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A Threat-Based Reassessment of Western Air Power

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Abstract

The way in which the West employs its air power in the post-September 11 world demands reassessment (as indeed does every other national security capability). Two factors are especially important. First, the strike against the World Trade Centre and subsequent attacks on Western interests around the world may imply a change in the nature of conflict, away from state-versus-state, theatre-level campaigns towards a more ambiguous model represented by non-state actors, undefined battlefields, and disregard for the law of armed conflict — so-called 'asymmetric' warfare. The question here is: within that model, how relevant are traditional doctrines? Second, the suite of capabilities needed to mount and sustain a modern theatre-level air campaign is so complex and extensive that it is questionable whether it is a realistic aspiration for any nation other than the United States. That is not to say that individual states should no longer contemplate the possibility of having to conduct theatre-level campaigns should their security circumstances indicate a need to do so; it is to say, however, that in the process they must be keenly aware of their limitations. More than ever, planners must satisfy the imperative to match force structures to threats and interests, both national and collective.

Throughout the history of the systematic application of air power, two roles have remained pre-eminent: defensive counter-air; and precision strike. The effects we require those vital roles to generate will remain constant, but the ways in which they are pursued are likely to change conceptually, technologically and organisationally. As long as those changes are managed capably (a task which may challenge some traditional air force preferences), focused defensive counter air operations, and strikes which are precise both in the understanding of their intended effect and in their execution, should continue to provide the West in general and its smaller member states in particular with a powerful military asymmetric advantage. The successful application of those capabilities will be central to the West's campaign to contain the threat of jihadist revolutionaries and rogue states, and to promote the interests of good global governance, at both the collective and national security levels.

A Threat-Based Reassessment of Western Air Power

Alan Stephens

Since the end of World War II the Western way of war has been increasingly shaped by the exploitation of well-educated populations and overwhelming technological superiority, a combination which has facilitated the ability to fight with knowledge and precision, at a distance. Many armies fight very well close-up; the point is to deny them that opportunity. By making the most of this compelling military comparative advantage, the West's defence forces have in the past fourteen years won a series of remarkably one-sided victories in theatre-level campaigns.

That comparative advantage has been most pronounced in air combat. Drawing on capabilities that have been immensely superior — indeed, in the case of the United States, to all intents and purposes incontestable — Western air forces have applied a proven formula: first, establish control of the air; and second, subject the enemy to devastating precision attacks which have redefined the notions of 'manoeuvre' and 'mass'. The campaigns fought in the Middle East, the Balkans and central Asia have graphically demonstrated the consequences of the West's air supremacy (as did those fought by the Israelis between 1967 and 1982.)[1] Such is the extent of that dominance that Western armies and navies now routinely prepare their campaign plans on the assumption that not only will they be free from enemy air attack, but also that they themselves will be able to exploit the skies unimpeded (for strike, reconnaissance, manoeuvre, information, resupply, medevac, etc).

But like every other national security capability, the way in which the West employs its air power in the post-September 11 world demands reassessment. Two factors are especially important. First, the strike against the World Trade Centre and subsequent attacks on Western interests around the world imply a change in the nature of conflict, away from state-versus-state, theatre-level campaigns towards a more ambiguous model represented by non-state actors, undefined battlefields, and disregard for the law of armed conflict — so-called 'asymmetric' warfare.[2] The question here is: within that model, how relevant are traditional doctrines? Second, the suite of capabilities needed to mount and sustain a modern theatre-level air campaign is so complex and extensive that it is questionable whether it is a

realistic aspiration for any nation other than the US.[3] That is not to say that individual states should no longer contemplate the possibility of having to mount theatre-level campaigns should their security circumstances indicate a need to do so; it is to say, however, that in the process, they must be keenly aware of their limitations. More than ever, planners must satisfy the imperative to match force structures to threats and interests, both national and collective.

The objective of this paper is to broadly reassess the role of Western air power as a tool of national security, with special reference to actors other than the United States. NATO and Australia provide representative historical and contemporary examples.

Threats and Force Structures

The North Atlantic Treaty Organisation was formed in April 1949 with twelve foundation members. NATO represented a rational response to any analysis of the classic security determinants of threats, interests and motive, being explicitly conceived as a counter to the Soviet Union, whose competing ideology and immense military power constituted a clear and present danger to each of the new organisation's member states.

Deciding that the USSR was in the first instance a military threat, and therefore by definition hostile to Western interests generally, was not an intellectually demanding exercise. Nor was it especially taxing to determine the broader defence posture NATO needed to adopt. Given the Soviets' substantial numerical advantage on the ground, their apparent greater willingness to accept casualties, and the likelihood that they would strike any first blow, NATO had to place its emphasis on superior air forces which could simultaneously stop the enemy's nuclear-armed bombers on their way to targets in Europe, and halt the advance of enemy tanks and troops across the plains of Germany.

As its response to the first component of that threat, NATO constructed an integrated defensive counter-air capability (DCA), built on contributions from member states. Within that total system, individual European states such as the United Kingdom, Sweden, Norway and France (whose relationship with NATO has at times been diffident, but whose participation in times of major crisis was expected) developed discrete DCA systems of their own. The thinking here was that the prospect of a nuclear strike against one's own citizens was too horrifying to have to rely on someone else, even NATO.

Air power was also central to NATO's plans to counter the second element of the Soviet threat, a land invasion. Eventually, air forces from the UK, the US, Canada and France were equipped with tactical nuclear weapons as a means of offsetting the Red Army's worrying numerical advantage in armour, artillery and men. The end result was, as one historian has written, by the mid-1950s, NATO had built 'a veritable … Maginot Line of fighter and fighter-bomber bases' along the Rhine.[4] Hindsight informs us, of course, that the anticipated war between east and west never happened, with the collapse of the Berlin Wall in 1989 also symbolising the collapse of the Soviet Union.

Such had been the immensity of the Soviet threat that its sudden removal left some defence planners in a state of intellectual uncertainty. Consequently, when the almost unavoidable time-lag associated with reshaping and re-equipping air forces was superimposed onto that uncertainty, NATO as a whole and some countries within the organisation arguably entered the 21st century with legacy force structures and legacy thinking.

Indeed, to pursue this line of reasoning, we might even question the relevance of NATO's defensive-counter air system for the three decades prior to the fall of the Berlin Wall, given that the Soviets deployed their first inter-continental ballistic missile (ICBM) in January 1960.[5] The point here is that once both of the Cold War's major protagonists had fielded nuclear-armed ICBMs, the superseding danger always was that any conventional conflict between the two would rapidly escalate into a nuclear exchange.[6] Should that have happened, NATO's conventional forces would have been irrelevant, at least in the context for which they were conceived. NATO commanders from that era might have been startled had they known that, immediately any hostilities started, the Soviets intended detonating tactical nuclear weapons on Denmark — a declared nuclear-free zone — as a demonstration of their ability to annihilate the rest of Europe.[7] In those dire circumstances, Moscow regarded Denmark as 'expendable'.

The reality is that the dominant operational concept of the Cold War had nothing to do with vast tank battles in the Fulda Gap, or mass aerial intercepts overhead the same region.[8] Rather, it was the grotesque yet compelling doctrine of mutual assured destruction (MAD). The concept of MAD explicitly recognised that defence against the nuclear threat was impotent, and that only deterrence in kind could act as a counter. It was the threat of MAD, not the disposition of conventional forces, that underwrote fifty years of relative strategic stalemate in Europe, by deterring direct military conflict between the superpowers and, by association, their client states.

In other words, the only military capability that really mattered in Cold War Western Europe was the American nuclear umbrella. An over-riding concern for states sheltering under that umbrella was whether or not the US would retaliate if Europe were attacked but America was not: to paraphrase the adage, whether the US would be prepared to exchange, say, Minneapolis for Milan. Happily we shall never know the answer to that, but we can be certain that no-one's national air defence system would have been of any use had ICBMs not bombers been the Soviets' preferred strike platform.

The preceding discussion perhaps goes some way towards explaining why NATO did not fight an air war until 1995; namely, because there was a fundamental disconnect between the bulk of its force structure and the reality of the threat. And when NATO finally did go to war in the air, the circumstances could scarcely have been further removed from those envisaged in 1949. Operation *Deliberate Force* had nothing to do with the air defence of any of NATO's members, but was instead a highly focused, limited duration, offensive air campaign against the regime of the then-president of the Federal Republic of Yugoslavia, Slobodan Milosevic. Furthermore, without questioning the professionalism of the other NATO contributors, a careful reading of the authoritative report on that operation suggests that American air power (air force, navy and marine) could have done the job comfortably by itself.[9] The same conclusion can be drawn from NATO's second air intervention in the Balkans, Operation *Allied Force*, conducted on a much larger scale four years later.[10]

A couple of intriguing observations arise from those two air expeditions. The first is that neither required NATO to conduct DCA operations, a situation which, given the organisation's raison d'être and the long-standing air defence posture of the smaller European member states, seems somewhat ironic. To adapt a truism from Michael Howard, force structures must constantly be tested against reality, and there are sufficient discontinuities here to justify some uncomfortable questions.[11]

The second observation has already been made but warrants elaboration: the Americans could have fought and won *Deliberate Force* and *Allied Force* unaided. By contrast, the rest of NATO's air power was utterly dependent on US capabilities such as intelligence (particularly from satellites), communications, all-weather precision strike, air-to-air refuelling, electronic warfare, suppression of enemy air defences, logistics, command and control, and planning. Once again, uncomfortable questions arise.

Answers doubtless would start from the ostensibly reasonable proposition that NATO is an alliance to which all contribute; and that any contribution serves to promote a nation's interests, multilaterally within the alliance and bilaterally with the Americans. But a devil's advocate might reply: at what stage does a contribution become token? And how token can a force structure become before excessive reliance on others (read the Americans) constitutes a de facto surrender of both sovereignty and the ability to self-defend in an emergency?

It would be unnecessarily alarmist at this early stage to make too much of President George W. Bush's recent announcement that over the next ten years the US will withdraw some 70,000 troops and 100,000 civilian employees and family members from Europe and Asia back to America.[12] But the decision should provide pause for reflection amongst those who believe the US will always come to the rescue, particularly in light of the Americans' increasing ability to conduct missions such as precision strike and ISR (information, surveillance, reconnaissance) from the continental US and/or space. (And a form of DCA may be added to those missions in the next few years if efforts to construct a national missile defence system succeed.) The implications are, first, that future American administrations may feel less inclined to commit their combat units to third-party threats and interests when those units are no longer in situ and, therefore, are not themselves at risk; and second, that the relevance of force structures assembled to confront a (now) non-existent danger must be vigorously re-examined against realistic threats and interests.

Threat assessment is sometimes considered an arcane art which is so uncertain that explicit conclusions either cannot be drawn, or are inherently too dangerous to draw because they could lead to an excessively specialised force structure, which in turn might be ineffective against unforeseen contingencies. But it is misguided to let policy vacuums develop. In the absence of informed judgments it can be tempting to take a blanket approach and try to cover every contingency by establishing a so-called 'balanced' force, in which a little bit of everything is represented. That kind of approach serves only to facilitate the clamour of vested interests above those of reason, and is likely to produce a defence force that is jack of all trades and master of none. In any case, at the broader level, threat assessments are neither arcane nor especially difficult to make.

For example, Nazi Germany and Imperial Japan clearly endangered a secure world order from around the mid-1930s; and the Soviet Union plainly was a threat to the West even when it was an ally in World War II. More recently, it is hard to dispute President George W. Bush's description of the

politically corrupt, disturbingly erratic, heavily armed North Korea as one of three members of an 'axis of evil' (even though we might feel uncomfortable with his rhetoric). Nor was Bush's naming of Iran and Iraq alongside Kim Jong-il's eccentric nation unwarranted, given both countries' recalcitrance regarding ballistic missiles and weapons of mass effect (WME). Iraq has of course been removed from the equation, for the time being at least. As for Iran, it is no coincidence that the country most at risk from any extremist Islamic state possessing nuclear-armed long-range missiles, Israel, is presently reshaping its force structure to emphasise long-range precision strike (that is, pre-emption), and missile defence of the homeland (that is, defensive counter-air).[13]

Just as the presence of a threat can be used to inform national security judgments, so too can the absence. To take an obvious case, the stunning transmogrification of the USSR into modern Russia has dramatically altered the security calculus in Europe. NATO today has twenty-six members compared to the original twelve, many of the additional fourteen being former members of the once-hostile Warsaw Pact. This radical shift indicates that any suggestion that Europe might be revisited by conflict of the nature or on the scale of the First and Second World Wars is so remote as to be incredible.[14]

Nor is it necessarily realistic to draw too much from what is happening elsewhere. Israel, for instance, has been fighting for its very existence for almost sixty years; in other words, however much we may regret what is happening in the Middle East, in terms of threat assessments, Israel is not Norway, or France, or Greece, and so on. To take the point further, while the Israeli Defence Force may be a model of professionalism, concepts of operations developed for, say, the Intifada in the West Bank and the Gaza Strip might not be readily transferable.[15]

At some stage in the threat assessment process judgments have to be made using the best available evidence, in order to ensure that timely, realistic security measures can be put in place. Such judgments were not difficult to make in the 1920s and 1930s, or during the Cold War, and they are not difficult to make now.

It is clear that by far the most serious and immediate threats to Western society come from the campaign of terror being waged by jihadist revolutionaries, and from the possibility of an attack with WME by 'rogue' states. Ultimately the jihadists will only be defeated by appropriate social and political policies, but in the immediate-term the phenomenon demands a focused military response. So too does the danger posed by rogue states: even though the probability that one of them will launch a nuclear-armed

missile may be low, the consequences would be so terrible as to require the most careful preparation.

Turning to interests as opposed to threats, everyone pays an unacceptable price when extreme human rights violations are allowed to continue unchecked. Persistent widespread abuses demand that recent examples of international interventions into places such as Rwanda, Somalia, Bosnia-Herzegovina, Kosovo, the Solomons and East Timor (with varying degrees of success) should remain foremost in the deliberations of national security officials.

Control of the Air

To summarise thus far, this paper has argued that force structure planning within many smaller Western nations (as in NATO) during the Cold War was not necessarily consistent with reality. Neither the nature of the primary threat nor the need to draw a distinction between collective and national security imperatives seems to have been adequately addressed. The paper has further argued that contemporary national defence planning (and therefore force structures) should be shaped, first, in response to the threats posed by jihadists and rogue states; and second, by the interests of the common good represented by intervention operations. The implications of those conclusions for air power will now be discussed.

Western air power has been remarkable for its constancy. For ninety years the air weapon has been distinguished by its unrivalled ability to deliver two vital capabilities: control of the air, and strike. Tactics and technologies may have advanced, but the two key competencies have remained the same. Recent campaigns in the Middle East and the Balkans, and against the jihadists, have however indicated that the way in which air forces deliver those capabilities may have to change.

Control of the air must be the start-point. Regardless of the level of conflict, for some sixty years dominating the skies has underwritten the Western way of war, a doctrine which increasingly has exploited overwhelming technological supremacy, a constantly improving ability to fight at a distance, precision, high-quality people, information superiority, and better ideas. Surrender control of the air and that entire methodology is placed at risk.

There should be no misunderstanding the fact that, for the first time since 1945, the extent of that dominance is under serious challenge. The West's enemies have finally realised that it is futile to oppose the air power of any US-led coalition in a conventional, theatre-level campaign;

consequently, they are turning to alternative ('asymmetric') methods which thus far the West has not adequately addressed. In addition to that doctrinal challenge, emerging technologies are likely to demand changes to the way in which Western forces achieve air dominance.

Traditionally there have been two main schools of thought on how best to win air superiority. The classic model formalised by the great Italian military theorist, Giulio Douhet, argues that it is preferable to destroy an enemy's air force on the ground, an offensive outlook which promises a rapid, decisive outcome.[16] The alternative model advocates aerial combat between opposing fighters, a defensive outlook which often involves a battle of attrition, and of which the American William 'Billy' Mitchell was an early proponent.[17]

Over the past fourteen years a third, 'intermediate' model may have emerged: one which combines the offensive and defensive approaches by striking against the infrastructure (radars, control and reporting units, communications, etc) of an enemy's integrated air defence system, rather than against his combat assets (aircraft, missiles, pilots). This intermediate approach relies heavily on suppression of enemy air defence (Sead) assets, and was applied by US-led coalitions in Iraq in 1991 and 2003, and in Kosovo in 1999.[18]

In general, the attainment of control of the air has not followed Douhet's offensive prescription but has been achieved defensively. The destruction on the ground of the Red Air Force by the Luftwaffe in mid-1941 and the Arab air forces by the Israelis in June 1967, for instance, were historical aberrations. Most air forces have preferred to structure themselves for the defensive counter-air role, because it is easier to organise and plan, politically less contentious, and can be concentrated around selected vital national assets such as the leadership, infrastructure, and the army. Examples include the Western Front in World War I, the Battle of Britain, the destruction of the Luftwaffe overhead Germany in 1944-45, Korea, Vietnam, the Falklands, and the Beka'a Valley.[19]

All three models today share a significant limitation, which NATO's history exemplifies. Within the setting of a major theatre-level campaign, only the Americans possess all of the essential capabilities (satellites and other specialised ISR systems, command and control, tankers, electronic warfare, Sead assets, information warfare, control of the Global Positioning System, large stocks of precision weapons, etc) to conduct a defensive counter-air, offensive counter-air, or 'intermediate' Sead campaign. Indeed, it is unlikely that NATO could mount and sustain a substantial campaign

without American assistance. This not only creates obvious operational problems for every other Western air force, but also brings into question the rationale for their dispositions in the context of national, as opposed to collective, security ambitions.

Complicating this disquieting situation is the changing nature of the threat. Counter-terrorism provides the start point, with the visit to Australia in October 2003 by US President George W. Bush offering an instructive illustration. For some twenty-four hours the citizens of Canberra could hear and often see Royal Australian Air Force (RAAF) F/A-18 fighters maintaining a standing combat air patrol overhead the national capital to protect President Bush against a range of possible terrorist actions. The Hornets reportedly were armed and authorised to shoot-down 'suspicious planes' during the arrival and departure of Air Force One, and to prevent possible suicide air attacks against the President's accommodation, the national parliament (which he addressed), and so on.[20] A similar operation was mounted during the (British) Commonwealth Heads of Government meeting at the Queensland resort town of Coolum in March 2002, when the rules of engagement apparently allowed patrolling F/A-18s to shoot-down any unauthorised aircraft that came within 40 kilometres of the venue.

Such operations bear little resemblance to the traditional application of control of the air, but we can expect to see more of the same, and variations thereof, in many countries, noting the frequent need for similar protective measures in the US and Europe since September 11, 2001.

This particular form of DCA illustrates a critical aspect of force structuring as it relates to national security obligations. As this paper has argued, within any collective security arrangement to which the US belongs, whatever the other members do or do not contribute to a theatre-level air campaign will be of little practical consequence, because the Americans will be more than capable of handling the job unaided. By contrast, at the national level, the new imperative to defend vital points, cities, VIPs, off-shore assets and the like against rapidly-appearing terrorist attacks has placed a premium on the ability to mount focused, independent DCA operations.

The issue is one of sovereignty as well as security. New Zealand provides a topical case study. In 2001 the New Zealand government disbanded its air combat force solely in the interests of saving money. Three years later, in a dramatically different international environment, the question now arises: how will New Zealand provide essential DCA when it next hosts a major international event? The odds are that its intensely nationalistic government will have to swallow its pride and come cap-in-hand and ask Australia to

do the job. There is little doubt that the RAAF would pick up such a task, but New Zealanders should be asking themselves: to what extent are they prepared to rely on others for their security; and how much sovereignty are they prepared to surrender in the name of reduced defence spending? The decision shows little comprehension of the security demands of the 21st century. Additionally, some might suggest that, as a wealthy member of the Western alliance, New Zealand has shown little comprehension of its responsibilities as a good global citizen.

A nation's ability to mount independent DCA operations overhead its vital places, people, events and so on will represent one of the key air power responses to today's often unconventional security environment.

Another unconventional threat to the West's continuing ability to dominate the skies is likely to come from shoulder-launched man-portable air defence system missiles (Manpads), and these too will require an unconventional DCA response.

On 8 January 2004 a USAF C-5 airlifter taking-off from Baghdad was apparently hit by a surface-to-air missile; similarly, on 9 December 2003 a C-17 was hit. Other details are not clear, but both aircraft landed safely. More information has emerged regarding the civilian DHL Airbus A300 cargo jet at which two Russian-made SA-14 Gremlin Manpads were fired on 22 November 2003. One missile hit the A300's left wing, which caught fire; again, the pilots managed to land safely. At least 14 other attempts have been made to shoot down civilian aircraft with Manpads in Iraq in the past year; additionally, a substantial number of US Army helicopters has been shot down by SA-7s and rocket-propelled grenades. The Manpads threat is not confined to Iraq. Two SA-7 Grails were fired unsuccessfully at an Israeli B-757 taking-off from Mombassa, Kenya, in 2002; while overall, in the past 25 years, some 35 missiles have been launched against civil aircraft around the world, leading to 24 crashes and 500 fatalities.[21]

The surprising thing is that more attacks have not been made. It is not difficult to transport, prepare, aim and fire a Manpad. Both the SA-7 and the SA-14 are light enough for one or two people to carry and fire, and both missiles take less than a minute to assemble, aim and launch. Hundreds of thousands of shoulder-fired missiles have been manufactured in the past three decades; and Russian authorities have warned that 'tens of thousands' of Manpads may have been stolen in the chaos that followed the disintegration of the USSR. Anything from 50,000 to 100,000 may be available on the international arms black market, with an SA-7 reportedly costing a mere US$15,000.[22] The SA-18 Grouse which has a kill probability of 0.75

(some three times greater than the 0.25 ascribed to the SA-7) may also now be available to terrorists.[23]

An advanced Manpad typically has a range of 5 kilometres, a ceiling of 4000 metres, and a speed near mach 2.0. When combined with the relatively slow climb and descent rates of airliners, those performance characteristics establish a threat envelope around airports about 80 kilometres long, 10 kilometres wide and 4,000 metres high.[24] At a major hub, a dozen or more wide-bodied jets might be inside that envelope at any one time. The difficulty of detecting and then neutralising a Manpads threat within the heavily urbanised areas that surround many airports is self-evident.

One response would be to equip airliners with military-style anti-missile defence systems (flares, lasers), a possibility which is presently being examined.[25] Proscription is also under consideration, with efforts now being made to establish a control regime for the production and sale of Manpads, one such call coming from world leaders at the Asia-Pacific Economic Cooperation meeting held in Bangkok in October 2003. But previous attempts to control arms flows have been largely unsuccessful; and anyway, in this case, the horse would appear to have already bolted. A much more proactive response to this most disturbing control of the air challenge is required. Prompted by the imperative to establish a safer operating environment for the helicopters which are an integral part of its activities in the occupied territories, the Israeli Defence Force (IDF) may have identified one useful concept.

Slower and less robust than fixed-wing aircraft, helicopters are highly vulnerable to ground fire from Manpads, rocket-propelled grenades, and a range of infantry weapons. Self-defence systems are available but, as the US Army's disastrous experiences with its Apache attack helicopters in Kosovo in 1999, Afghanistan in March 2002, and Iraq in March 2003 demonstrated, helicopters are best employed after control of the air has been achieved in the traditional manner, that is, by fixed-wing fighter and ground attack aircraft.[26]

But the kind of threat posed by a suddenly-emerging Manpads team, or a fleeting gunman, is unlikely to be countered by the traditional method. Consequently, in a most inventive response, the IDF is adapting a technique pioneered by the US Marines by developing sniper posts for its Black Hawk helicopters.[27] Mounted on the side of the choppers, the posts consist of a platform and gunnery chair which remain relatively stable even during turbulence and aircraft manoeuvring. A sharp-shooter with a long-range sniper rifle is carried on the platform and is responsible for seeing and

picking off suddenly-appearing militants before they can fire their anti-aircraft weapons.

This unusual control of the air initiative apparently has captured the attention of US forces in Iraq, where militants are regularly shooting down helicopters over both open and built-up areas. If the airborne sniper post works — and, having conducted trials, the IDF reportedly is confident it will — it is likely to be copied around the world. If so, it may raise awkward questions of resource allocation for senior air commanders who customarily have preferred to spend their limited budgets on fixed-wing fighters. Awkward or not, such questions will have to be addressed in relation to realistic threat assessments.

At the other end of the threat scale, ballistic and cruise missiles fitted with WME constitute another growing non-traditional control of the air challenge.[28] In recent years the number of countries reportedly capable of fielding ballistic missiles has grown from eight to twenty-five. The performance of many of those weapons is improving, with North Korea's developmental Taepo Dong-2 having a range of around 15,000 kilometres; India's Agni-III about 4,000 kilometres; Iran's Shahab-3A/4 some 1,500 kilometres; and China's CSS4 and CSS5 both with intercontinental range.

There is no little irony in the fact that the Scud surface-to-surface missiles which caused so much concern in the two wars with Saddam Hussein's regime, and which continue to be a primary vehicle for the efforts of a number of rogue states to develop long-range ballistic missiles, is a derivative of the Nazis' World War II V-2 ('Vengeance') rocket. The (British) Royal Air Force had no viable control of the air system against the V-2, and it remains a moot point whether one exists against its successors. Initial fulsome claims made on behalf of Patriot anti-missile batteries during the 1991 Gulf War were subsequently found to have been grossly exaggerated (although unofficial reports suggest that the system may have performed better against cruise missiles in 2003); and while the Israelis have expressed confidence in their Arrow anti-missile system, which was declared operational in March 2000, it remains unproven in combat. And controversy continues to shadow the US's long-standing effort to develop a national missile defence system (NMD), which many critics assert is technologically impracticable and, at US$100 billion, unaffordable.[29]

Still, we should not be surprised that numerous nations are interested in missile defence systems. The danger posed by medium- and long-range missiles armed with nuclear, chemical or biological warheads is simply too great not to demand a proactive response. It is no coincidence that the

country presently most at risk, Israel, has had its Arrow anti-missile defence system in place for almost five years; and the country next at risk, the United States, has made the development of an NMD one of its highest security priorities.

Other nations that have expressed a strong interest in missile defence systems include India and Pakistan (against each other), and Japan (against North Korea). Japan's proposed architecture of Patriot PAC-3 land-based systems and Aegis-frigate/SM3-missile sea-based systems may represent an affordable prototype for countries other than the US, and for whom a realistic objective would be to defend a specific point against a specific threat.[30] By contrast, the Americans' objective for their NMD is to build a defensive shield that would protect the entire country against all threats.

A common feature of both the Manpads and ballistic missile threats is that, in contrast to the enemy capabilities which gaining control of the air traditionally has eliminated — air strike, reconnaissance and manoeuvre — the problem here is ground-based. A focus on ground-based threats is also motivating the American, German and Italian armies' interest in developing a theatre-level equivalent of NMD, titled Medium Extended Air Defence System (Meads), which aims to protect deployed land forces against the menace of rockets, artillery rounds, mortar shells, cruise missiles, manned and unmanned aircraft, short-range ballistic missiles, and Manpads.[31] Expected to defend an area out to a radius of 40 kilometres, Meads would utilise a range of sensors and kinetic- and directed-energy weapons.

It remains to be seen whether Meads and similar systems will be effective against yet another disturbing emerging ground-based threat, the very short range ballistic missile (VSBM). Flying at transonic speeds over distances less than 100 kilometres, at rates of fire up to twenty rounds per minute, potentially armed with WME, and largely exempt from international arms controls protocols, VSBMs pose a severe DCA challenge.[32] Presently VSBMs are arrayed mainly against Israel, along whose northern borders thousands are said to have been deployed, but the weapon's relative simplicity, low cost, and high leverage are likely to lead to its proliferation in the next few years.

A conspicuous feature of initiatives such as the helicopter sniper posts, NMD and Meads is their implicit acknowledgement of the changing face of control of the air, through their focus on ground-based threats. Indeed, in an air defence environment that has become far more difficult to manage, land forces may have to assume greater responsibility generally for gaining control of the air.

There is any number of precedents, two of the more notable being the capture of Luftwaffe airfields and, therefore, the negation of Nazi air power, by advancing allied armies following the Normandy invasion in June 1944; and the breaching by Ariel Sharon's armoured columns of the Egyptians' previously impenetrable (to the Israeli Air Force) ground-based air defence system along the Suez Canal during the first week of the Yom Kippur War in 1973. More recently, Australian, British and American Special Forces played a vital clandestine role in the weeks leading up to the start of Operation *Iraqi Freedom* by ensuring that western Iraq was free of Scuds which might have been fired at Jordan and Israel in an attempt to widen the pending conflict.[33] Given the nature of current threats, we may see more resources being diverted towards this non-traditional approach to control of the air.

Precision Air Strike

The ability to strike unexpectedly and decisively at great distances — to generate a rapid strategic effect — has been and remains the second essential string to the West's unrivalled air power bow. Like control of the air, strike capabilities must be measured against credible threats and legitimate interests. And it is again the case that American offensive air power is so superior to everyone else's that it can be used only to inform, not to emulate. Any examination of Western orders of battle and recent post-conflict reports will reveal that no nation other than the US could mount and sustain a theatre-level offensive air campaign unaided: the necessary breadth, depth and quality of resources simply is not there. Even the United Kingdom needed extensive assistance from the US during the (admittedly very demanding) campaign against Argentina in the South Atlantic in 1982; similarly, Israel could not have conducted its brilliant offensive campaigns in 1967 and 1973 without massive American support.[34]

Because US air strike power will be capable of doing the job by itself in any coalition operation, any nation seeking to play its part either as a good global citizen, or in order to build credit with its allies, has a wide range of options since, in terms of resolving those (nominal) conflicts, what it does (as opposed to the perceived need to be involved) will not matter. Again, as was the case with control of the air, the issue therefore becomes one of identifying those capabilities that are relevant to national, as opposed to collective, threats and interests. As it happens, technologies such as stealth, precision, advanced ISR and communications, stand-off weapons, and miniaturisation, are making focused precision air strikes increasingly feasible for small, high-quality air forces.

Israel's stunning raid against the Osirak nuclear reactor at al-Thuwaitha near Baghdad in June 1981 serves as an early model: although neither stealth technology nor stand-off weapons were used, the Israeli Air Force achieved similar effects through the substitution of exceptionally skilled planning and mission execution.[35] It is noteworthy that the mission was flown by only eight strike aircraft accompanied by six air defence fighters, with a handful of communications and intelligence platforms in support. That such a small force could achieve such a dramatic effect should be noted by every thoughtful military planner. Plainly, strategic outcomes are within the potential of an intellectually and technologically advanced air force.

Similar skill sets were evident during NATO's so-called 'crony targeting' air campaign against former Yugoslavian president Slobodan Milosevic's inner circle of supporters during Operation *Allied Force* in 1999. Properly directed against the will of the privileged élite whose backing an authoritarian ruler invariably needs to hold power, 'crony targeting' attacks those individuals' means of power and the things they cherish: their businesses, their wealth, their prized possessions, their organisational systems, their information, perhaps even their values.[36] The key to any such campaign is not numbers but, like the Osirak raid, quality people, ideas, information and technology.

'Crony targeting' implies more than a hint of 'decapitation', a notion which has been in vogue since John Warden's ideas on air strategy came to prominence during the 1991 Gulf War.[37] More than any other theorist, Warden has stressed the importance of attacking the enemy's leadership, by which he means senior officials, command and control systems, and communications. One interpretation of this theory has emphasised 'decapitating' (a euphemism for 'killing') the ruling élite, with the attempted assassination by air strike of Saddam Hussein, his sons and other members of the Ba'athist hierarchy during Operation *Iraqi Freedom* in 2003 being an example.[38] Another example has been provided by the Israelis, with the killing of Hamas leader Sheik Ahmed Yassin by a helicopter gunship in March 2004. Yassin's death seems to have served Israel's interests in the short-term at least, as it reportedly has prompted other Hamas principals to go into hiding and to stop using traceable communications such as cellular telephones, thereby limiting their ability to manage terrorist operations.[39]

There are arguments for and against decapitation. On the one hand, Israeli officials argue that assassinating enemy leaders undermines terrorist organisations and reduces the possibility that their citizens will be blown-up by suicide bombers. Furthermore, the use of small numbers of precision

weapons and the targeting of specific individuals both punishes those believed to be primarily responsible for acts of aggression and minimises collateral damage. And when the target is someone like Saddam Hussein, decapitation seems to offer the promise of a strategic outcome.[40] Finally, the technique is suited to the skills possessed only by the highest quality air forces; that is, it represents an asymmetric advantage for the West.

On the other hand, assassination carries serious legal and ethical implications, especially when a formal state of war does not exist between the protagonists. Nor is it clear that decapitation is ultimately effective. Killing people like Sheik Yassin might well derail an organisation's schemes in the short-term, but thus far there is insufficient evidence to show that the practice leads to long-term solutions. At this stage it is unclear whether decapitation represents an instance of technology driving ideas — of doing something because we can, not because we should — or whether it is a legitimate and viable operational concept. That particular concern should not, however, be allowed to cloud the potential for precision strikes against lawfully determined enemy centres of gravity to achieve rapid strategic effects.

Interests and Interventions

Turning to interests as opposed to threats, the global situation indicates that the most likely military task for developed nations over the next twenty or so years will be intervention operations into states where human rights are being abused, or peace and security have been compromised to an unacceptable degree, or assistance is needed to prevent a collapse into the 'failed state' category.[41] Whereas the consequences of actions taken in response to threats could be dire, the success or failure of an intervention is unlikely to impact on the immediate well-being of the participating nations. In other words, involvement should be motivated more by the general interest, as defined by good global governance, than by any direct security concerns.

Recent intervention campaigns have varied considerably in scale and scope, but valid generalisations can still be drawn. The United Nations-sanctioned mission in East Timor in 1999 represents a useful model because it was reasonably large and complex, risked the possibility of a hostile military reaction from the host/aggressor nation, Indonesia, and was ultimately successful.

The International Force East Timor (Interfet) was initially led by Australia and eventually comprised seventeen nations. No American combat forces were directly involved, although the US did make an important logistics

and ISR contribution. The deployment ostensibly was mounted with Indonesia's cooperation, but the possibility of aggression from either rogue elements of the Indonesian armed forces or their violent client militia gangs could not be discounted.

As far as air power is concerned, once Interfet was safely established on the ground in East Timor, airlift in all of its varieties became the primary contributor. But prior to that, in the early days, the situation was highly charged and could easily have escalated dangerously. A key factor in keeping things under control was the weapon of deterrence. The entire intervention in East Timor was underwritten by the deployment to northern Australia (that is, to within range of Timor and points west) of Australian Defence Force F-111 bombers. In the event, those air strike forces were not needed, but there should be no doubt that the implied threat was well-understood in Jakarta. Equally significant was the potential for F/A-18 fighters to appear on DCA patrol overhead the otherwise vulnerable ships and transport aircraft that landed Interfet's advance guard.

In short, a demonstrated ability to mount credible, focused, defensive counter-air and air strike operations can be a valuable tool for exerting pressure on reluctant host/aggressor nations. That pressure can be exploited to convince the hosts to accept intervention; and once the intervention has started, it can be paraded to remind them that recalcitrant behaviour could attract severe costs.

Emerging Technologies and Concepts

Before concluding, brief comment should be made on the likely impact on air power of new technologies, and of the important emerging concepts of effects-based operations (EBO) and network-enabled warfare (NEW).[42]

Technology will have no impact whatsoever on the defensive counter-air and precision strike capabilities that this paper has argued will be central to the ability of advanced nations to mitigate their threats and to pursue their interests. DCA and strike missions undoubtedly will migrate from manned to unmanned platforms, both air-breathing and space-based, probably sooner rather than later, but the new hardware will simply continue to generate the same capabilities, albeit by remote control and, in the case of space systems, from a greater height.

Unmanned aerial vehicles (UAVs) have been demonstrating their worth in the ISR role for years. That worth seems certain to extend to unmanned combat aerial vehicles (UCAVs), with the impressive results already achieved by first-generation systems such as Predator A armed with Hellfire

missiles indicating that we have only scratched the surface.[43] The enormous performance gains and casualty minimisation inherent in removing pilots from platforms should eventually generate an irresistible momentum towards UCAVs, despite the opposition from entrenched organisational (pilot) interests.[44] Space systems remain more problematic, but ISR satellites in particular should become accessible to more nations as miniaturisation continues to reduce costs.[45]

Indeed, the challenge for today's air power commanders is not whether UAVs, UCAVs and space systems might eventually replace piloted aircraft — that is a given. Rather, their task is twofold: how and when will they manage the shift of resources (equipment acquisition, education, training) away from manned aircraft towards unmanned vehicles; and what kinds of people will they need to operate systems that no longer have on-board pilots?[46] The challenge essentially is a matter of timing. While the way must be prepared now for change, in the medium-term, only manned combat platforms will offer a flexible, rapid reaction response to suddenly emerging threats to remote vital assets such as, for example, off-shore rigs and resources. Furthermore, notwithstanding the unquestioned potential of unmanned vehicles, their comparative inflexibility will make them a problematic alternative for most (resource limited) air forces for many years yet.

It is appropriate that this paper's final observation, ostensibly about EBO and NEW, is, in reality, about people. Modern air power provides a unique capability with which to counter threats and pursue interests. Very few nations are capable of properly applying air power and, for those that are, it represents perhaps their single greatest military comparative advantage. And let us not misunderstand the moment of that advantage. In an era when nihilist enemies habitually ignore international law, human rights law, and the law of armed conflict as a means of leveraging asymmetry, we in turn must seize every opportunity to leverage our asymmetric advantage, which is technological and intellectual as opposed to behavioural. Which leads to the people who translate technological potential into legitimate force.

Simply put, an air service can only be as good as its people and their ideas. A recent Australian experience is instructive here. In July/August 2004 the RAAF hosted 'Pitch Black 04', a demanding, multi-national air defence exercise fought over hundreds of thousands of square kilometres in Australia's remote northern regions.[47] Pitch Black reportedly was a great success, featuring among other things real-time operational control exercised

by a combined air operations centre (CAOC) located at Air Command Headquarters just west of Sydney, some 3,000 kilometres distant from the area of operations. On occasions, the CAOC tasked rudimentary time-sensitive targeting missions.

While the overall conduct of Pitch Black may (understandably) have fallen short of the idealised notion of EBO and NEW, it nevertheless applied their basic precepts. According to unofficial reports, the single greatest capability shortfall commanders had to contend with was not the technology, which by and large was available and did the job but, rather, the scarcity of people who were educated to think and work within an EBO/NEW framework. A similar point was made in a different context by a senior American official discussing the use of advanced technologies to combat terrorism: 'You can field the technology largely with off-the-shelf products. What's the most difficult is the training, the concept of operations, developing the tactics, techniques and procedures that are required to make [these new devices] into viable operational assets'.[48] There is an enduring message here.

Conclusion

A nation's security posture should be determined by a rational assessment of threats and interests. That assessment in turn should lead to a realistic defence force structure which will satisfy both national and collective objectives. Against the background of the overwhelming nature of the concept of MAD which dominated security planning for most of the Cold War, it is problematic whether the conventional air power assembled by smaller Western nations during those years was realistic in relation to the threat, although it may have served national interests to some extent.

Contrary to some assertions, the calculation of broad threats and interests is not an arcane art. Thus, just as MAD should have shaped everyone's Cold War posture, so the threats of jihadist revolutionaries and rogue states armed with WME, and the over-riding common interest served by good global governance, should be the dominant considerations for today's leaders, including military commanders.

Throughout the history of the systematic application of air power, two roles have remained pre-eminent: defensive counter-air; and precision strike. The effects we require those vital roles to generate will remain constant, but the ways in which they are pursued are likely to change conceptually, technologically and organisationally. As long as those changes are managed capably (a task which may challenge some traditional air force preferences),

focused DCA operations, and strikes which are precise both in the understanding of their intended effect and in their execution, should continue to provide the West in general and its smaller member states in particular with a powerful military asymmetric advantage. The successful application of those capabilities will be central to the West's campaign to contain the threat of jihadist revolutionaries and rogue states, and to promote the interests of good global governance, at both the collective and national security levels.

Notes

[1] The references here are to Operation *Desert Storm* (Iraq, 1991), Operation *Deliberate Force* (the Balkans, 1995), Operation *Allied Force* (the Balkans, 1999), Operation *Enduring Freedom* (Afghanistan, 2001-2), Operation *Iraqi Freedom* (2003), the Six-Day War (1967), the Yom Kippur War (1973) and the Beka'a Valley (1982).

[2] Ironically, the emergence of the global Islamic jihadist revolution has given some states that previously had troubled relationships a new form of shared interest, as they unite against a common enemy. As far as rogue states are concerned, the (British) Royal Air Force's commander-in-chief of Strike Command has suggested that the US-led invasion of Iraq in 2003, Operation *Iraqi Freedom*, might be regarded as 'the last war of its type' because 'we are pretty much running out of rogue states'. See Air Chief Marshal Sir Brian Burridge, 'Iraq 2003 – Air Power Pointers for the Future', in the *Royal Air Force Air Power Review*, Vol. 7, No. 3, Autumn 2004, p. 2.

[3] In addition to the standard capabilities provided by air defence and strike aircraft, a modern, robust theatre-level air campaign would require at least the following: space-based sensors (for navigation, weather information, surveillance and intelligence, and target tracking); precision weapons; highly skilled campaign planners; airborne early warning and control; air-to-air refuelling; electronic warfare; information warfare; suppression of enemy air defences; a real-time command and control system; and data links. Only a handful of nations could aspire to that standard and, within the Western alliance, all, including the UK, would have to rely on the US to some extent.

[4] Stuart Peach, 'RAF-USAF Air Power in Germany during the Cold War', in Royal Air Force Historical Society, *Journal 32*, 2004, p. 89.

[5] The first operational Soviet ICBM was the SS-6/R-7 'Sapwood', which had a 3.5 megaton yield warhead and a range of about 8,500 kilometres.

[6] For a seminal examination of this issue, see Desmond Ball, 'Can Nuclear War be Controlled?', in *Adelphi Papers*, No. 169, International Institute for Strategic Studies, London, 1981. A somewhat (not unreasonably) cynical but no less powerful analysis of the same subject can be found in Martin van Creveld, *The Transformation of War*, The Free Press, New York, 1991, pp. 1-32.

[7] Robert Hutchinson, *Weapons of Mass Destruction*, Cassell, London, 2004, p. 3.

[8] The Fulda Gap is the term used to describe the geographic corridor in Germany that starts near Erfurt-Eisenach in the east, crosses the old Cold War border near Phillipstal-Rasdorf, and then runs west all the way to Frankfurt and the Rhine. Its relatively open terrain was a major passage for allied armies in World War II, and it was considered likely to have been the main route for any invasion by Warsaw Pact forces during the Cold War.

[9] For details of the campaign see Robert C. Owen, *Deliberate Force: A Case Study in Effective Campaign Planning*, Air University Press, Maxwell Air Force Base, 2000.

[10] See Benjamin S. Lambeth, *NATO's Air War for Kosovo*, Rand Corporation, Santa Monica, 2001.

[11] Michael Howard, 'The Forgotten Dimension of Strategy', in *Foreign Affairs*, Summer 1979. Howard's point was that theories must constantly be subjected to the test of reality.

[12] For an analysis of this, see Michael P. Noonan, 'Reform Overdue: The Geopolitics of American Redeployment', Foreign Policy Research Institute, Philadelphia, 23 August 2004.

[13] Iran's Shahab missile was paraded by Revolutionary Guards along with the banner 'Israel should be wiped off the map': Agence France-Presse (Tehran), 'Iran Ready to Show Off Shahab-3 Missile', in *DefenseNews*, 7 September 2004. See also Andrew Koch and Robing Hughes, 'Tehran altering ballistic missiles', in *Jane's Defence Weekly*, 8 December 2004, p. 4.

[14] As John Keegan has noted in relation to D-Day, 'I think it was the last great battle between Europeans … I don't think Europeans will fight each other again'. Interview, in *The Weekend Australian*, 5-6 June 2004, p. 31.

[15] A comprehensive review of developing Israeli concepts of operations is presented in Alon Ben-David, 'Inner Conflict: Israel's Low-Intensity Conflict Doctrine', in *Jane's Defence Weekly*, 1 September 2004, pp. 24-28. 'Intifada' is the name given to the Palestinian's lightly-armed but aggressive resistance to the Israelis in the occupied territories.

[16] Giulio Douhet, *The Command of the Air* (trans. Dino Ferrari), Office of Air Force History, Washington DC, 1983, pp. 52-3.

[17] William Mitchell, *Winged Defense*, Dover Publications, New York, 1988, p. 199.

[18] For details of those 'Sead' campaigns, see Richard P. Hallion, *Storm over Iraq*, Smithsonian Institution, Washington, 1992, pp. 162-200; Lambeth, *NATO's Air War for Kosovo*, pp. 19-25; and Walter J. Boyne, *Operation Iraqi Freedom*, Forge Books, New York, 2003, pp. 68-89.

[19] The destruction of the Luftwaffe over Germany in 1944-45 has been characterised as DCA because it was achieved by RAF and USAAF fighters which were protecting the allied bomber stream. The bomber stream may have been moving in space, but in effect it was a single 'vital point' around which its escorting fighters flew DCA. The Luftwaffe was drawn-up to attack the bombers, and was gradually destroyed by the USAAF and RAF fighters in a war of attrition. See Noble Frankland, *The Bombing Offensive Against Germany*, Faber and Faber, London, 1965, p. 83; and John Terraine, *The Right of the Line*, Sceptre, London, 1988, pp. 619-20, 664.

[20] David McLennan, 'Armed Hornets to escort Bush 747', in *The Canberra Times*, 21 October 2003, pp. 1-2.

[21] William Matthews, 'Defending Airliners from Portable Missiles', in *DefenseNews*, 1 December 2003, p. 22.

[22] See Douglas Barrie and Robert Wall, 'Big Headache' in *Aviation Week & Space Technology*, August 23/30, 2004, pp. 57-8; Victoria Samson, *The MANPADS Menace?*, Center for Defense Information, August 2003; GlobalSecurity.org, *SA-14 Gremlin 9K34 Strela-3*, at http://www.globalsecurity.org/military/world/russia/sa-14.htm, accessed 15 September 2004; 'Surface-to-Air Missiles Seized in Albania', in *DefenseNews*, 13 December 2004; and 'Israel Accuses Palestinians

of Harbouring Five Missiles', Agence France-Presse, Jerusalem, in *DefenseNews.com*, 4 January 2005.

[23] A probability of kill (pk) of 0.25 means that a weapon has a one-in-four chance of destroying its target. Thus, if four SA-7s were fired at the one aircraft, the pk mathematically would be 100%.

[24] Matthews, 'Defending Airliners from Portable Missiles', p. 22.

[25] Pierre Tran, 'EU Soon to Select Airliner Protection Plans for Study', in *DefenseNews*, 3 September 2004; and Robert Wall and David Hughes, 'Missile Quandary', in *Aviation Week & Space Technology*, 1 December 2003, p. 46.

[26] The references here are to the US Army's failed attempt to bring Apache attack helicopters into action during Operation *Allied Force* in 1999; to the near-disastrous Operation *Anaconda* in 2002; and to the equally bungled Apache attack against the Medina Division on 24 March 2003. See Lambeth, *NATO's Air War for Kosovo*, pp. 147-158; and Boyne, *Operation Iraqi Freedom*, pp. 87-9.

[27] Barbara Opell-Rome, 'Israel to Equip Black Hawks with Sniper Posts', in *DefenseNews.com*, 28 October 2003.

[28] Randy Barrett, 'US Study: Growing Threat from Ballistic Missiles', in *DefenseNews.com*, 14 October 2003.

[29] See for example 'Anti-missile system fails interceptor test', in *The Australian*, 17 December 2004, p. 8.

[30] See Gopal Ratnam, 'Less Expensive PAC-3 Passes US Army Test', in *DefenseNews*, 13 September 2004.

[31] Robert Wall, 'To the Finish Line' in *Aviation Week & Space Technology*, 23/30 August 2004, pp. 29-30; Martin Agüera, 'Partners Work to get MEADS Papers in Order', in *DefenseNews*, 23 August 2004; and Michael Sirak, 'US Army eyes defence against a mix of threats', in *Jane's Defence Weekly*, 5 November 2003, p. 5.

[32] Barbara Opell-Rome, 'Israel Seeks Way to Thwart VSBMs' in *DefenseNews.com, Air Warfare*, 30 August 2004. 'Thousands' of Iranian-built 'Fajr' VSBMs reportedly have been deployed in southern Lebanon by the terrorist organisation Hezbollah.

[33] Quoted in Greg Sheridan, 'US plan to "pre-position" arms', in *The Australian*, 19 January 2004, p. 2.

[34] UK forces received crucial intelligence and weapons resupply from the Americans.

[35] See Rodger W. Claire, *Raid on the Sun*, Broadway Books, New York, 2004.

[36] See William M. Arkin, 'Smart Bombs Dumb Targeting', in the *Bulletin of the Atomic Scientists*, May/June 2000, Vol. 56, No. 3, pp. 46-53; Lambeth, *NATO's Air War for Kosovo*, pp. 70-1. For the theory of 'axiological' (values-derived) targeting, see Peter W.W. Wijninga and Richard Szafranski, 'Beyond Utility Targeting: Toward Axiological Air Operations', in *Aerospace Power Journal*, Maxwell Air Force Base, Winter 2000, pp. 45-59.

[37] For commentary on Warden's ideas, see David S. Fadok, 'John Boyd and John Warden: Airpower's Quest for Strategic Paralysis', in Phillip S. Meilinger (ed.), *The Paths of Heaven: The Evolution of Airpower Theory*, Air University Press, Maxwell Air Force Base, 1997; Robert Pape, *Bombing to Win: Air Power and Coercion in War*,

Cornell University Press, Ithica, 1996; and John Andreas Olsen, 'Colonel John A. Warden III: Smasher of Paradigms?' in Peter W. Gray and Sebastian Cox (eds.), *Air Power Leadership: Theory and Practice*, London, The Stationery Office, London, 2002.

[38] For more details of those attempted assassinations, see Boyne, *Operation Iraqi Freedom*, pp. 48-9, 53, 144-5, 148-9.

[39] E. Blanche, 'Yassin Assassination Undermines Arafat', in *Jane's Intelligence Review*, 1 May 2004; see also Barbara Opell-Rome, 'Israel Weighs Expanding Assassination Missions', in *DefenseNews*, 5 April 2004, p. 36.

[40] A recent provocative article argues that the West (for which read the US) has not killed enough enemy leaders in the campaigns of the last decade, and consequently 'charismatic' leaders who have survived have been able to restore their (ostensibly defeated) regime's status and organise post-conflict resistance. See John E. Peters, 'A Potential Vulnerability of Precision-Strike Warfare?', in *Orbis*, Vol. 48, Issue 3, Summer 2004, pp. 479-87.

[41] For an excellent, succinct account of this phenomenon, see Clive Soley, 'Tyrants and failed states: The world must find a way to intervene', in the *International Herald Tribune*, 18 March 2004; for more detail, see Sebastian Mallaby, 'The Reluctant Imperialist: Terrorism, Failed States, and the Case for American Empire', in *Foreign Affairs*, March/April 2002.

[42] The term most commonly used is 'network-centric warfare'. However, the use of 'centric' implies a doctrine of warfighting, when in fact the concept is simply a warfighting tool, an enabling mechanism, albeit one that is potentially enormously powerful. For comment on NCW/NEW and EBO, see Arthur K. Cebrowski and John J. Garstka, 'Network-Centric Warfare: Its Origin and Future', in *Proceedings*, US Naval Institute, January 1998; and Alan Stephens, 'The End of Strategy: Effects-Based Operations', *Working Paper No. 383*, Strategic and Defence Studies Centre, Australian National University, Canberra, December 2003.

[43] Predator A is a relatively simple, low-performance UAV, but when hastily converted into a first-generation UCAV by the addition of Hellfire missiles during the war against the Taliban in 2001-2, it achieved some notable successes in the air strike role.

[44] For authoritative updates on UAV/UCAV developments, see Bill Sweetman, 'In the tracks of the Predator: combat UAV programs are gathering speed', in *Jane's International Defense Review*, August 2004, pp. 48-55; and Robert Wall, 'The Latest Leap: Darpa aims to convince skeptics its UCAR [Unmanned Combat Armed Rotorcraft] is feasible and compelling', in *Aviation Week & Space Technology*, 6 September 2004, pp. 46-50. See also Price T. Bingham, 'Demise of the fighter-bomber?', in *ISR Journal*, September 2004, pp. 26-9. On the organisational issue, air forces are dominated by pilots, who collectively remain predisposed towards manned aircraft.

[45] Japan, for example, has announced plans to launch three 'national security' satellites by March 2007, at a cost of US$638 million. The new satellites will complement two already in orbit. Paul Kallender-Umezu, 'Japan Plans to Launch 3 Satellites', in *DefenseNews*, 13 September 2004. Aspects of Israel's Ofeq

intelligence satellite program may also be relevant. Ofeq-1 was launched in September 1988 and Ofeq-5 in May 2002. Ofeq-6 was due to be launched on 6 September 2004 but was delayed because of technical problems. There are reports that Singapore is consulting with Israel to develop a similar program.

46 For comment on this, see William B. Scott, 'Milspace Warts: Transition from milspace "operators" to "space warriors" has wide-ranging impacts', in *Aviation Week & Space Technology*, 5 July 2004, p. 30.

47 Exercise Pitch Black 04 homepage at http://www.defence.gov.au/pitchblack/default.htm, accessed 15 September 2004.

48 Michael Patterson (deputy director for US Big Safari programs), quoted in David A. Fulghum, 'Out of the Black', in *Aviation Week & Space Technology*, 16 August 2004, pp. 24-5. Big Safari is a highly-classified US organisation that specialises in the rapid development of ISR systems.

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