

AIR DOMINANCE:CONCEPT AND PRACTICE

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Many years have elapsed since we witnessed a conflict where the opposing air forces were of comparable capability and it became necessary to wage a war for supremacy in the air. Possibly, the last occasion was in the 1971 Indo-Pak conflict that led to the birth of Bangladesh. That was over 37 years ago! In the 1973 Arab-Israeli “Yom Kippur” War, the Israeli Air Force was challenged to start with but essentially by ground fire. There were few air battles and Israel got the upper hand in the air dominance stakes rather easily with the use of electronic jammers and good tactical flying. After that, air power played a major role in the victory that followed. In the 1982 operations in the Bekaa Valley, the Israeli Air Force outclassed the Lebanese defences to win total air superiority. Before the 1991 Gulf War, it was envisaged that an air battle could ensue but the Iraqis put up a very weak challenge, stayed on the defensive and preferred to fly their aircraft to Iran. Thereafter, in the subsequent conflicts that have occurred—in the Balkans, Kosovo, Afghanistan, Iraq, Lebanon and more recently in Gaza, etc — there has really been no viable opposition to the North Atlantic Treaty Organisation (NATO) or ‘allied’ or Israeli air power. During Kargil 1999, Pakistan had a reasonably good air force but elected not to use it or was wary of the consequences of its use.

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Although the military victory in the ongoing conflict in Iraq and Afghanistan was quickly achieved, peace is yet to be restored in those troubled lands. Again, there is a large and increasing number of areas on the globe where terrorism and 4th Generation Warfare are taking their toll. In these types of operations, the importance of air power, though still significant, is somewhat reduced.

The one-sided air operations over the last many years in a number of varied types of conflicts in different types of terrain has led some to question the need for the expensive weapon systems needed to win the air battle. It is argued that the nature of conflict has altered; major battles are highly unlikely in a globalised world; we must prepare for the type of conflicts that are far more likely to occur; and that defence budgets would be better utilised for procurements and training that suit the needs of the conflicts that are ongoing or those that are more likely to occur in the near future. It is also stated that in anti-insurgency and 4th Generation War, we need more manpower and far more specific to task equipment. Therefore, it is argued, that we must have “more boots on the ground,” and that programmes like the F-22 can and should be curtailed. Such sentiments are expressed in many parts of the world, and most often, presumably by military practitioners and others who have but a distant relationship with aerospace power, and a consequent lack of appreciation of what air power implies and what it can achieve.

History teaches us that whilst it would be wrong to only “prepare to fight the last war,” it would be equally incorrect to forget the lessons of previous wars. Moreover, it takes a long time to develop capabilities and we cannot legislate to the enemy on the type of war to be fought. In fact, the type of war the enemy chooses to prosecute will in all likelihood take advantage of our weaknesses. Hence, we must be prepared to fight throughout the spectrum of conflict. Air dominance has a part to play, in varying degrees, in sub-conventional, conventional, even nuclear

wars or even the threat of a nuclear war. Such capability would also have deterrence and coercive power. Again, there is an old and trusted adage that since the maturity of the air arm, no country has ever won a war without winning the air war, and no country that has won the air war has ever lost the war. This is a very pertinent statement and we will do well to bear it in mind.

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Doubts are expressed on the need for air domination assets as, more often than not, we tend to read recent history from the point of view of the victors. The impact of air power could be better understood if we were to place ourselves in the shoes of the Kosovars, the Iraqis, the Taliban in Afghanistan, or, for that matter, the Palestinians and Lebanese that faced the wrath of Israeli air power. The lack of adequate air capability was acutely felt and a military defeat was beyond doubt.

The requirements of current conflicts and the types of conflicts that are envisaged must be met. The immediate needs demand higher priority. At the same time, the military option by itself can never bring about the desired end results, and a multi-dimensional approach is necessary. However, this article is restricted to military issues only and concentrates on the meaning of air dominance and the advisability of securing air dominance. Other equally important considerations like geo-politics, the nuclear factor, Comprehensive Test Ban Treaty (CTBT), Missile Technology Control Regime (MTCR), Fissile Material Cut-off Treaty (FMCT) and the all important consideration of international relations and diplomacy are all beyond the pale of this article. Also, in this article, the phrases “air dominance” and “air domination” are used interchangeably. It is presumed that there are degrees of air domination and air domination exists from the time one side gains the upper hand and extends to when full air dominance is achieved.

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WHAT IS AIR DOMINANCE?

In simple terms, air dominance implies the dominance of the air medium. That is just a phrase but if the concept of air dominance is well understood, it will be easy to appreciate that it is the prime objective of the 'armed forces,' it supports all the armed forces, and is not only an air force task although air power will have a significant part to play in achieving it. Unquestionably, securing air dominance is the *raison d'être* of air power. It must

also be emphasised that achieving air dominance is not an end unto itself. No capability ever is. However, air dominance is a means to an end and facilitates, in no uncertain measure, the early and favourable outcome of conflict. If air dominance is only a means to an end, the question arises as to how much air effort should be devoted towards winning it? This is an important consideration but the answer is implicit in the understanding of the concept of air domination. Some will argue that almost the entire capability of air power should be used for the mission to win dominance. Others will again find fault with the air force for giving undue priority to 'fighting its own battle.' The optimum use of air assets for the air dominance battle will depend on circumstances that prevail at the time. There could also well be major differences amongst protagonists in the manner in which available assets are used. The differences will come about because of the relative strengths and capabilities, planning parameters that could vary, and the overall strategy adopted by the adversaries to bring the conflict to an early and satisfactory conclusion as seen from their own respective points of view. No hard and fast rules can be formulated. The importance and salience of air domination will be better gauged by an examination of the purpose and implications of air dominance.

PURPOSE AND IMPLICATIONS OF AIR DOMINANCE

The purpose of air domination is to have as near as possible full freedom of the skies. The 'freedom' has also been described as "freedom to attack and

freedom from attack.” Although reasonably accurate, the phrase does not fully describe the concept of air dominance. Greater elucidation is called for and the different purposes should be enumerated.

The first purpose that air dominance serves is to ensure air defence of our territory or area of interest. The area of interest could even be in enemy country. The primary objective is to inhibit enemy aircraft from attacking our sea, air or ground assets. It will be a major achievement if we can ensure that enemy aircraft cannot successfully attack any of our armed forces or centres of industry or population. The basic requirements are effective radar cover or other means so that we can ensure detection at maximum possible ranges; a sound identification system, and kill capability to engage enemy aircraft identified as hostile as far away as possible from the intended target. If we can achieve the kill in enemy territory itself, so much the better. Radar cover could be markedly augmented with the use of the Airborne Warning and Control System (AWACS) or aerostat balloons. Identification system will involve data links and data processing, and the ‘kill’ systems could be aircraft armed with missiles and guns, ground-based weapon systems that will include Surface-to-Air-Missiles (SAMs) and Air Defence (AD) artillery. As and when available, lasers and directed energy weapons could also be used. Over and above these essential requirements, there must be a robust communication and control system. Air defence is a difficult operation of war. Perforce, there will be a number of vulnerable targets and it may take a few days for us to discern the enemy strategy. Again, we would not wish for our air defence assets to be spread out too thinly. Compromises will have to be made and the optimum utilisation of resources worked out and plans altered progressively, depending on the circumstances. Given the perennial scarcity of resources, it will be nigh impossible to provide effective air defence throughout our country and other areas of interest. However, we should be able to protect defined areas over stipulated time-frames. Even then, prioritisation is essential. Such calculations and related decisions should form part of the joint planning system.

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Leading on from air defence requirements, the second purpose of air dominance is to progressively move from achieving a favourable air situation to air superiority and on to air supremacy. This can be brought about by lowering the enemy air capability slowly but surely. It will involve good air defence systems as well as attacks on the air and command and control assets of the enemy. The idea is to relentlessly push the enemy

onto the defensive. The degree of air superiority that we can muster is an important consideration for the prosecution of war by our surface forces and air forces. However, although the concepts of air defence and air superiority are very important considerations, they remain somewhat passive aspects with the limited objective of preventing the enemy from harming us. It is probably more important to cause harm to the enemy forces by inflicting the desired degree of damage to enemy targets and target systems.

The enemy will also try to field an effective air defence system and vie for air superiority. Hence, the third purpose of air domination is to ensure that our air operations are not hampered by enemy air or ground defences. This will involve Electronic Warfare (EW), techniques for Suppression of Enemy Air Defences (SEAD) or Destruction of Enemy Air Defences (DEAD) by hard or soft kills and, probably most importantly, by shooting down enemy air defence aircraft in air-to-air engagements. In addition, deception and other tactical considerations will also impact on this requirement.

Fourthly, and probably most importantly, air domination also encompasses the ability to hit air and surface targets effectively and speedily within the defined area where we exercise air domination. This is the essence of air domination. The previous three considerations or purposes were but a prelude to the use of air assets against enemy forces unhampered by enemy air. The same holds true for attacks on enemy economic or other targets. The success of the previous three aspects of air domination will determine the freedom to attack and, consequently, the accuracy and effectiveness of the air

attacks. Enemy military assets have to be attacked to inflict damage or destruction to the required extent in order to force a military victory. At the same time, with air domination, air assets can be used against enemy forces in close vicinity of our forces with considerable impunity. Aircraft can now fly over the battle area over extended periods of time, carefully select targets and hit them. Air domination will also permit the luxury of immediate battle damage assessment and near immediate reengagements if required. Moreover, the need for the very expensive stand-off weapon systems will decrease and attacks on enemy surface forces can be carried out more cost effectively. What is stated above will apply when full air domination has been achieved. In practice, such instances will indeed be rare, particularly if the adversaries are reasonably well matched, but the effectiveness of air attacks against enemy forces will be directly dependent on the degree of air domination that we have achieved.

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Fifthly, the attacks on surface forces must also include attacks on enemy missile sites and AD artillery that can target areas in our country or areas we wish to protect. The ranges of ground-to-ground missiles have increased considerably and they can be fired with effect from well within the enemy country. The option of choice to neutralise them is the use of our air assets, be they aircraft or some form of unmanned vehicles. With air domination, it will become easier to locate, acquire and destroy such targets.

Another important purpose of air domination is intelligence gathering. Gathering intelligence with surveillance and reconnaissance (ISR) is a prime task for an air force. The means available could be visual reconnaissance or sensors of different types placed aboard aircraft, Unmanned Air Vehicles (UAVs) or satellites. The sensors will include those required for eavesdropping on enemy communications and interception of all types of information that is relayed from one enemy source to another. Mapping the enemy electronic order of battle should be a priority task. Gathering intelligence is an ongoing

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exercise in peace and war and aerospace assets are the prime instruments for the task. In the same breath it must also be mentioned that Human Intelligence (HUMINT) has an equally important role to play and often, the different sources complement each other and offer corroboration where needed. Air domination will also permit enhanced safety in intelligence gathering, collation, analysis and timely dissemination. Air assets can also be used as relay stations.

It will be appreciated that air dominance is a major military requirement and it represents the all embracing use of air power. Its impact on the prosecution of war is indeed significant and, for this reason alone, achieving air dominance should be a high priority task in the planning of joint military operations.

The impact of air domination would be that the side that is able to win it will be able to 'see' what it wants to see, 'hear' what it wishes to hear, discern what is necessary, hit targets at will and operate with freedom. Air domination represents the unfettered use of the air medium.

In spite of the gains that will accrue with air dominance, the question must be asked as to whether a country like India can hope to achieve it against our possible adversaries. Many would equate our quest for air dominance with chasing a mirage. It is true that fighting for air dominance will require a much stronger air force than what the adversary can bring to bear on us. However, air dominance can also be progressively achieved with better planning and optimum use of extant resources. The fundamentals should be clearly understood. Gaining air dominance will always be a worthy objective and its attainment will ease the way to military success. It must also be mentioned that although full air dominance may not be possible, any level of air dominance will be of considerable benefit. Again, much will depend on the nature of war, its likely duration and limits of action that may be placed on the armed forces.

Such issues will hopefully be considered in the joint planning, and consensus reached on the desirability of maximum possible level of air dominance.

BENEFITS OF AIR DOMINANCE

Unchallenged use of the air medium promotes obvious military advantages, some of which have been described earlier. The situation permits many options in the choice of targets, and the weapon systems to be used against them. For instance, it will not be necessary to move the battle front progressively. Parallel war can be conducted with impunity. With no or vastly reduced enemy air interference, planning and prosecution of military options is considerably simplified. Greater choices also become available in the choice of weapons to be used. Lesser number of precision guided weapons would be required, as many target systems could be engaged, at reduced costs, by unguided weapons whilst retaining the ability to cause the desired degree of damage.

Our Special Forces are highly trained to carry out tasks in enemy country. Apart from the chance element inherent in such operations, a major drawback is the inherent risk in infiltration and exfiltration. With air domination, the passage to and from target areas will be safe from enemy air and the target area could also be sanitised from the air. Under the circumstances, even normal troops could be tasked for missions where otherwise the requirement would have been for Special Forces only. Similarly, air dropping of agents and their retrieval will be much easier and involve no detailed planning requirements. Again, air evacuation of combat casualties could be more readily carried out. Indeed, a number of operations that carry high levels of risk would be simplified beyond recognition.

Military operations involving airborne or heliborne troops are complicated and often dangerous, essentially because of high vulnerability at launch pads, air transportation to the target in machines that can be readily downed by enemy air or ground fire, problems in linking up with the main forces if necessary and resupply requirements. All these 'problems' are considerably eased with even a modicum of air dominance, leave alone full air dominance.

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Thus, air dominance implies that the enemy territory, and the otherwise highly defended areas therein, are laid bare for attack. It would be a planner's dream if we could achieve it in full measure. However, even with reduced levels of air dominance, it would then become progressively less problematic to increase the domination quotient. In time, the enemy would

be rendered incapable of offensive action. This recognition will result in the stronger adversary exercising escalation dominance and fighting the battle at intensity levels of its own choosing; and relegating the other side to either vie for peace or fight on terms dictated by the side that enjoys air domination. Air power capability is highly visible and the likelihood of one side attaining a fair degree of air domination, with consequences that will automatically follow, increases the deterrence level and, for that matter, the capability to exercise coercion as well. May be there is some substance in the claim made by an official of M/s Lockheed Martin that the F-22 aircraft is nearly as good a deterrent as nuclear weapons! There could be some exaggeration but the import of the statement is all too clear.

ACHIEVING AIR DOMINANCE

Achieving air dominance is not a factor of brute force alone. Considerable planning and forethought is necessary. Air power characteristics of flexibility, speed of action and reaction, etc have a major part to play. It is often mooted that air power tasks like air defence, counter-air operations, interdiction, close air support, air maintenance, etc are considered separately only for greater clarity. This is indeed true. In fact, there is a close inter-relationship and inter-dependence amongst all these tasks and others as well. In one way or the other, all air power tasks aid the battle for air dominance. In some scenarios, a major part of the entire force capability may be used to secure the essential task of air dominance. At times, surface forces must also play their part with special reference to the use of the Army and Naval Special Forces. Hence, the

requirements to fight the battle for air domination will, *inter alia*, include a sufficient number of appropriate aircraft of adequate range and capability; weapons and missiles; radars and other sensors; AWACS and Air-to-Air Refuelling (AAR); data links and command and control systems; space systems; air and ground infrastructure; expertise as required; analytical systems; Electronic Warfare (EW), INFOWAR; Network-Centric Warfare (NCW) capabilities and cyber warfare assets. The increasing importance of cyber warfare cannot be over-emphasised and, in the years ahead, such assets and their judicious use will significantly aid the winning of air dominance.

The quality of situational awareness is an important factor in the fight for air dominance, particularly if the opposing sides are evenly balanced. In a fluid battle environment, situational awareness will remain of concern even when air dominance has been largely won. Surprises can occur in terms of equipment fielded, tactics and possible antidotes to our strengths. We cannot let our guard down till the war is over and not even then thereafter.

Sound training schedules are also necessary to optimise the use of available systems. Very often, a well trained force used with deft planning can get the better of another force that boasts of superior equipment. Our equipment is way superior to that of our possible adversaries and we must not allow inadequate training or preparation to lower the effectiveness of the weapon systems.

The one factor that can make the difference between victory and defeat is the quality of intelligence inputs made available. Intelligence has a central role to play. Actionable intelligence that is timely, adequate and accurate will always be a force multiplier. For instance, in the battle for air dominance, the defences around the targets, enemy dispositions, definition of target systems and their exact location are inputs that will result in good and cost-effective results. Equally importantly, it will be a great help if we know the impact of our military activity not only on the battlefield but in the enemy corridors of power as well. The importance of intelligence inputs can never be over- stated.

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WINNING THE BATTLE FOR AIR DOMINATION

If there is considerable asymmetry in air power capability, adequate air dominance can be readily and quickly enforced. If the capability is more or less at par, air dominance has to be fought for. In the last conflict India was engaged in, Kargil in 1999, Pakistan handed over air dominance to India without a fight. Had Pakistan offered combat, as indeed they should have, given the fact that their soldiers were being killed by our air attacks, the pattern of air activity would have been very different. We would have had to fight for air dominance, even if it was to be at the cost of other air operations of war.

There cannot be any hard and fast rules on how to win the air war. Much will depend on the strategies adopted, the type of weapon systems available on both sides and their effectiveness in the types of operations envisaged. The likely duration of war and the possibility of one side or the other being in a position to limit the duration is another important consideration. Such imponderables may alter the nature of the air war but the imperative of winning air domination to whatever extent is possible will always remain. Again, if a particular plan does not work, the flexibility of air power will permit ready and quick alteration to the plan.

Both adversaries will vie to achieve air domination. As a rule, the extent of air domination will be a function of military power. Resources will always be important but possibly more important is the planning and utilisation of resources. A sound doctrinal approach will produce better results. As one side begins to gain advantage in the air domination stakes, it will attempt to capitalise on the gains and seek even greater dominance. However, at no stage can anyone let their guard down. Continuous effort is necessary to maintain the air dominance or improve on it. Good intelligence information is also needed to ensure that we are not surprised by the introduction of more effective equipment, and the enemy can always learn from experience and alter tactics to their advantage. Nothing should or can be taken for granted in war.

Air power is an offensive weapon and must be used offensively. The first requirement is to try and attenuate enemy offensive capability. The object

is to force the enemy onto the defensive. One way to achieve this is by attacks all over his country whereby he is forced to not only thin down his defences, but also lower his capability for offensive action. Offensive and defensive counter-air operations will have to be launched and it must be our attempt to challenge enemy air power at every possible opportunity. It is also a corollary in air operations that the optimum use of air power is towards targets where the likely gains are maximised consistent with a low attrition rate.

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The winning of air dominance requires knowledge, capabilities and suitable equipment. Such information and capabilities are required for both air combat and air-to-surface attacks. The effectiveness of air power will be governed by the degree of air dominance that can be achieved. The greater the air dominance that one is able to create, the more effective will be the support to surface forces. Undoubtedly, with air dominance, our ability to mount ISR missions and attacks on surface targets will be with greater surety, confidence and effectiveness.

The reverse is equally true with the added disadvantage that the enemy air will be permitted greater freedom of action against our surface forces. These factors should be well understood and be duly considered in the joint planning for different contingencies.

Air power can be a potent weapon if used well, and could be ineffective if the essentials of air operations are ignored. In our case, in both the Kargil conflict and in Operation Parakaram, our potential for air domination was not applied and, hence, wasted.

Much has changed in air capabilities in the last few decades but the concept of air domination is a classic one—never changing. What has markedly altered is the ability to exercise air domination and, by extension, the increasing need to do so.

APPLICABILITY OF AIR DOMINANCE

The applicability of air dominance extends throughout the entire spectrum of conflict that encompasses sub-conventional war, conventional war of different intensities and nuclear war as well. The concept is also applicable immaterial of the type of terrain. However, the means to achieve air dominance to whatever degree is possible or desirable will vary.

It would be incorrect to try and launch any operation with whatever objectives, or howsoever small, without air power. Otherwise, the full potential of military power will not be brought to bear on the enemy. Undoubtedly, a single Service operation is a valid operation of war but that should be reserved for special occasions and specific situations only. A good joint planning mechanism that operates regularly and continuously will ensure the optimum use of military power under all circumstances. One factor that must be shunned is the belief that if we do not use air power, somehow, the adversary will also desist from using his air power. Air power will be used if it is advantageous to use it, and the side that uses air power first will always be at an advantage.

It is generally accepted that air power has a decided impact in conventional war and provides an important leg of the triad in the nuclear deterrence stakes. The role of air power in sub-conventional or 4th Generation War, merits some explanation. There are three major characteristics of air power that impact war. The first is the ability to see from a vantage position. The 'see' includes the ability to eavesdrop on communications, intercept data transmissions and the entire ambit of assessing the enemy electronic order of battle. With better sensors mounted on satellites and UAVs as well, persistence can be ensured to a considerable degree and intelligence information corroborated with inputs from more than one sensor mounted on different platforms. Persistent surveillance can also support the guiding of our troops to make contact with the enemy and to keep our forces abreast of the changing situation. Secondly, air power permits the rapid, fast and safe movement of men and material to wherever required. Resupply and greater concentration can also be effected. Thirdly, air power can hit

targets in the air and on the surface accurately, efficiently and effectively. These are all important capabilities that can always be brought to bear on the enemy in all types of warfare including sub-conventional war. The effectiveness of air power will be dependent on the capabilities. Much can be done from the air but we have to have the required wherewithal. Technology will play an increasing role in the conduct of 4th Generation Warfare and well planned technological advances towards a defined purpose can only improve the effectiveness of air power. There can be no denying the impact of air power. Finally, the example of the Liberation Tigers of Tamil Eelam (LTTE) air force could happen elsewhere as well and the most effective counter can only be air power.

AEROSPACE DOMINATION

Space is but an extension of the air medium. Similarly, the term air domination should be extended to aerospace domination. The rapidly increasing civilian use of space, and the great advantages that the use accrues, make a space war of sorts highly probable. The civilian space industry is worth over \$200 billion and conflict often follows commerce. Similarly, use of space assets in military operations is of increasing significance and, once again, competition for unchallenged use of such assets and their denial to the adversary should be expected and planned for.

It is not yet certain as to how conflict regarding the use of space assets will be conducted. The options are numerous but the importance of aerospace domination is easy to comprehend.

Use of space assets can be countered by either hard kills or soft kills. Apart from the unlikely use of lasers or other destructive means to destroy enemy satellites by use of our space assets, hard or soft kills have to be carried out by using ground-based systems or airborne systems. These can be readily targeted by aircraft and missiles. The ground segment of space capability including control stations, Research and Development (R&D) facilities, launch pads, and the like are very vulnerable to air attacks, especially if air domination has been achieved. Thus, air domination and space domination do actually coalesce.

There will also be many limitations but aerospace domination is a laudable objective; the degree to which it can be achieved will be a function of the respective hardware, training and planning.

The term aerospace domination is accurate; it should form part of military lexicon.

Cyber warfare impacts both air power and aerospace power. The obvious advantages of controlling the cyber space are again too obvious to enumerate. Much work is ongoing on developing techniques and safeguards to engage in cyber warfare. Domination in this field is also an attractive proposition. As the air, space and cyber space represent closely

integrated mediums, their control should be by a single agency. In our country, the Indian Air Force automatically suggests itself.

CONCLUSION

The significance and essentiality of securing aerospace domination are all too obvious. Aerospace domination that must include cyber space may not be readily achieved if the adversaries are well matched. Under these circumstances, the domination will have to be fought for with the aim of securing the highest degree of domination that is feasible commensurate with the military requirements. The quest for aerospace domination is far too important to merit anything short of a very high priority, if not the highest priority.

There are costs involved. There will also be many limitations but aerospace domination is a laudable objective; the degree to which it can be achieved will be a function of the respective hardware, training and planning. A strategy enunciation is the first step. Any degree of dominance is better than lesser dominance.

There will always be those who will doubt whether the objective of aerospace domination is feasible and categorically state that the high costs are unwarranted. Again, they will argue that we cannot afford the high costs. The more relevant counter argument is that we cannot afford NOT to find the requisite funding for the best aerospace domination we can secure.