First, changes in the national security assessment provide a top-down input to doctrine; and second, influences external to national security that affect doctrine development will have to be accepted without disrupting the alignment.

A very cautiously developed doctrine development process will adhere to certain fundamental principles. First and foremost is that the doctrine should be indigenous, which means that it must be developed for the needs of the air force concerned. For a considerable period in the development of air power this was not the case and air forces, even those of calibre, borrowed other air force's articulated doctrine, adopting it without any change. Philosophical doctrine must be able to mould the strategy and concepts within the air force. In order to ensure that this influence is appropriate, it is necessary for the doctrine itself to be shaped by, and be in harmony with, the grand strategic defence policies of the nation. An adopted doctrine will never achieve this to the extent required, making it imperative for a small air force to have its own doctrine, perhaps shaped or informed by the doctrine of allies to improve interoperability.

Second, doctrine should be explicit and at the strategic level kept at the unclassified level. It should be explicit to avoid any

confusion that could arise from varied interpretations and also to ensure that there is common understanding across the force and between different Services regarding the fundamentals that shape the air force. It should be unclassified for two reasons. One is that the doctrine articulates an air force's role within the broader arena of national defence and therefore, should be available to all elements of national power. Two, small air forces are very susceptible to public opinion making it necessary to influence public perception regarding their contribution to national security. A well-conceived doctrine should be able to achieve both these objectives.

Third, doctrine should encompass both change and continuity. This is particularly important for air forces, especially small air forces. The development process should be able to evaluate emerging technologies and their influence on the employment of air power. Technology can and will exert pressures that could lead to doctrinal changes. However, in the case of air forces this must be counterbalanced by the enduring principles that strengthen the application of air power. Continuity during change is a very visible part of doctrine development in air forces. Small air forces need to take a measured approach to prematurely accepting technology-driven doctrinal changes that may skew the development process to the larger detriment of the doctrine itself. The safer option in such situations will always be to seek the thread of continuity until the technology has been proven and accepted into the air force capability spectrum. On the other hand, small air forces must also retain the agility to integrate fast-emerging technologies in order to maximise the technology advantage.

Fourth, air force doctrine must be able to influence joint doctrine. For this to occur, the development process must itself be complementary to the joint doctrine development process. It must also consider the other environmental doctrines and their development processes to ensure that fundamental inputs such

as national defence policies are consistent in all cases. Those who conduct the development process must at all times be consciously aware of the interdependence of strategic doctrine within the ambit of national security. This does not mean that one or the other Service doctrines will be the driving factor in the joint development process, but that each one must be in harmony with the others. Failure to achieve the necessary level of synchronisation could make the joint doctrine development process, and with it the doctrine itself, unviable and tangential.

Professional Mastery

> *The end for which a soldier is recruited, clothed, armed, and trained, the whole object of his sleeping, eating, drinking, and marching* **is simply that he should fight at the right place and the right time**. *[Emphasis in original]*
>
> Carl von Clausewitz [62]

Professional mastery is the sum of an individual's knowledge and understanding of air power along with the experience gained over a career. This individual mastery of air power when viewed collectively for the whole force creates a valuable body of holistic knowledge and experience for the air force. Higher level leadership plays an important role in converting individual mastery into organisational mastery through the provision of enduring vision, guidance and the processes necessary for the

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[62]   Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret, Princeton University Press, Princeton, NJ, 1976, p. 95.

force to evolve and operate.[63] Further, professional mastery also has a moral, ethical and intellectual aspect to it.

Professional mastery of a force as a whole is dependent on a number of factors, all of them based on the development of its personnel to the required level of competence through training and education. Professional mastery creates the confidence necessary to combine the skills and knowledge of individuals to form a whole and then to envelop it with experience to match the overall capabilities of the force to national security imperatives. It also constitutes a number of characteristics that can be clearly identified. Admittedly, these characteristics are unquantifiable but their assessed adequacy, or otherwise, will indicate the level of professional mastery of an air force.

Education Process

Development of the necessary level of professional mastery in all personnel is both an institutional as well as individual responsibility. This depends to a great deal on two equally important factors. One, the educational model being practised in the force; and two, the priority being placed on the educational process by the strategic leadership of the force. The educational model has to be de-linked from the foundational training necessary in military forces and must have a visible continuum from the lower levels all the way to the senior ranks. At the tactical level it is often said that whatever is emphasised by the commander will be the priority of the unit. This is also true when extrapolated to the whole force, wherein the strategic leadership's support to a certain activity will make that a priority. Therefore, direct support for the educational process from the strategic leadership is essential to ensure its success. Without

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[63]   Royal Australian Air Force, Australian Air Publication 1000–D—*The Air Power Manual*, Fifth Edition, Air Power Development Centre, Canberra, 2007, p. 18.

such support to the educational process the force will not be able to derive its benefits, however well constructed the process may be.

Small Air Force Peculiarities

Small air forces need their personnel to possess a higher level of professional mastery for a number of reasons. First, they function at the critical mass most of the time, especially when they are engaged in actual operations. This itself requires a higher level of command capacity to ensure that the force is being optimally employed at all times. Further, operating at the critical mass has its own unique issues in terms of personnel rotation, training etc. If these issues are poorly managed, the likelihood of operational fatigue with the associated decrease of overall efficiency is very high. Second, the raise, train and sustain function that has to be conducted simultaneously while operations are being conducted places an extra burden on the professional mastery of the force across all levels. Third, small air forces may not have the strategic depth—in terms of availability of personnel to be spared for education—to elevate the necessary number of people to the required professional standard. This is a peculiar problem that small air forces face and if not carefully managed could lead to a continuous decline in the capability of the force to develop professional mastery, with disastrous results. There is an inherent dichotomy here. On the one hand, professional mastery is one of the principal factors that ensures the competence of small air forces and on the other, by virtue of the same 'smallness', they find it difficult to grow the required level of professional mastery.

Small air forces need to be aware of this challenge and must consciously make efforts to ensure that the education process is correct and that they are growing professional masters at all times across the entire force.

Moral Courage

One of the challenges that face leadership at all levels, even beyond the military command structure, is the requirement for individual moral courage in discharging their responsibilities. This is a crucial input in decision-making at all levels, the correctness of which is in turn critical to the successful conduct of all activities. Moral courage at the grand strategic level of government is a prerequisite for the success of all national security endeavours.

Moral courage is not a quality that is exclusive to air forces or, for that matter, any particular area of government. It is a quality required across the spectrum of decision-making and management. The unique characteristics of military operations make moral courage critical to the success of command at all levels. History is replete with examples of failed military campaigns brought about by the lack of moral courage at the command level to accept and/or remediate the capability deficiencies in the force, to identify and accept the disconnect between capabilities, doctrine, strategy and concepts of operations, to make tough but necessary decisions in a campaign, and to be realistic in setting the desired end-state. Of particular importance is the moral courage necessary to provide pragmatic advice to government regarding the likelihood of success or otherwise of a campaign being planned. The level of moral courage required in this instance is of a very high order.

Moral courage is not a quality that can be introduced and grown in a short time frame. Further, the possession or lack of this quality is demonstrated only when it needs to be applied, thereby precluding any preparation that can be made when circumstances need it. Therefore, it requires careful nurturing over time, through visible evidence of the exercise of moral courage by commanders at all levels and also the acceptance by senior leadership of junior and middle-level leaders exercising it. This is particularly important when the force is in extended

periods of peace. In a true democracy, the exercise of moral courage at the highest levels of national leadership and military command can only be achieved when there is transparent and proven mutual trust and confidence between civilian and military leadership. Such confidence will buttress the moral courage of the military leadership to provide free, frank and diligent advice—however unpalatable it may be—regarding the status of the Services and their capability spectrum to government. The military leadership will have to establish a degree of trust within the government to ensure that such advice is valued for its honesty. Within the military hierarchy, the same principles apply for the interaction between different levels of command. Moral courage is especially important during the ultimate test of a military force—when engaged in armed conflict.

Even though moral courage is not unique to air forces, it is a critical element in the development of their professional mastery and in a cyclical fashion can only be truly exercised if an individual is confident of the level of his/her professional mastery.

Learning Organisations

The stark realities regarding the current and possible future security environment are that the challenges are becoming increasingly varied and complex, while the solutions to them are becoming more resource intensive and almost completely intertwined with political paradigms. Within the force, the means to achieve these solutions are becoming more complex as new technologies emerge. Successful air forces will not only be aware of this convoluted situation, but will also address the challenges proactively. If this is not the case, small air forces— and even large ones who fail in this aspect—will rapidly face irrelevance. In order to stay relevant, small air forces have to, by design, transform themselves into innovative, adaptive, learning organisations. A common and fundamental characteristic of

competent air forces, large and small, is that they are all, without exception, learning organisations—albeit in different stages of development—able to operate innovatively at the cutting edge of technology, concepts and doctrine.

The one single essential ingredient to ensure that air forces become and remain learning organisations, able to shape the security environment, rather than being reactive to emerging challenges, is professional mastery of their personnel. By being a learning organisation, a small air force ensures its success at the strategic, operational and tactical levels and preserves the flexibility and inherent aptitude to adapt to even unforeseen circumstances more rapidly than the adversary thereby retaining the initiative at all times.

Masters of Air Power

Professional mastery is the stepping stone for strategic leaders to become masters of air power. A master of air power will be able influence the strategic decision-making process of the nation regarding security issues. Further, only masters of air power are able to transform a small air force of operational and tactical excellence to a force capable of creating strategic effects. Creating strategic effects is an involved and difficult process that can only be achieved by a small air force if it possesses certain qualities and has the capacity to evolve by itself into a force of influence through concerted efforts. A small air force must be consistently able to excel in operations, have sustainability in terms of its capacity to maintain an acceptable level of operational tempo, retain the capability to accept random increases in the intensity of operations and be able to synergise its different capabilities to produce air power of the desired quality. In addition, a small air force of calibre will also have mature and articulated doctrine, clearly defined strategy and a viable concept of operations that has the built-in flexibility to adapt rapidly to changing circumstances.

Masters of air power need not always be operating at the highest level of national decision-making. In fact, when functioning within the air force they are the indelible link that ensures the wellbeing of small air forces through the proficient application of adequately developed professional mastery. This link is of cardinal importance in the process of transformation of small air forces. Without adequate mastery of air power resident in the force—through personnel with a high order of professional mastery at all levels—the process would be difficult to effectively craft and implement.

Masters of air power are at the apex of professional mastery, which is the single quality that distinguishes the leadership of a small air force of calibre from others that are not. With leadership that has achieved mastery of air power and adequate professional mastery vested in itself, a small air force has a very good chance of achieving the transformation that will perpetuate its relevance to the national security environment and calculations.

Logistics

> *Logistics arrangements and systems must be flexible enough to support changing missions, evolving concepts of operations, and the dynamic situations that characterise Air Force operations.*
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> AAP 1004—Air Force Logistics Support Concept[64]

Logistics is the deliberate organisation of equipment, its maintenance and the associated resupply of spares and

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[64]   Royal Australian Air Force, Australian Air Publication 1004—*Air Force Logistics Support Concept*, First Edition, Director of Logistics, Air Force Headquarters, Canberra, 2004, p. 15.

consumables like fuel, oil, water and ammunition.[65] Logistics is perhaps the most critical of support functions that keeps the military forces operating effectively. A well-defined and efficiently functioning logistics support network has historically been considered critical to the success of a campaign and, precisely because of this criticality, as one of the centres of gravity to be attacked for maximum effect. The spread of the logistics network, even when operating from home base, is very broad making its assured protection a difficult task and increasing its vulnerability to dedicated attack.

Logistics Planning

One of the most important aspects of campaign planning is logistics planning, which must be considered as the first priority even before operational planning is commenced. There are four major factors that must be considered in the logistics planning process. First is the adequacy of materiel and its assured availability. Both these elements are of crucial importance to all forces but are of special significance to small air forces. Adequacy of materiel, in terms of quantity, is a requirement that small air forces may not be able to fulfil on their own. The dependence of most small air forces on external sources for their materiel requirements places an added strain on the planning process. Stockpiling equipment and accessories to ensure calculated adequacy for the duration of the campaign may not always be a viable option because of financial, procurement and warehousing constraints. In the case of air forces, wherein the equipment is more likely to need specialised handling and storage, and may have limited shelf life, this option becomes even more difficult to implement. The assurance of availability of equipment is an even more vexed issue for small air forces. Availability of spares and

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65   Ian MacFarling, *Air Power Terminology*, Aerospace Centre, Canberra, 2000, p. 71.

the like from allies has a political dimension to it and, therefore, the air force alone cannot mitigate the challenge. However, it has to be borne in mind by all planners that small air forces can be debilitated by the stoppage of spares and 'rotables' from the source, even at mid-stride during a campaign. There are no easy solutions to this challenge, other than to tailor the air power requirements of a particular campaign to what can be realistically produced within the available logistics support.

Second, planning must decide on a fallback option if the logistics chain is broken, either through enemy action or because of other reasons. Building redundancy in logistics is not an easy task and involves expending a large amount of resources. This will definitely not be a luxury that small air forces can afford. From a small air force perspective, structuring the base level operational unit to have a certain level of stand-alone capability could provide a part solution to the breakdown of the logistics supply chain. However, this cannot provide an open-ended assurance of operational capability.

Third, logistics planning must consider the size of the force to be supported. There is an inherent advantage and a disadvantage in a large force. By virtue of its size, a large force will have strategic depth in logistics, which can be leveraged in situations where the normal logistics chain is faltering. This is a great advantage and could in extreme cases be the difference between victory and defeat. However, a large force has the inherent disadvantage of needing a large volume of logistical support to operate at the required levels of efficiency. If not carefully planned this could overburden the logistics chain, leading to failure. The advantage that is evident in the size of the force should be used to offset the disadvantage, and logistic supply should be cautiously monitored to ensure that the chain is not overextended while continuing to have a minimum strategic depth.

Fourth, the nature of operations being undertaken by the force will have a salutary effect on logistics planning. In this respect, expeditionary operations will be on one end of the spectrum in terms of logistic requirements and degree of difficulty in ensuring adequate supply. The other end of the spectrum will be operations mounted from established peacetime locations. In supporting expeditionary operations, logistics planning must consider three separate inputs—the provision of logistics to forces in operations must be timely, the logistical chain and storage facilities must be secure, and increased personnel requirements must be considered.

Timeliness of supply may necessitate sustainment of the force through airlift. However, airlift is a high-demand capability and may be difficult to obtain on immediate or short-term time frames, unless specific pre-planning has been done to cater for such eventualities. Planning must incorporate sufficient redundancy in quantity to cater for the possible non-availability of transportation. Security of the chain and storage facilities is a prime consideration. In certain circumstances it may be more secure to maintain the chain completely through airlift, even at the extra cost that such operations entail. Location of storage facilities and their protection will also depend a great deal on the prevailing circumstances vis-à-vis the local support or otherwise for the expeditionary force. Expeditionary operations will always need more personnel than otherwise. This requirement is in direct contrast to the trend in small air forces to outsource as much of the maintenance, and even the provision of air transport, as possible to reduce costs. Such outsourcing will allow a small air force to maintain a smaller air transport 'mass' but will also restrict the number of personnel available for operational deployments, especially to combat zones. When combined with the requirement for storage and base protection, this restriction could effectively constrain the overall capability envelope of a small air force. Success in expeditionary operations depends on

being aware of these logistical limitations and preparing possible actions to circumvent them in advance.

Industry Considerations

Indigenous aviation industry—its status and capabilities—has a direct impact on the logistics of air forces. A nation with a vibrant aviation industry will obviously be better able to support air force operations, expeditionary or otherwise, than a nation without one or with an industry of very low capacity. This factor is outside the direct influence of the air force and to a certain degree will depend on the level of technological advancement of the nation as a whole. Small air forces must monitor the industry input, at whatever level it may be, to ensure that it can be optimally used to improve the logistics situation. This monitoring will also permit small air forces to identify opportunity areas and prioritise the requirement for non-indigenous support. Domestic industry can also play an important role in the overall maintenance support for air forces. This is particularly important for small air forces that need to retain expeditionary capabilities to be effective elements in the national security apparatus.

Air forces are materiel organisations dependent on complex infrastructures for the efficiency of their logistics network. To succeed, air forces need their logistics to be robust and reliable. A carefully planned and developed logistics infrastructure can by itself enhance the effectiveness of an air force and pave the way to victory in battle. While assured logistics by itself does not guarantee success, the lack of logistics infrastructure will lead to failure in the long term.

The corollary to this is that, in conflict, logistics is also the weak link in the system and can very easily become the air force's own centre of gravity. The protection of logistics infrastructure, both physically and virtually, therefore assumes critical importance. Success and failure of an air campaign are both

equally dependent on the level of availability and the strength of logistical support and infrastructure.

Training

The only thing more difficult than getting a new idea into the military mind is to get an old one out.

B. H. Liddell Hart [66]

Training is the process that provides the workforce with the skill set necessary to carry out designated tasks. It involves imparting instructions and a learning process that creates the ability to undertake skilled work and is normally based on practical issues. In the air force the operation of complex equipment such as aircraft requires training of a high order for the personnel to be effective and efficient in the roles that they have to perform. Training is aimed at excellence at the tactical and operational levels. When operational excellence is further enhanced with education, personnel make the transition to professional mastery at the required level. However, realistic training is a foundational requirement for an air force to function at the necessary level of competency.

Small air forces face a daunting challenge in terms of the adequacy of training. They normally do not have the luxury of maintaining extra numbers of personnel and are almost always operating at or very near critical mass. Training is not a one-time feature and personnel require regular on-the-job and refresher training to maintain the edge in their learning process. A small force

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[66]   B.H. Liddell Hart, *Thoughts on War*, Faber and Faber, London, 1943, p. 112.

operating within the constraints of limited numbers will find it difficult to release the required personnel for training without a detrimental effect being felt at the field level of operations. This lacuna will become even more pronounced when the force is actively involved in operations. The effectiveness of training under these circumstances will be directly proportional to the balance that a force will be able maintain between operational and training commitments. Small air forces will be successful if they can maintain a small buffer between the requirements of personnel numbers and their availability.

The other factor that is dependent on training is procedural interoperability with allies and coalition partners. There is very little doubt that most future operations of small air forces will invariably be as part of a coalition. This will need a minimum level of interoperability with the air forces of allies and coalition partners. Training is the underpinning requirement that permits interoperability between air forces. This is so even when the forces are operating the same equipment and especially important if they are not. Interoperability is based on the understanding of each other's doctrine, concepts of operations and tactical procedures—all of which improves with constant training and practical exercises.

Coalition operations are complex and their success can never be taken for granted. In fact, lack of training and poor interoperability could lead a coalition to defeat, even if the constituent forces are by themselves of a high calibre. Small air forces may also have to take the lead in coalition operations dependent on circumstances and context. Therefore, the training regime has to be adaptable and flexible to cater for contextual interoperability needs. This is once again a stress-laden situation for small air forces because, if it is not carefully handled, it could lead to failure and the collapse of the coalition itself, thereby contributing to the strategic irrelevance of the small air force.

The appropriateness and effectiveness of training is difficult to measure accurately. Inadequacy of training will only become apparent when failure occurs, by which time it will already be too late to initiate remedial action. Small air forces, perhaps more than larger ones, are critically dependent on a high standard of training for their efficiency. However, they also face the issues of simultaneous sustaining operational and training responsibilities with limited extra resources and personnel. Selection and retention of personnel with the right attributes and calibre is one of the primary inputs to a successful small air force's overall capability. Further, flexibility and depth in the training regime and the operational concepts are cardinal to a small air force's success.

Personnel Management

I will start my discussion with a statement: Our people are the Air Force.

Air Commodore John Blackburn[67]

In the current environment in which a majority of air forces are volunteer forces, personnel management—which includes recruitment, training and education, career management and retention—is vital to the sustainability of small air forces. The selection criteria and process for entry into a small air force are,

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[67] Air Commodore John Blackburn, 'Knowledge in the Australian Theatre – Air Power: Our People, Their Knowledge', in Wing Commander Keith Brent (ed.), *Air Power and Joint Forces,* The Proceedings of a Conference Held in Canberra by the Royal Australian Air Force, 8–9 May 2000, Aerospace Centre, Canberra, 2000, p. 153.

by necessity, more rigid than in the case of other employment opportunities. When combined with the total remunerations being only at the national average level, it becomes difficult to attract competent personnel in the required numbers. All modern air forces suffer from being undermanned, especially in critical areas that require dedicated and long-term training. While it may not be possible to mitigate this shortfall completely, except in times of national security crisis, proactive personnel management will be a significant contributory factor in increasing the retention level within the force.

Strength to Establishment Ratio

A primary function of personnel management is to ensure that a laid down minimum number of personnel to match its force structure design is maintained at all times. This is of critical importance to small air forces because any shortfall from the minimum requirement would be unsustainable and the force would enter a downward spiral in personnel terms. Larger air forces may be able to overcome such shortfalls for a certain period of time, which could provide the time necessary to increase the personnel numbers. The minimum strength that provides sustainable capabilities to a small air force is influenced by a number of factors, both quantifiable and intangible, like operational deployments and their length, training schedules, separation rates, perception of the public regarding the status of military forces, national ethos in terms of security perceptions, and the role of the military in the national security debate. Personnel management is intricately involved in extrapolating these considerations to the current and future force. Success lies in being able to minimise the challenges and optimise the utilisation of personnel through innovative means.

Quality of Intake

Small air forces have to be much more discerning in the selection, training and retention of their personnel when compared to larger forces which could afford to lower their standards in a limited manner if circumstances so demand. This is because large air forces are able to assimilate a slightly lower calibre of personnel, perhaps on a limited basis, without suffering any noticeable fall in performance, purely because of the larger total numbers involved—provided they have a core of high-quality personnel. Small air forces cannot exercise this option without suffering long-term detriment to their overall capability.

The limited numbers in a small air force automatically means that individual flexibility and adaptability of personnel are important qualities to be nurtured. These qualities will permit multiskilling of personnel which increases the virtual mass of the force, providing a large return for very limited inputs. This is an option that small air forces must regularly consider to mitigate the challenges brought about by limitations in personnel numbers. It must be noted that the time and effort required to bring a force back to its original capability level after it has suffered a setback would be more than double of the time it took to go down. Personnel management encompasses the entire spectrum of activities and is an extremely important function in small air forces. It can be said without doubt that the calibre of a small air force is directly dependent on the effectiveness of the personnel management within it.

Connection to Training

A force-in-being has to continuously train people to be inducted into the force to replace personnel lost, mainly due to natural separations. In most air forces, training is conducted by a dedicated training command or group. This ensures that there is continuity and that the training process is always being undertaken, even when the force is fully deployed. For small air

forces this could become a stretching point and there will be instances when the leadership is tempted to adopt one of the following two options. First is the temptation to halt the training process so that the experienced trainers may be deployed on operations. This will always be done with the intention that the stoppage of training will be for a very minimal period of time. However, this will rarely be the case and such a move is fraught with pitfalls, invariably leading to an unsustainable situation vis-à-vis replacement of personnel.

Second is the approach to reduce the duration of training so that more numbers are available to be inducted into the operational force. Reduction in the duration of training will definitely produce larger numbers; however, the non-quantifiable dilution in performance of the new trainees will eventually percolate through the force as a whole, downgrading the overall capacity.

It is the function of personnel management to ensure that the force does not commit either of these blunders. Both the options discussed above will manifest in a rapid deterioration in the sustainability of operations and the force's overall capability when they occur in small air forces already operating at significant personnel stress. The ability of a small air force to absorb the vagaries of the loss of assured induction of trained personnel is extremely limited. This must be clear to the entire leadership and it is the responsibility of the personnel management division to ensure it.

Managing Separation

In all-volunteer forces separation—voluntary or forced—will always be an issue. Both will have to be managed differently. Voluntary separation is almost always the result of some level of dissatisfaction, at the personal or professional level, and it is the responsibility of personnel management to analyse the reasons and institute remedial measures to reduce the level of

such separations. On the other hand, forced separations need to be carefully managed with a view to ensuring that the Service's image is not affected in the general public through adverse inputs to the media regarding the reasons for such separations. However, the personnel management organisation will need to resort to such separations to ensure that non-performing personnel are discharged to enhance the total capability of the force.

Personnel management is the one function that bridges the continuum from the induction or recruitment process to sustainment and separation. There is obviously a direct connection between the two and managing the relationship is important to maintain the necessary balance, not only in terms of pure numbers but also in terms of corporate knowledge and strategic depth in operational capabilities. Effective management of this constant, ongoing process is crucial in small air forces with very limited spare capacity to absorb unforeseen personnel issues.

Air forces in general tend not to lay sufficient emphasis on personnel management issues. A large air force may be able to function satisfactorily with minimal inputs from this function, but a small air force will fail if its personnel management function is not first-rate. This is an area that is not sufficiently highlighted or optimally managed in a number of small air forces. Close examination of such air forces always indicates the influence of the mismanagement of personnel on the overall deficiencies that become apparent when they deploy for operations.

Quality of Air Power

All the ingredients to success contribute, individually and collectively, to producing air power of the desired quality and creating an organisation that has the ability to apply it efficiently when and where required. This arrangement has to be clearly understood by all practitioners of air power. It is not a difficult endeavour to evolve the capacity to produce quality air power, provided the necessary resources are made available. However, building and sustaining an organisation—an air force—that can effectively apply this air power to create the necessary effects, from strategic to tactical levels, is an arduous task. The quality of air power delivered is dependent on the judicious combination of both these elements. In the case of small air forces the need for the organisation to be robust is far greater than in large air forces for two obvious reasons.

First, the wherewithal to produce the desired quality of air power is resource intensive and must therefore be carefully nurtured. The flexibility inherent in air power can only be exploited by an organisation that can leverage it properly. The fact that the quantum of air power available to a small air force is finite makes the requirement for the organisation to be adaptable more urgent and immediate. Second, the shortfall in the quality and/or quantity of air power that a small air force generates can be somewhat ameliorated through organisational flexibility in applying it. Small air forces must lay great emphasis on their organisational structures adapting in a contextual manner for the unique requirements of each nation. This requires constant finetuning of the organisation in order to keep it aligned with the broader national security requirements.

The other factor that will directly influence the quality of air power that an air force produces is its ability to sustain operations. The effectiveness of air forces is measured on their ability to operate concurrently in separate theatres and retain

sustainability in simultaneous operations. Although the words have very similar meanings, concurrency and simultaneity in terms of air operations are not exactly the same, even though the characteristics overlap a great deal. Small air forces will always be strained by the need for concurrency in operations because this entails operating in different theatres that require independent administrative and support capabilities. This requirement will be beyond the capacity of most small air forces, thereby putting extraordinary strain on their resources. On the other hand, competent small air forces will have the resident capability to conduct simultaneous operations for a limited duration. Small air forces will always be constrained by the period of time that they can sustain operations. Therefore, the capacity to sustain—both in terms of time frame and effectiveness of power projection—both concurrent and simultaneous operations will be the measure of the capability of a small air force.

It is clear that small air forces will be constrained in the amount of air power that they can bring to bear in any given circumstance as well as by the duration for which they can sustain the necessary intensity and tempo of operations. This is a limiting environment within which to function, even at the best of times. Under the current circumstances of uncertainty and changing global security situation, small air forces will be hard-pressed to fulfil all their responsibilities. It therefore becomes important for them to always be employed at the right time and place if they are to create the effects that will contribute directly to national security. Failure to achieve this optimisation will invariably lead to dissipation of the force's capabilities, which is something that a small air force can ill afford.

Within this almost rigid environment in which a small air force is employed, two major factors contribute to ensuring its success; first is for the force to be made capable of creating strategic effects in its application; and second for it be an influential participant in the national strategic dialogue, to ensure the

optimum employment of its air power. This requires dedicated professional mastery, able leadership at all levels and a high degree of innovative conceptual development. Small air forces have no other viable option to assure their relevance in the long-term considerations of national security.

SMALL AIR FORCES:
STRATEGIC EFFECTS AND STRATEGIC INFLUENCE

*Aircraft enables us to **jump over** the army which shields the enemy government, industry and people, and **so strike direct and immediately at the seat of the opposing will and policy**. [emphasis in original]*

B. H. Liddell Hart [68]

Throughout history, global peace and stability have often been challenged, with only the intensity of the convulsions varying with time and context. This almost perpetual challenge to stability is currently manifest through the scourges of international terrorism, religious- and ideology-based threats to regional stability with very real chances of escalation, transnational crime such as people smuggling and drug trafficking, instability precipitated through weak and corrupt governance and the implosion of failing states with regional and even global repercussions. The security environment is complex and evolving. However, nation-states that take their international commitments seriously will have to take joint responsibility to stabilise this volatile environment and work to shape and

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[68]   B. H. Liddell Hart, *Paris or the Future of War*, Dutton, New York, NY, 1925, p. 37.

influence it for the security of the larger global community. There is a vital role for air forces in this process.

A competent air force should be able to protect the sovereignty of the nation and its interests and must also have the resident capability to project power—both in the physical and cognitive domains. The capacity for an air force to be an effective influence in shaping the security environment for peace and stability is directly proportional to its competency as an element of national power. Small air forces tread a very thin line in this respect. They have to consciously tailor their resident capabilities to best meet their near-term operational responsibilities while ensuring that they remain strategically aligned to the national security imperatives and grand strategy, considered in the long term. This means having a forward-looking capacity and being pre-adapted to meet emergent security requirements. The effectiveness of a small air force is almost completely underpinned by its ability to mature into a force that can create strategic effects and thereby become a key and influential contributor to national security. This is always an uphill task for a small air force that is bound to be challenged in resources, personnel and capability spread.

Factors Affecting Strategic Effects

There are three major factors that small air forces must constantly contain to be effective in creating strategic effects and also to retain the reserve capacity to be utilised in transforming to and remaining air forces of strategic influence. First is that they will not be able to rely on mass to ameliorate the demands of concurrent and simultaneous operations. Instead, the disparate demands for sustaining these operations would have to be met through nurturing the effectiveness, efficiency, innovation, adaptability and flexibility brought about by the professional mastery of the personnel. Combining these primary characteristics in the right proportion will create sufficient strategic depth and cater for the lack of mass in small air forces.

The second factor is that under the current circumstances small air forces do not have the luxury of rapidly increasing the size and shape of the force in times of crisis. There are two reasons for this. First, general mobilisation is not a viable option in democracies; and second, the gestation period required for air power of the necessary quality to come to fruition is very long and normally not available in times of crisis. From an air force perspective these two factors preclude the option of creating a standing core around which part-timers and/or reservists could be assembled to rapidly build up the force to cater for emergent situations. Consequently, small air forces must plan to fight and win with the force-in-being.

Third, air forces need to maintain battlespace dominance—a combination of control of the air, effective command and control, and information superiority. In the contemporary battlespace, where asymmetric and complex threats are the norm, this is an increasingly difficult and complicated task. For smaller air forces this is a factor that has the potential to stretch the already limited resources to untenable lengths.

Force structure development in all cases will have to be done within the resource allocation to a service from the overall national budget. In the case of small air forces the three main factors, which are constraints and contextual imperatives, will also influence force structure development. This development is one of the cornerstones on which the competencies of military forces are built and sustained. Therefore, the ability of small air forces to create strategic effects hinges on their getting the force structure development correct for the current, as well as future, employment of the force. It is imperative for a small air force—already functioning under added constraints—to align long-term force structure development with a forward-looking national security policy and strategy. This is critical to it becoming a force of strategic influence.

It is evident that the processes involved in ensuring the effectiveness of a small air force—one that can produce strategic effects and be influential and with a clear relevance to national security—are complex and ongoing. Further, these processes are influenced by internal factors and impacted by extraneous ones.

Force Structure Development

The demands on small air forces are the same as those placed on large ones. They are required to be able to project military power from and through the medium of air, independently or as contributing members of joint, coalition or combined forces. They are also required to do this while simultaneously undertaking humanitarian assistance and peacekeeping operations within the broader, multi-agency security environment. Even for large air forces the spread of tasks is difficult to address competently and requires very careful nurturing of resources at the strategic level. For a small air force the appropriately prioritised allocation of limited resources, inclusive of capabilities, assumes critical proportion. Further, it becomes the most important contributing factor to the success of a small air force involved in concurrent and/or simultaneous operations.

Small air forces face a vexed question regarding force structure development. On the one hand, they could orientate their development towards the ironclad requirement to fight and win wars of necessity—the defence of national sovereignty against conventional attack. On the other, they could emphasise the capabilities required at the lower end of the spectrum of conflict to provide humanitarian assistance or contribute to coalition operations and irregular wars; in other words, conflicts of choice. The current requirement seems to be the ability to be part of coalitions willing to employ force to achieve global stability. However, there is no doubt that, in order to retain long-term relevance and maintain strategic influence, small air forces must

develop a force structure to conduct operations of necessity—the most dangerous scenario. Within this structure they must inculcate and retain sufficient flexibility to undertake operations of choice by incorporating inherent adaptability, versatility and the ability to innovatively employ resident capabilities.

A force structure that caters for high-end conflict can be ramped down and adapted to operate at the lower-end of the spectrum of conflict with relative ease. Ramping up lower-end capabilities in times of crisis to meet high-end conflict demands is a difficult and complex process that may not always be possible and is a potential point of failure. For a small air force, such a failure would have catastrophic consequences to its continued relevance as an instrument of national security. The adaptability necessary to field the appropriate capabilities that create the desired strategic effects is the product of the combination of flexible and sophisticated air power systems and the quality, commitment, education and training—in other words, the professional mastery—of the personnel that operate them. This combination is fundamental to the relevance of small air forces and critical to their evolution and maturation as strategically influential forces.

Transforming to Strategic Influence

Small air forces have to be oriented towards becoming strategically influential while excelling at operational functions. In fact, only an operationally competent force can aspire to develop into one of strategic influence. In order to create strategic effects and stay relevant in the national security equation, a small air force will have to develop the ability to overlay a strategic focus on its already effective operational competence. Combat power and its projection capabilities will continue to be the cornerstone of a small air force's ability to create the necessary effects, by force and with authority. This is the acme of technical mastery—the basis upon which a force's operational excellence and competence is established and maintained. However, a force

focused on creating strategic effects and being influential will transcend the purely operational aspects of the application of air power by evolving its combat power with the ability to project both physical and virtual power across the entire spectrum of operations. For a small air force that is already capable of competently operating across the entire spectrum of conflict, professional mastery adds the extra dimension that will enhance its strategic influence.

An air force of strategic influence would have a clear understanding of the long-term national security environment and a credible anticipation of future needs vis-à-vis its force structure and capabilities. Based on this, the force would have carried out extensive planning and training to cater for all possible exigencies, from the most probable emergent situation to the least likely. Such an air force will develop its capabilities and design its force in close coordination with the national security policy. This process is not easily undertaken and needs a high level of commitment and professional mastery from the leadership to succeed. However, this process, when successfully integrated within the force, will ensure that its resident capabilities adequately match the requirements of the national security strategy. This is the only way for a small air force to develop into a force of strategic influence, able to shape national strategy.

The process of transforming a small air force to one of strategic influence cannot be undertaken as the result of impromptu decisions. It involves the acquisition of capabilities well aligned with the future requirements of the force if it is to meet national security demands. Air power capabilities, predominantly based on sophisticated, state-of-the-art technologies, require a long lead time to assimilate and be made fully operational. This adds a further dimension to the challenges inherent in the planning process. Small air forces need to have a long-term view of sufficient fidelity to be able to achieve the necessary capability

level, which in itself is of paramount importance for the force to mature and evolve.

The global and regional security circumstances are in perpetual change, the pace varying with the influence of emerging elements and considerations in the political social and economic environments. In conflicts, the modus operandi of the combatants and the character of conflict by itself are constantly evolving. The obvious fallout of such a volatile situation is that even an extremely competent small air force must be in the process of a continuous but controlled transformation in order to stay aligned with, and be relevant to, national security requirements. In the modern battlespace, ultimate victory in a conflict is perpetuated in the cognitive domain—the behaviour pattern and belief system—of the adversary, irrespective of the physical and virtual military victories in battles, campaigns and wars. This amounts to dealing directly with the 'thinking process' of the adversary. In order to prevail, a small air force must be able to identify the factors that influence the cognitive process of the adversary and implement actions to target them in order to make the adversary change their behaviour and belief.

This is the decisive application of force and, in the context of small air forces, entails much more than the mere physical projection of air power. While the physical generation, sustainment and application of air power will remain a core function, small air forces will gain strategic influence only if they can dominate the cognitive domain and the physical battlespace effectively. In combination, this will provide a small air force with the capacity to seize the initiative and control the tempo, intensity and more importantly the direction in any conflict. A competent small air force can use such a commanding position, brought about through the astute application of operational excellence, to create strategic effects and become strategically influential beyond the physical domain. If such a situation can be achieved and maintained, the strategic relevance of a small

air force in the higher levels of national security will never be in doubt.

The concept of a modern strategic air force is very different from the traditional understanding of the term 'strategic air force'. The traditional measurement of a strategic air force has been long range, heavy payload and the ability to strike 'strategic' targets. This view is restrictive in the modern security and conflict environment, even though kinetic effects still matter and may even be critical to victory in some situations. It is increasingly clear that in order to be acknowledged as a strategic force, a modern air force should have the ability to create strategic effects in both the physical and cognitive domains while simultaneously being capable of positively shaping the operating environment, deliberately through design. The foundation to achieve this combination will be the authority of a small air force's demonstrated combat power.

In order to create strategic effects a small air force must be able to consistently formulate and implement well-thought-through strategies that achieve the political end-state dictated by government. The strategies should also be aligned completely with the application of military power, in adherence to a deliberate and considered plan of action for the campaign. Strategy is the link between the political ends to be achieved and the application of available military means towards that goal. Ideally this process should generate a coherent plan of action for the conduct of all activities oriented towards the achievement of laid down objectives and end-state. Government security policies formulated in isolation from the military or military capabilities developed in isolation of government's security imperatives will create definitive circumstances for failure. For a small air force, with limited or no spare capacity to waste on ill-considered actions, matching the desired ends to means available is of cardinal importance to ensure success. This can only be assured by maintaining a trusted relationship between

the civilian government and the military high command. A small air force can only be successful in the long term by having the influence to shape the security circumstances appropriate to its context and resident capabilities and aligning its capability and strategy with national interests and security imperatives.

Small air forces, even those steeped in operational excellence, always face the real risk of being overwhelmed by numerically larger forces or outmanoeuvred by more agile or asymmetric adversaries. The obvious counter to such a situation is the ready availability of a reserve of qualitative quantity—in capabilities and personnel—that can be brought to bear rapidly. However, small air forces do not have recourse to such a solution. They will have to rely almost completely on a perpetual cycle of intelligent innovation in terms of concepts of operations and the application of force to prevail. This is the touchstone that will demarcate the strategically transforming small air force and the merely tactically oriented ones.

A small air force that is strategically oriented will be able to negate the disadvantage of the limitations of mass and quantum of capability through its ability to influence and even dominate the cognitive domain and fashion desired outcomes. The ability to achieve this dominance will be a key to the success of small air forces. Domination in the cognitive domain can only be achieved through the effective integration of the force's capabilities and personnel, through well-formulated doctrine, strategy and concepts, into a harmonious and coordinated whole, capable of applying and/or projecting power in the desired domain.

For small air forces, staying relevant in the long term is almost completely dependent on their ability to transform into entities that create strategic effects and thereby become strategically influential in the context of national security. This is an essential and unavoidable first step, which if not confidently taken will result in the gradual failure of a small air force.

Conclusion

There are compelling reasons for a small air force of calibre and competence to embrace the transformation to a strategic entity. Adequate air power is a critical element in a nation's defence and only independent air forces can be effective in providing the air power capabilities essential to secure the sovereignty of the state. The necessity for air forces to be independent is not based on a parochial or biased requirement for Service identity. It stems from the acknowledged need for air power to be wielded cohesively, within the proven tenets of the application of air power, by professional masters of the air domain. Such mastery is not easily achieved and is the product of a lifelong study and involvement in all aspects of the planning, executive application and sustainment of air campaigns and command of air forces. Air power is a sophisticated and complex form of military power and professional mastery in all its intricacies can only be achieved in an independent force. Any other model is bound to fail, however assiduous the attempt to make it work.

The primary danger to a small air force will be its inability to transform into a strategic force, for any number of reasons. In such a situation it will become increasingly irrelevant to national security in the ever-changing security circumstances. A small air force that can function at the purely reactive level to emerging threats—excelling at the operational and tactical levels of conflict—but is unable to shape the environment to optimise its own power projection capabilities and align the effects created to meet the desired national end-state would no longer be relevant to the needs of the government. Such a force will rapidly become irrelevant.

As security instruments of state, small air forces typically do not disappear or are not rapidly disbanded if they do not perform to the satisfaction of their governments. However, they can, and do,

disappear from the national security calculus. This is not a viable option—either for the government or for an air force of calibre.

It is not the strongest ... that survive, nor the most intelligent, but the one most responsive to change.

Charles Darwin[69]

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69   Charles Darwin, 'Great-Quotes.com', at: http://www.great-quotes.com/quote/160342, accessed 21 March 2011.

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Conclusion

The opportunities for air power are immense – as are the challenges. If we accept the challenges and overcome them, we will make a major contribution to world peace and stability. If we refuse to accept the challenges and continue to live in a long-gone world of flying scarves, our relevance will fade rapidly, and with it our best hope for the future.

Colonel John A. Warden III,
USAF (ret.)[70]

Air forces have demonstrated tremendous capacity for growth in the past 100 years. In these years they have decisively moved from being supporting arms in conflict to being war-winning forces that have the capability to dominate the entire spectrum of modern operations. This unsurpassed development in effectiveness has been facilitated by technology and the impact that the lethal application of air power creates in the battlefield. As a result, air forces have traditionally been operationally focused; concentrating on winning battles and campaigns. This focus has often been at the cost of understanding the broader

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[70] Colonel John A. Warden III, 'Afterword: Challenges and Opportunities', in Dr Richard Hallion (ed.), *Air Power Confronts an Unstable World*, Brassey's (UK) Ltd, London, 1997, p. 240.

strategic effects that are necessary to be created in order to win wars. From the beginning of military aviation, this dichotomy was apparent in the thinking of air power strategists and became embedded in the conceptualisation of the employment of air forces. However, in the past few decades air forces have been able to overcome this limitation and have very often become a preferred government option for the application of force. Further they are now considered critical elements of national power. The challenge for small air forces is to ensure—through constant striving to maintain such acceptance—that they are considered to be direct contributors at the strategic level of warfare.

The current international security environment has altered the character and conduct of warfare, which in turn has diminished the operational contribution air forces can make to the successful prosecution of campaigns. This situation has further exacerbated the dilution of the air force contribution to national security at the strategic level. To an extent, air forces, irrespective of their 'size', are now at a critical juncture or decisive point in their development. Air forces have traditionally relied on what could be termed, a 'high-tech approach' to operations, depending on technology to optimise the application of air power and the technology gap between them and a less sophisticated adversary to prevail. The irregular wars that are currently being waged, and which are likely to continue for at least the mid-term future, tend to neutralise this technological advantage to some degree, thereby at times reducing air forces' operational effectiveness. There is an inherent drawback—albeit limited—in continuing to pursue a purely high-tech approach to the application of air power.

At this juncture, air forces need to evaluate the alignment of their capabilities with the strategy at the highest level. This can be achieved by developing employment concepts with sufficient flexibility to be effective at the lower end of the technology spectrum while also being able to cater for high-end warfare.

Obviously, such concepts will have inputs into force structure development and will require a carefully balanced approach to ensure correctness of alignment with the grand national strategy. The alignment of national security strategy, employment concepts and force structure development, is a necessity to enhance the effectiveness of the air force.

There is now general acceptance that air forces are critical elements of national power resident within the broader military forces of the state. In addition, the deterrent capability of air power is also viewed with much more interest than previously because of the changed character of the adversary and the irregular pattern of their modus operandi. The inherent characteristics of air power—reach, responsiveness, precision and discrimination—provide a visible capability that in itself deters an adversary from initiating actions inimical to the interest of the state. When this capability is combined with a demonstrated national will to employ it in securing the state, the deterrence is greatly enhanced and emphasised. Further, air power can be tailored to create effects in the cognitive domain, primarily through nonlethal applications, at a much faster pace than with the employment of other force projection capabilities. In the national security equation, the deterrent capability resident in the air force is a crucial consideration.

The criticality of air forces in securing the nation is not in doubt. However, the perceived adequacy of the air force in terms of its capabilities vis-à-vis the security requirements of the nation is primarily affected by the national perception of its security environment and the national understanding of air forces and their capabilities. The decision to maintain an air force is a national political decision and is itself based on such variables as threat perception, resource availability and the ability of the nation to obtain the necessary air power capabilities—either indigenously or from reliable external sources. In the past few decades, there has been a tangible change in the understanding

of national security in almost all nations with broader national interests being viewed within the security fold, leading to a belief that there will always be some level of threat to national security. Under these circumstances, the need to possess an air force with at least the minimum level of air power capabilities gets reinforced and accepted.

When a nation accepts the need to maintain an air force it is committing itself to providing the necessary outlays and resources, on a continuous basis at the national level, in financial, political, personnel, industrial and environmental spheres. Here it is important to point out that the outlays required in each of these areas will be high and could at times go beyond national affordability in terms of what a state is prepared to expend on military forces. Therefore, it is imperative that the commitment to maintaining an air force of the appropriate capability be undertaken within a whole-of-nation approach to national security.

The corollary to the acceptance of the need for an air force to bolster national security and the commitment to provide the necessary resources is that the air force must accept certain reciprocal responsibilities. First, it must be aware of the constantly changing nuances of national security and align itself correctly. This alignment would require clear capability development processes that cater for altered demands on the force, flexible force structure with adequate built-in adaptability to span the full spectrum of conflict at the desired level of competency, and doctrinal and conceptual maturity to support these requirements. Second, the air force must be seen to be upholding common national values in terms of morality and civilian primacy in matters of national security.

In effect, the required national outlay must be earned by the air force and not purely demanded. Any shortfall in resource availability must be seen by the nation as a whole to be

detrimental to its security, thereby creating a favourable situation for the government to allocate resources even during economic downturns. Such a situation will be the hallmark of a competent air force and the only way for an air force to remain a relevant element in national security.

Air forces can be categorised as large, small or niche, taking into consideration and assessing a number of characteristics of the nation and its air force. These include the overall strategic status of the nation in terms of it being a large, middle or small power, which in itself takes into consideration a large number of factors; analysis of the air force's size and capability, which is fairly straightforward; assessing contributory factors such as national industrial and educational base, which is complex; calculating attrition absorption capability, which will be a determining factor in small air forces; and the doctrinal and conceptual maturity and applicability to the circumstances of the nation.

Most air forces come under the categorisation of 'small air forces'. A small air force faces a number of challenges in meeting the demands placed on it in being an effective element that provides the necessary capabilities at the required time and place. Overcoming the challenges becomes the primary focus of small air forces because they possess lesser capacity to neutralise these challenges while continuing to operate at the desired level. If mitigation of emerging challenges is not carefully and consciously managed, small air forces could find themselves either faced with challenges that have grown to become insurmountable issues or a situation wherein the edge has been taken off their operational efficacy by the efforts to contain the challenges. Either situation is not conducive to optimum performance.

Some challenges that will have to be 'absorbed' are beyond the control of small air forces in that they are politically induced and their effects can only be alleviated through political intervention. The forming of alliances, bilateral or multilateral, and their

robustness, which will directly affect the operational employment of military forces, is a case in point. The international power imbalance that is a major contributory factor to a majority of irregular conflicts is also politically eventuated to a certain degree. Small air forces will find it difficult to directly address challenges that are derived from political roots.

The optimum employment of air forces will occur when there is a direct and clearly visible connection between national security and air power. This can be achieved by the air force being proactive to changes, which are almost always ongoing and gradual, in the strategic level of decision-making in the nation. This means that the air force's strategy must be sensitive to even the mildest change at the highest level of decision-making—a factor that air forces must take cognisance of in their planning. Only by being proactive to these changes can the air force ensure that it establishes and retains a credible status within the national security strategy. It is important for the air force to be fully embedded at the highest level of national security discussions for one primary reason. The success of an air campaign is almost completely dependent on its planning and execution being fully aligned with the joint campaign, which in turn is derived from politically laid down national objectives. Small air forces have no choice but to be sensitive to national objectives and adapt to achieve the desired end-state.

The relevance of a small air force is almost completely dependent on its ability to overcome the challenges that it is forced to face and to optimise its employment to meet national security requirements. There cannot be any single template for the employment of an air force—in fact, its versatility negates the very idea at the outset. The application of air power to achieve national security objectives will be as varied as the range of political manoeuvres that could be employed in the pursuit of a desired end-state. Small air forces will remain relevant to the nation as long as they are able to provide the government with

flexible response options, both lethal and nonlethal, to emerging threats; retain the capacity to respond in a time-critical manner in humanitarian relief operations and other missions in the 'aid of civil authorities'; and ensure that they remain strategic instruments of national power. For air forces that are limited in size, capability and 'staying power' this combination of requirements leads to complex circumstances. Their relevance to the nation is crucially dependent on their success in being able to overcome the complexity of the situation.

The success of a small air force is predicated on its ability to create strategic effects at all stages of the campaign to ensure national security and sovereignty. This directly translates to staying relevant at the grand strategic level of the security debate within the nation. For small air forces this is no easy task. The tactical relevance of air forces—fairly easily achieved—does not automatically ensure permanence of their status. In fact, if an air force does not have the capacity to be effective at the operational, and further, at the strategic level, it may well face gradual irrelevance and oblivion. To stay strategically relevant, a small air force must have philosophical as well as operational level doctrine that is current and relevant to the force-in-being; professional mastery across all levels of command within the force, at the required level; and a robust training and education program that not only permits the force-in-being to operate efficiently, but also creates the conditions necessary to develop future leaders. These conditions should be met not merely within a war strategy but within a flexible strategic framework that caters for both war and peace. By creating such a framework and meeting these conditions, small air forces will be able to produce and employ quality air power in the service of the nation—ensuring their lasting relevance.

All air forces are products of their individual history, their successes and failures in conflicts and their position within the state in relation to national security. The strategic agility to adapt

to an uncertain future will remain an enduring principle around which small air forces will have to evolve and tailor their future employment concepts and methodologies. It is imperative for small air forces to evolve from being efficient tactical forces into becoming air forces of strategic influence, capable of creating strategic effects, rapidly, precisely and with discrimination. This can only be built on a sound foundation of professional mastery and by being equipped and structured to influence and shape the security environment in the direction that is desired by the government.

As clever, adaptive and learning organisations, small air forces of calibre are capable of playing a vital role in positively shaping the paradigms of the current and emerging security environment. This is the challenge that small air forces—evolving to forces of strategic influence and able to create strategic effects at will—must meet in the coming decades. Failure to deliver will lead to a failed air force—which is not an option. Small air forces that prevail over the myriad challenges they face will ensure lasting strategic relevance in the national security environment.