

Commander's Perspective

Establishing the Air Truth

By Air Marshal (Retd) Sir Stuart Atha KBE CB DSO RAF

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Biography: Air Marshal Sir Stuart Atha KBE CB DSO retired as Deputy Commander Operations at Headquarters Air Command in May 2019. During a distinguished career, Sir Stuart led No. 3 Squadron during Operation Telic 1, commanded RAF Coningsby, was Officer Commanding No. 83 Air Expeditionary Air Group, Air Officer Commanding No. 1 Group, Air Component Commander for security during the 2012 London Olympics and Chief of Staff (Operations) at the Permanent Joint Headquarters, Northwood.

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A retrospective review of post-modern air power application; alternatively, what my career has taught me about air power.

Truth is the property of no individual but is the treasure of all men.

Ralph Waldo Emerson

Introduction

Any retrospective harvest of a career for lessons runs the risk of exaggeration, self-promotion and the partial selection of events to wrap prejudices in the cloak of illusory truth. Inevitably opinions are based on an eclectic mix of experiences and, whilst I claim to be alive to these risks, I accept that readers (especially those who know me) may hear the faint clippety-clop sound of the occasional hobby horse. There are rarely ground truths, merely perspectives; it is a truism that where you stand on any issue depends on where you sit. I have endeavoured, however, to guard against the inappropriate extrapolation of an anecdote to some universal truth; instead my aim is to establish some home truths relevant to those interested in the effective application of air power. These truths are not extensive, are based on *my* experience, and therefore are my air truths.

Despite the reaffirming experience of our centennial celebrations, I still sense in Air Force circles the whiff of under-confidence, which is, perhaps, rooted in our status as the 'junior Service'. Knowing something of the small man's complex, I realise that we younger siblings can be quick to take offence, and too readily adopt a defensive crouch whilst forwarding arguments that sound shrill and singular to others. There is no need for this. A cursory review of the Royal Air Force's distinguished record over the past century – and notably in this post-Cold War era – should encourage us to stand tall, speak air truths unto power, and move forward into our second century with confidence and optimism.

The caricature continues with the description of airmen and airwomen as 'doers' not 'thinkers', who leave doctrine writing and reading to the air power zealots. When they do write, they like to use small words, simple ideas and PowerPoint slides. Intellect is necessary but intellectuals are discouraged. Decision making is intuitive rather than considered and involves the rapid assimilation of risk and benefit. Whilst I recognise some of this in the person staring back at me in the mirror, this article is an attempt to address these perceptions and to underline my belief in the importance of 'Thinking, and writing, to Win'.

My task is, therefore, to search the operational lie of the land, spatially and temporally, for air truths. The landscape surveyed is a career of service on operations, abroad and at home, that coincides with the post-modern era of air power. What follows are my perspectives – my *truths*, if you like – based on the view I have had from privileged seats in the cockpit, the Combined Air Operations Centre (CAOC) and the UK Government's Cabinet Office Briefing Room. The 'truths' are not the 'top ten' of air power issues and they are not the sole preserve of air forces. Nor, however, are they the idle musings of a detached observer (or, worst of all, an

‘armchair air marshal’), but instead the reflections of an airman who has had the great fortune to be part of an air force that is respected, valued and has been employed on operations – at home and abroad – throughout his service; an airman who is proud to have played a part in a range of operations with this nation’s, and many other nations’ finest, in the air, on the land and at sea.

As is befitting a child of decimalisation and someone attracted by symmetry, I have identified the following 10 air truths.

- 1. Air forces are at their most potent when integrated to the joint force.***
- 2. The effective delivery of air power and a considered political strategy are mutually dependent.***
- 3. ‘Air power is the most difficult of all forms of military force to measure, or even express in precise terms.’¹***
- 4. Air forces risk being tactically excellent and operationally absent.***
- 5. Air Forces need to remain adaptable; the operation you will fight in is probably not the operation for which you prepared.***
- 6. A powerful and symbiotic relationship exists between air forces and special forces.***
- 7. Network Enabled Warfare is not new and is essential to the effective delivery of air power.***
- 8. The rapid delivery of understanding in the battle space is a unique strength of air (and space) forces, but ambiguity will continue to challenge decision makers.***
- 9. The future success of air forces depends on transforming how we train.***
- 10. Day 1 is the most dangerous day of any operation.***

My First Air Truth: Air forces are at their most potent when integrated to the joint force.

The British politician and statesman the late Lord ‘Paddy’ Ashdown often said that the armed forces were at their best when they worked together, a condition dependent on mutual trust and respect, the tolerance and celebration of differences and similarities, whether in MOD meetings or on Middle East operations. Yet there remains unhealthy conflict between the Services in a competition where no one wins, this despite the importance of teamwork being instilled at Cranwell, Dartmouth and Sandhurst, where virtuous collaboration is promoted,

and toxic parochialism discouraged. Tribalism is perhaps inevitable in any organisation that sets such great store by team and identity, where there is a constant fight for resources in an era of enduring financial pressures, and have distinct environments within which the Services operate and employ technology. The operational imperative, however, demands joint teams drawn from across the Services, expert men and women proud of their disparate identities but working as one to a common goal. We still have some way to go before all three Services operate individually and together with equal ease, confident of their place within the order of battle. The challenge is to create, foster and promote a joint instinct, a joint identity, whilst protecting the ethos and culture of the individual Services.

Purple Reigns

'Purple' (that is to say 'Jointery') became the 'new black' for the UK's armed forces in the 1990s and encouraged by the 1998 Strategic Defence Review (SDR). Great progress was made with the establishment of a myriad of joint organisations, including the Permanent Joint Headquarters (PJHQ), the Joint Services Command and Staff College, and front-line formations such as the Joint Helicopter Command and Joint Force Harrier. The subsequent experience would suggest that joint institutions are at their most effective when sitting above the Services, like PJHQ, or astride the boundaries between them, like the JHC. More recently, Joint Forces Command (JFC) has acted as the UK Armed Forces joint focal point, although, thus far, it has been more of an under-resourced purple orphanage than an empowered joint director and co-ordinator. The imminent rebirth of JFC as Strategic Command in December 2019 may provide the much-needed impetus to transition from single-Service sibling to an integrator with genuine authority, where the combined attributes of the single Services are synergised; in short, where Defence comes together to deliver.

PJHQ

Regardless of the shortcomings of its superior formation (the JFC), PJHQ is, and must remain, the exemplar of operational jointery. The counter-insurgency operations of Iraq and Afghanistan have dominated in terms of blood and treasure expended, and the excessive emphasis placed on land forces has put at risk PJHQ's joint credentials. The operational experience of the UK Armed Forces in the post-modern era, however, is much more diverse, underlining the need to insure against the risk of parochialism and bias. In addition to a steady stream of Humanitarian Relief operations, unexpected operations in the post-Cold War era have arisen with Olympic periodicity. The operations in 1991 (Iraq), 1995 (Bosnia), 1999 (Kosovo), 2003 (Iraq), 2007 (Russian Long-Range Aviation sorties recommenced), 2011 (Libya), and 2015 (Iraq/Syria) have each underlined the central importance of a joint operational-level headquarters, able to integrate single-Service tactical activity, cohere the UK's contribution with partners and coalitions, and act as the bridge to, and sometimes a firewall from, Whitehall.

Homeland Operations

There remains a gap, however, in the direction of homeland operations. Whilst the Army can lead the response to bovine diseases and national strikes, they are not well equipped to

coordinate, let alone integrate, air, maritime and land activity in the UK. The success of the UK Armed Forces' contribution to delivering a safe and secure London Olympics can be attributed to the innate jointness of the commander, General Sir Nick Parker, and despite the lack of PJHQ involvement. The 2012 Olympics also demonstrated the importance of greater integration of the military and other cross-Government entities, reinforcing the need for a Comprehensive Approach, Fusion Doctrine or whatever the in-vogue description of joined-up government is today.

Carrier Aviation

The Falklands Conflict in 1982 provides a rich seam for joint lessons, both good and bad, relevant to the employment of aircraft carriers. The sense of a joint team was in short supply at sea, which contrasted with the integrated efforts delivered ashore, where the demands of mortal combat displaced any room for single-Service tribalism, as it always does.² The unfortunate experience on board HMS Hermes highlights the importance of the tone set by the captain. Fortunately, the RAF squadron commander, Wing Commander Peter Squire, employed all his skills of tact and diplomacy on board HMS Hermes to mitigate the damaging consequences of the toxic atmosphere. One of the lessons of carrier aviation in 1982 was that when trust is lost, we all lose. **It does not need to be this way**, as demonstrated by the highly successful carrier deployment to the Gulf in 1998. This involved HMS Illustrious and an RAF Harrier Squadron deployed in support of Op Bolton, the UK's contribution to policing the Iraqi Southern No-Fly Zone. The RN and RAF contingents worked harmoniously together thanks to the sense of team instilled by the Captain and the Squadron Commander. I enjoyed a similarly productive deployment on board HMS Illustrious in 2001, again this was because of the generous and collegiate nature of the Captain (Capt Charles Style on this occasion).



Aircraft Landing on HMS Illustrious.



F-35 First Landing on board HMS Queen Elizabeth.

UK Carrier Strike, the combination of the F-35 Lightning and the Queen Elizabeth Class aircraft carrier, is a potent symbol of national ambition and offers the Government a paradigm shift in power projection. To realise this potential, we must recognise and exploit the strengths that sit at the heart of both the Royal Navy (RN) and the RAF, whilst respecting the traditions and practices of each Service. Senior RN and RAF officers must, therefore, dump all tribal baggage, ignore the siren calls of ancient mariners and airmen alike, and ensure that the first operational

deployment of 617 Squadron F-35 Lightnings on board HMS Queen Elizabeth (and alongside the USMC) is planned and conducted as partners and in a spirit of openness and collaboration. You only have one chance to make a good first impression on partners, politicians and the public.

My Second Air Truth: The effective delivery of air power and a considered political strategy are mutually dependent.

Whatever one's view of Britain's place in the world, there was global astonishment at the level of ambition and commitment displayed by the UK in 1982. The combination of political rhetoric and the Task Force sailing towards the South Atlantic remains one of the most potent expressions of political intent. It was also a profound demonstration of the physical and cognitive effects deliverable by the Carrier Strike capability. The post-Cold War era has been characterised by so called 'wars of choice' that present more challenging political intervention dilemmas. Consequently, the sensitive and sophisticated relationship between the political intent of governments and the application of military force has dominated the discourse on intervention, both in public and parliament. Moreover, the debates and parliamentary votes in March 2003 (invasion of Iraq), August 2013 (air strikes against Assad regime targets in Syria) and December 2015 (air strikes against ISIS in Syria) have further complicated both the sufficiency of evidence and the authority of governments to go to war. Whilst conflict and controversy appear to be two sides of the same air operational coin, the truth is that air power has proven to be a versatile military force that can be interwoven with diplomacy and calibrated to match political ambition and risk appetite, offering governments a wide range of choices when grappling with intervention dilemmas.

NATO Over Bosnia

NATO's Operation Deliberate Force, the first combat operation conducted by the Alliance, was characterised by the sophisticated integration of diplomacy and air power over a 3-week period in 1995. Precise and discriminate air power was applied and withheld in concert with political dialogue supporting a strategy that was more 'Talk and Act' than 'Shock and Awe'. Diplomats offered the carrot, whilst NATO's air forces wielded the stick in a strictly calibrated manner synchronised with the diplomatic campaign. This way in war proved popular with the western democracies of the Alliance and was preferred to the blunter approach of taking and holding ground. It proved successful, leading to the Dayton Accords and the end of the war in Bosnia – without any NATO fatalities.

NATO Over Kosovo and Serbia

Four years later, Operation Allied Force, NATO's response to Slobodan Milosevic's persecution of ethnic Albanians in Kosovo, yet again demonstrated how well air power, diplomatic pressure and strategic communications can be integrated. The 78-day campaign involved the diverse use of air power, ranging from tactical attacks in Kosovo to strategic strikes into Serbia, synchronised with a belated but effective strategic communication effort. The Alastair

Campbell diaries covering this era provide an interesting perspective on this³ and illustrate well the importance of integrating the application of air power with both media and information operations as part of an Information Strategy, which is in turn guided by carefully considered political objectives. This was not the case at the start of the operations but improved through the campaign thanks to Campbell and others. The delivery of lethal and destructive force from the air over the 3-month operation amplified the message to Milosevic of NATO's unity and political resolve, helped by reassuring strategic messages to domestic audiences, emphasising the application of discriminate and proportionate qualities of air power, despite the occasional mishap such as the accidental bombing of the Chinese embassy in Belgrade. The overall effectiveness of NATO action is returned to later.

NATO Over Libya

In 2011, Gaddafi's brutal repression of the Arab Spring uprising in Libya presented western governments with a difficult test of their resolve to support the UN Responsibility to Protect principles with action as mandated by UN Security Council Resolution 1973. The intervention decision focused on how, not if, to intervene and was complicated by the US reluctance to lead the effort and the absence of a dominant line of diplomatic activity with which NATO military force could be integrated. The use of air and maritime forces, which did not mire the Alliance in a 'boots on the ground deployment', combined with the ability to operate beyond the range of hostile systems, increased their attractiveness to the international community (who were suspicious of western political motives); to NATO countries' domestic audiences (who were sensitive to any operation that might involve casualties and enduring commitment); and to our national political leaders (who could be seen to act decisively in a way that lent itself to political *control* with arguably limited political *risk*). Moreover, the limited ground footprint in Libya made extraction from operations relatively simple, when compared with the 'land-centric' deployments to Iraq or Afghanistan. From the outset, NATO made it clear that it was only responsible for the military line of operation, protecting civilians and implementing the arms embargo and No Fly Zone, thus hindering the integration and synchronization of military action with a range of activity including diplomatic and economic levers. The events in Libya 2011 are a valuable source of lessons for both governments and militaries and provide critical insights into intervention decisions and how nations discharge their Responsibility to Protect. Whilst 'warfighting at scale' – as required by a NATO Article V-type operation – has the serious potential to lead to the end of the world as we know it, the political decision to participate in such an operation is arguably simpler than in the case of a highly politicised decision to participate in war of choice. Such decisions are difficult and need to be supported by a well thought through strategy rather than a knee-jerk response to events and the public clamour for action. As events in Syria demonstrate, however, the consequences of deciding *not* to act can have ramifications that are just as dangerous as deciding *to* act.

Number 11 Group

The RAF's re-formation of Number 11 Group in 2018 marked a step change in the RAF's ambition to conduct operations across all domains and to integrate tactical activity with

information operations. The 11 Group three pillars of Operations, Space and Information Advantage may be crudely drawn at present, but they will provide the basic architecture on which information-centric campaigns will be built in the future and should ensure our activity is better synchronised horizontally with the other Services and vertically with PJHQ and other Government and international actors. The pathfinder 11 Group operation for this ambition was the small-scale 2018 NATO Air Policing deployment of a Typhoon squadron to Romania on Op Biloxi. A sophisticated Information Operation drove the Typhoon flying programme over the Black Sea (rather than the more commonly applied inverse of that approach), with the aim of communicating messages tailored to a range of audiences, including the Russians and the Romanians. The 2019 deployment to the Baltic Region on Op Azotize built further on this and strengthened the links with the British Army's 77th Brigade⁴ and PJHQ. The assessment of air operations is dealt with elsewhere, but on this occasion, measuring the success or otherwise of the efforts to reassure NATO partners and deter Russia was as difficult as it is critical. After all, you usually only know for sure when deterrence fails, not when it works. We do know, however, that the stand-up of 11 Group will help enhance the RAF's ability to play its part in coherently and effectively amplifying political and diplomatic messaging.

The Third Air Truth: 'Air power is the most difficult of all forms of military force to measure, or even express in precise terms.'

My Third Air Truth has been borrowed from Sir Winston Churchill and is as true today as it was when Portal and Harris were planning and directing the Strategic Bombing Campaign in World War II. Any high-performing organisation needs to know its numbers, to know those measurable factors which are critical to an informed assessment of success or failure. In recent years, it has been fashionable in staff colleges and elsewhere to worship the 'art' of war rather than its 'science'. There have been good reasons for this (not least in the UK due to its inconsistent grasp of the operational level of war, and the art required to direct it), but in this context it has been an enduring challenge for air forces to quantify and articulate their campaign value. Finding the magical metric that is easily measured and directly linked to operational success has been the holy grail for air commanders throughout the 'air century', and it has been even more difficult, as Churchill asserted, to express that contribution to non-airmen who are apt to relegating air power's vital contribution to just that of the supporting cast.

Operation Allied Force - Air Power Effectiveness in Kosovo and Serbia

NATO's Operation Allied Force in 1999 was for some the highwater mark of air power in the post-modern era and claimed as the most successful air 'campaign' ever. 'A turning point in the history of warfare,' wrote the respected military historian Sir John Keegan, proof positive that 'A war can be won by airpower alone.'⁵ In the Pentagon, the Chairman of the Joint Chiefs of Staff, General Henry Shelton, claimed that NATO's air forces had destroyed around 120 tanks, 220 armoured personnel carriers and up to 450 artillery and mortar pieces. However, when

the US Munitions Effectiveness and Analysis Team (MEAT) deployed to Kosovo, they found these claims to be grossly exaggerated. The issue of the number of 'tanks' destroyed therefore became a favoured measure by which to gauge the success or otherwise of air operations, an approach eagerly championed by those who were tired of a decade of airmen cockily proclaiming that 'Armies occupy, Air Forces conquer'.

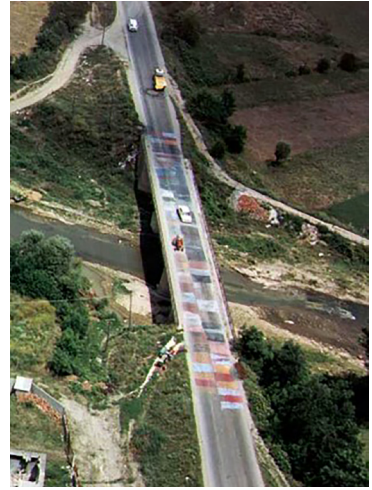
So how relevant was the apparent 'failure' of air power to destroy the Serbian war machine, as imagined by those with a tank fixation? George Robertson, the UK's Defence Secretary during the operation and one year later speaking as Secretary General of NATO, perceptively responded 'Enough', when asked how many tanks had been destroyed.⁶ He went on further to say that, 'The aim was not to wage war against Yugoslavia or to bring about the fall of Milosevic and his regime. The air campaign set out to disrupt the violence against the Kosovars and to weaken Serb military capabilities in a carefully controlled way. And that is what we did'.⁷

The RAF Weapons Effectiveness Team

It is sometimes forgotten that the RAF deployed its own equivalent of the MEAT, comprising scientists, engineers and me. I opted to call our team the Weapons Effectiveness Team or 'WET'; whimsically named, but with a serious purpose. I had the unique experience of flying combat missions during Operation Allied Force and then returning on the ground when combat operations ceased to compare the view from above with the reality on the ground. Whilst the WET's focus was initially on assessing the physical effects of bombs on buildings, bunkers and bridges (as you might expect, we only found a couple of destroyed tanks), it was the surprising abundance of evidence of tactical cognitive effects that was of greatest interest. The popularity of NATO's action amongst Kosovan Albanians was widespread. Wherever the WET visited, we were quickly surrounded by large groups chanting support for NATO and Tony Blair. On one site, I met a Kosovan and his son who were rebuilding a house that a wayward UK bomb had destroyed. After showing him the aircraft video of the attack and explaining what had gone wrong, he said, 'Tell your friend, thank you. I have my health; I can rebuild the house and the Serbs have gone because of him'. On another occasion, a Kosovo Liberation Army fighter in Dakovica seemed strangely uninterested in the tank controversy. For him it didn't matter if the tanks and the armed personnel carriers were destroyed or hidden in the Pristina Bus Station; the Serbs were not using them because of the air threat and the disruption to movement inflicted by the bridge attacks. In the end, NATO's objectives were achieved; but it is a stretch to claim this for air power alone. Milosevic was coerced by a much more complex and sophisticated array of factors, of which 78 days of air operations were critical, but just a part. The debates during the operation, which can be characterised by the tactical air power focus of SACEUR (General Clarke) versus the more strategic application preferred by the Air Commander (General Short), combined with the debates after the operation, underline the challenge of establishing the ground truth and measuring air effect in such campaigns.

Concealment and Deception

Part of the reason for the disparity between the number of targets claimed versus the number destroyed, was the extensive use of decoys by Serb forces. Olive-coloured filing cabinets with plastic pipes and car wheels rested against them, looked very much like artillery from a couple of hundred yards, let alone 3 miles (the height of NATO aircraft). The Serbian deception measures ranged from the simplistic use of black polythene to create false roads and bridges for the Alliance to bomb, to the more sophisticated step of painting colourful squares on the surfaces of bridges to confuse the targeting systems within NATO weapons. The experience of Kosovo demonstrated that air systems are susceptible to concealment and deception measures.



This vulnerability reinforces the importance of fused technical and human intelligence to develop an understanding of the situation on the ground, a subject I will return to when considering the symbiotic relationship between air forces and special forces.

Measuring Campaign Success

In Libya in 2011 it was again difficult to know if the operation was succeeding, stalling or failing. The position of the line between opposing forces and the amount of territory occupied by friendly forces were obvious and attractive measures of success (and easily determined by the RAF Sentinel sensor), which led to much talk of stalemate during the summer, when there was little movement of the battle lines. Metrics of success were also a contentious issue during the counter-Daesh operations in Iraq and Syria in 2015. Some US military leaders insisted on using enemy body count as the key metric, despite the difficulty of measurement or the experience of Afghanistan where the number of Taliban killed appeared to have little correlation with the success of the campaign. Consequently, PJHQ developed its own assessment of campaign progress as part of an overhaul of its campaign management. Many colourful charts were produced, measuring a variety of parameters and assessing them against campaign objectives. Whilst the charts provided a reasonable picture of the current situation, they were less useful in forecasting campaign progress and thus the future air power requirement.

Measuring Cognitive and Physical Effect

The truth is that it is difficult to accurately measure campaign progress in general and the effects delivered by air power specifically, particularly where the objectives are cognitive rather than physical in nature. Air forces must guard against setting too much store by metrics that are appealing because they are easy to measure, like the number of sorties flown and amount of ordnance expended. Such an approach dogged USAF and US Navy operations in Vietnam, and drove a competition between the Services that had no bearing at all on the operational

effects they should have been delivering. Simple yardsticks do have some value in assessing simple matters, such as in weighing the balance of effort of contributing nations (10% of the US effort is considered appropriate for the UK) but commanders must beware unbalancing a campaign by giving a particular metric undue priority. In Afghanistan, there was a risk that the focus on Troops in Contact response times skewed the air tasking. Certainly, significant CAOC effort went into reducing the time taken, for good tactical reasons, but this gave rise to the mischievous suggestion that the CAOC Strategy Division was more of a 'Statistics Division'. Describing and assessing cognitive effects may always be more challenging than measuring physical effects, but the intelligent and effective application of air power depends on a deep understanding of both.

My Fourth Air Truth: Air forces risk being tactically excellent and operationally absent.

I accept the charge of exaggeration, but only just. There is no doubt that the RAF's current generation can be very proud of its performance; they are a team of outstanding men and women, military and civilian, who have done great things for their country at home and overseas, without seeking or receiving the spotlight of publicity they deserve. It has been my privilege to see persistent professionalism and the conduct of unselfish, brave and skilful acts in the air and on the ground. The application of force and, equally, the decisions to withhold force, have been made with consistently exceptional judgement. Set against our tactical excellence, however, it is disappointing to see the limited influence that airmen and airwomen have had on the conception, development and execution of campaigns. There are exceptions, but they are just that, exceptions.

US CAOCs

Part of the problem is rooted in a similar struggle in the US. USAF CAOCs are powerful sources of air power wisdom, expertise and direction. However, as Air Marshal Sir Arthur Coningham learned in North Africa in World War II, air commanders need to be inside the same country if they are to be inside the theatre commander's mind. As a result, and despite the pervasiveness of air power in Afghanistan, it was too often an afterthought to the plan and not an integral element; what a respected RAF planner likened to 'putting your underpants on after your trousers'. There are many other factors that account for this unfortunate shortfall. It was a land-centric campaign that was an aggregate of task force operations, making it difficult for the CAOC staff in Al Udeid to find the appropriate point of influence in the planning process. Air Planners were at their most effective when supporting theatre-level operations, such as the presidential elections. It was unfortunate, therefore, that the Afghanistan command and control model was applied to the counter-Daesh effort in Iraq and Syria, despite the fundamentally different character of the operations.

Whilst senior US airmen valiantly advocated for at least one rotation of a Combined Joint Task Force HQ built on a USAF framework, the enduring construct continued to be based on rotating US Army Corps HQs. Undoubtedly many talented soldiers, sailors, marines and

airmen were employed in these operational HQs, and on occasion air power was employed intelligently, but the C2 construct spanning Iraq and Syria was not optimised for the effective integration of air forces into the campaign and must not be considered to be the template for future operations. Command structures must be tailored to their operational realities, not to some doctrinal idyll. After all, as Carl von Clausewitz reminds us, 'The first, the supreme, the most far-reaching act of judgment that the statesman and commander have to make is to establish by that test the kind of war on which they are embarking; neither mistaking it for, nor trying to turn it into, something that is alien to its nature.'⁸ Regardless of the kind of war, or the nature of the operation, the lesson of history is that someone with an expert understanding of air power should be part of the planning team from the conception through to the delivery of the plan.

Thinking to Win

The RAF needs to think differently, if it is to continue to win in the future. The RAF's re-formation of Number 11 Group was a good start, but it needs to be followed by even greater investment in thinking. Liberal use of phrases like multi-domain operations are unhelpful if the lexicon lacks intellectual underpinning. Reportedly, a senior government official bemoaned the absence of air generals, an anecdote that further emphasises the importance of the RAF's 'Thinking to Win' programme, a coherent and wide-ranging effort launched by a previous Chief of the Air Staff, Air Chief Marshal Sir Andrew Pulford, to reinvigorate the RAF's conceptual component. The aim was to address intellectual shortfalls by better harnessing the thinking capacity of the entire air force. Some of the programme has delivered: the RAF has a strategy, and the Commandant Air Warfare Centre (AWC), the Director of Defence Studies and station commanders have done much to reinvigorate interest in the application of air power. But we are still dependent on the US and the French to provide C2 courses and our training for senior air commanders tends to the ad hoc and the bespoke. Much more is required if we are to ensure that the RAF's intellectual edge remains a competitive advantage and the excellence delivered at the tactical level is matched by presence and performance at the operational level.

Investing in Air Command and Control

The primary way to increase our operational influence is to place 'Air Command and Control' (Air C2) at the front and centre of our thinking and not treat it as an auxiliary capability that plays second fiddle to our airborne platforms. Air C2 must sit alongside Attack, Control of the Air, ISTAR and Air Mobility as one of the RAF's key roles. Through continuing development, 11 Group and the JFAC are making positive strides to optimise the ability at home and overseas to direct operations in the air, space and cyber domains, while enabling those in the land and maritime domains. This progress must continue. The RAF's peacetime and crisis establishments need to better reflect policy ambition and ensure it has the resilience to support the many external calls on manpower both nationally and by NATO. Furthermore, no longer should the RAF follow a magic 'pixie-dust' strategy that relies on the salami slicing of the front-line to deliver individual augmentees to deployed operations; the RAF needs a

considered, articulated and credible manpower plan, involving the Whole Force, that delivers appropriately prepared men and women in the numbers required, without denuding the generating force at home of the vital manpower and skills it needs. Robbing Peter to pay Paul is not a sustainable strategy.

NATO Article V Operations

The RAF needs to better understand how a 21st Century NATO Article V operation might be fought and how best to train for this. It must engage the RN at all levels and support both the Continuous At Sea Deterrent and Carrier Strike capabilities with an enthusiastic spirit of collaboration. The importance of operations across the hitherto neglected air-maritime seam is underlined by the arrival in service of both the F-35 Lightning and the P-8 Poseidon. Moreover, we must not think we have air-land operations hacked. In Afghanistan and Iraq, airmen and airwomen were humbled by the exceptional bravery of those on the ground and did their utmost to provide them with the intimate and persistent overwatch, protection, information and mobility they needed. But the brilliance of the UK armed forces' combined efforts in Afghanistan, Iraq and Syria should not blind us to the much greater challenges of supporting a manoeuvring division in continental Europe in an Article V-type operation. Neither the Army nor the RAF, nor indeed any of our NATO partners understand what this requires or how they are going to gain this understanding.

Adaptive Basing

The RAF's thinking must not focus simply on what it does in the air, but must also address how and where it would operate from in time of war. Russia and other potential adversaries are enhancing their space-based Intelligence Surveillance and Reconnaissance (ISR) capabilities and are swiftly developing long-range air and surface-launched weapons (including hypersonic ones). No longer, therefore, should the UK be considered to be a sanctuary remote from the dangers of modern warfare. Depending on the scenario, our aircraft carriers provide a flexible basing option, but only for a proportion of the F-35 Lightning Force. The RAF needs to develop an adaptive basing concept that provides greater resilience through dispersal. Wherever the RAF operates from, it needs to configure Expeditionary Air Wings to better address the myriad of logistical, communication, mission support and force protection challenges associated with adaptive basing. An intrinsic element of this challenge is to develop ways that enable dispersed operations in the UK and overseas, supported by robust, flexible and credible doctrine.

Maintaining the Intellectual Edge

Lastly, the RAF needs air power ambassadors and advocates, not zealots, who know how to wield air power as a coercive and deterrent tool, not just a destructive one. It must create the environment that fosters debate and engagement throughout our organisation. The AWC-sponsored annual Weapons and Tactics Conference was shamelessly plagiarised from the USAF and stands as an exemplar of this. The RAF must promote study and education (and promote in rank those who excel) to deepen the intellectual well from which to draw and

make best use of our talent and harvest good ideas, whatever the source. The technical developments of Typhoon and the arrival of the game-changing F-35 Lightning demands we lead technology with our thinking. Blind faith in advanced technology dulls the drive and desire for innovation and we will fail if we simply try to force these new capabilities into the old doctrine. We need to change our lexicon and drop irrelevant terms like fighter and bomber and embrace the challenges of the emerging operational paradigm that blurs the distinction between home and away, war and peace, physical and virtual, strategic and tactical. To succeed, doctrinal moulds may need to be smashed and sacred cows slaughtered. This requires people, whether they are in the cockpit, classroom or the CAOC, who are tactically excellent, competent in the art of campaigning, and who Think to Win. Only by doing so can we maintain the intellectual and therefore combat edge over our adversaries.

My Fifth Air Truth: Air Forces need to remain adaptable; the operation you will fight in is probably not the operation for which you prepared.

Time and again we learn that predicting the future is not one of our strengths. The UK's 2010 Strategic Defence and Security Review (SDSR) focussed on 'war amongst the people' and failed to predict the events of the Arab Spring, nor the return of a resurgent Russia and radical Islam in the guise of Daesh. Few expected Putin's annexation of Crimea, the nerve agent attack in Salisbury, or the associated crude cyber activity in the Hague. Even fewer predicted the drone threat that has emanated from Yemen, let alone the disruption caused by a series of alleged drone flights in the vicinity of Gatwick Airport in December 2018. So we should heed the wise counsel of the historian Sir Michael Howard, 'No matter how clearly one thinks, it is impossible to anticipate the character of future conflict. The key is not to be so far off the mark that it becomes impossible to adjust once that character is revealed.'⁹

The Cold War Legacy

Throughout my early years, I was part of an Air Force that trained, equipped and postured for the Cold War scenario. Despite excursions like the Falklands Conflict, we had spent decades preparing for a particular fight. But when it came, the fight was not against the Soviet Red Army, but against Saddam Hussein's forces which had invaded Kuwait in 1990. 'Adapt and overcome' may have been the mantra we Brits employed, but some weapons like the JP233 runway cratering and area denial weapon were so designed that the scope for tactical innovation was extremely limited, and brave Tornado crews were forced to conduct low-level attacks at far greater risk than those who operated at much higher levels. It is to the credit of senior figures in the Jaguar Force that despite a suite of aircraft, weapons and tactics optimised for low-level operations, they rapidly adapted their tactics and operated from medium level. Later during air policing operations in Northern Iraq, the Harrier Force were using reconnaissance pods that were designed for low level, but had utility when employed using chinograph marks on canopies to aim them and flying knife-edge manoeuvres to employ the higher focal length cameras to produce images of useable resolution. Whilst such examples of tactical innovation were commendable, the speed of adaptation was slow, and

the RAF spent most of the 1990s evolving our equipment and tactics to catch up with the needs of the post-Cold War era.

The Resurgence of State-Based Threats

More recent events in Libya, Crimea and Syria remind us that whilst we cannot afford to insure against all security risks, there is a requirement to maintain a broad spectrum of capabilities that can respond quickly to new and unexpected security threats. Unlike our adversaries of recent decades, we now face potential enemies which exhibit both great power ambition and pariah state behaviour; states whose ability to operate across the spectrum of conflict and in all warfighting domains continues to grow quicker than expected. The threats we face are advanced, comprising new advanced weapons systems as well as digital upgrades to legacy systems, such as the Cold War Tu-160 BLACKJACK (which has re-entered production) and the MiG-31 FOXHOUND (which is being used as the launch vehicle of hypersonic cruise missiles that are under development). Our speed of response will need to match their speed of upgrade.

An Air of Complacency

Unlike the experience of recent operations, our potential adversaries are targeting our traditional strengths; they are not trying to outmanoeuvre us asymmetrically with low technologies; they are developing advanced 5th-generation aircraft and missile systems and are exporting them to other mal-intentioned states. The threat from the air is changing both to our deployed forces and to those at home as we see the proliferation of drones, cruise and ballistic missiles. The appearance of both the S400 surface-to-air missile and Su-57 fighter in Syria highlight this threat and underline the need to drop the expression 'near-peer' and instead simply refer to a 'peer' adversary. The relative freedoms we have enjoyed in the skies over Afghanistan and Iraq mean that awareness of the need, if necessary, to *fight* for control of the air has atrophied. As the former US Defense Secretary James Mattis warned, 'When our soldiers hear the noise of aircraft, they no longer look upwards, assuming the jet aircraft to be friendly; this will not always be the case'. The unqualified success of Western air power in recent decades means that complacency is the greatest risk to surface forces. No British serviceman or woman has been killed by enemy air action since the 1982 Falklands Conflict; and the last American soldier to be killed by enemy air action was in Korea. But the threats posed to us by our potential enemies are not idle: come the day, they can and *will* do us harm. As airmen and airwomen, we need to counter the complacent attitude that believes control of the air is a natural given state of affairs. We need to remind others that control of the air will yet again be violently contested and that its preservation is *a* (if not *the*) critical enabler of all our military endeavours. Taking control of the air is an air force's primary and enduring task: its loss spells defeat. As Field Marshal Erwin Rommel despairingly recognised, 'Anyone who has to fight, even with the most modern weapons, against an enemy in complete command of the air, fights like a savage against modern European troops, under the same handicaps and with the same chances of success.'¹⁰ We must also recognise that space is an increasingly contested environment and that our growing dependency on space-based capabilities is increasing our

vulnerability and why, for the armed forces and air forces in particular, the sky must no longer be the limit to our interests. Control of space is of such importance to modern warfare that its loss, like control of the air, could have catastrophic consequences.

Reinvigorating the Conceptual Component

The conceptual foundation of the UK's 2015 SDSR was based on the resurgence of persistent strategic competition and state-based threats. The policy response of 'warfighting at scale against a near peer threat in an Article V-type scenario' marked a quantum leap in Government ambition for the UK armed forces and a colossal shift of emphasis from the 'war amongst the people' theme of SDSR 2010. Whilst we respond to this challenge, the words of Sir Michael Howard above must resonate in our thinking and permeate our decision making. History teaches us that what we consider to be the most likely event is actually unlikely to happen because we take rigorous steps to deter that eventuality. Conversely, the threats that we either fail to spot or regard as unlikely, can creep up on us unawares because we have failed to deter them from occurring. Therefore, whilst we need capability optimised to the most dangerous threat described in SDSR 2015, we need equipment, doctrine, tactics and mindsets that are readily adaptable to a broad range of scenarios; to do otherwise would risk irrelevance. Central to our response is a reinvigorated conceptual component. To paraphrase Lieutenant General Sir Graeme Lamb, whilst we can train for the certain, we must educate for the uncertain. Delivering the 'Next Generation Air Force' exists much more profoundly in the conceptual than the technological sphere; although the RAF may be dependent on technology and armed with the most manoeuvrable aircraft we have ever operated, history teaches us that the key to success in the past, today, and in the future, lies in the conceptual component and the intellectual adeptness of our people.

My Sixth Air Truth: A powerful and symbiotic relationship exists between air forces and special forces.

The combined power of air forces and special forces is greater than the sum of the parts. Air forces provide special forces with firepower, mobility and an unblinking eye in the sky. Special Forces provide air forces with a persistent presence on the ground, generating unique insight and intelligence to help with targeting and building relationships with indigenous forces. Air forces and special forces possess complementary – not competing – strengths and, when interwoven, they are a force unmatched in terms of responsiveness, versatility and utility. Whether it involves a hostage rescue, elimination of key enemy leaders, interdiction of adversary supply lines, support to indigenous forces or an attack on heavily defended targets, air forces and special forces offer governments discrete, scalable and highly capable options.

Informing and Integrating

Ignorance and integration are 2 key challenges for the combined air and special force. The need to protect special forces, their members, ways and equipment, promotes a

mystique that heightens the perception of omnipresence and overwhelming power. This can help when the audience is the enemy, but is a weakness when the ignorance extends into CAOCs and cockpits. Mutual trust, respect and understanding provides the critical underpinning to the relationship and requires significant investment of personal effort and time by both parties. Often both forces have capabilities that the other is unaware of or does not understand; the F-35 Lightning might stand as an air force example of this challenge. A liaison network that sits astride the boundary between the 2 forces, therefore, is critical. The special forces excel at building effective networks but there is a risk that the diminishing size of the RAF and our tendency to consider such C2 posts an overhead to be filled by random volunteers will erode our capacity to provide credible liaison officers in the right numbers, of the right calibre and character, and with the right skills.

Another challenge for the combined force is to integrate a highly sensitive national capability into the coalition, possibly comprising a wide array of nations from NATO and beyond. Ways have been developed within US CAOCs to put a firewall around this activity, alongside sensitive cyber and space capabilities, and to insert them into coalition campaigns. The experience of Libya in 2011, however, highlights the difficulties of developing similar processes within NATO. The most recent exercises involving the Standing Joint Force HQ and UK Joint Force Air Component suggest that whilst we are better prepared than we were, we still have some way to go.

History Lessons

The classified nature of special operations fosters ambiguity and risks a diminished understanding of this critically important subject. Commanders need to study carefully, therefore, the classified lessons identified in this post-Cold War era. My first immersion in the combined force and the need to train and prepare rigorously together was the 1994/95 plan to extract British soldiers from the Gorazde enclave in Bosnia – a rare example of a sensitive operation that has subsequently emerged in public. The contingent operation required the development of a complex night-time heliborne extraction plan. Key to success would be the intimate synchronisation of Harriers, helicopters and forces on the ground. In preparation, a series of rehearsals were conducted covertly in both Wales and Scotland through 1994 and early 1995. Aircrew familiarised themselves with every nook and cranny of Gorazde, helped by the creation of a room which had 3D images of the town and surrounding terrain pinned to the walls. In the event, the plan was overtaken by the events of Op Deliberate Force and the Royal Welch Fusiliers simply drove out of Gorazde.

There are many instances of the RAF providing intimate support to ground forces, and readers should review the experience of Afghanistan in 2001, the Western Desert of Iraq in 2003, Libya in 2011 and Syria in 2016. As a former CDS, General Sir David Richards, said in 2011, notably 4 years before Op Shader, 'In an era when we are less likely to commit ground forces to combat unless our vital national interests are threatened, finding another means of achieving the same effect is vital'. The future relationship between proxy land forces and the air and

special forces who support them, therefore, will continue to be a crucial area for development, and further underlines the combined versatility and potency of air and special forces operating together.

My Seventh Air Truth: Network Enabled Warfare is not new and is essential to the effective delivery of air power.

Network-Enabled Warfighting is not a new concept and is the employment of Network-Enabled Capability to deliver operational tempo, enhanced situational awareness and therefore decision superiority and information advantage. From the early days of the RAF's formation, through every chapter of our history, including our 'finest hour' in 1940 and the London Olympics Air Security Plan of 2012, the RAF has built and exploited networks like the Dowding System to ensure the swift progression from understanding to decision to execution, integrating air platforms, processes and people with those of land and maritime forces, across the air, space and cyber domains, and with NATO and other coalition partners. As we consider the shape of the Next Generation Air Force and the future adversaries we may face, we must not let the complexity and array of multi-domain threats and technologies blind us to the simple principles of Network-Enabled Warfighting and the lessons of the past.

The RAF Strategy insures against this through the Strategic Objective that describes the ambition to become, *'An integrated Air Force that recognises information is its lifeblood, with people, processes and practices that allow it to respond rapidly and decisively to changing threats at all levels of warfare.'*¹¹ Satisfying this objective will require many strands of activity, including the training and education of our people in the ways of the information age rather than the industrial age. We must have adaptable structures and processes and platforms that can operate throughout the spectrum of conflict. This is a complex challenge requiring advances along the 3 principal axes of policy, technology and doctrine if we are to deliver a seamless war-fighting force that has the means to maintain persistent understanding and can rapidly decide and deliver the required effect.

Network Challenges

Our aircraft and, indeed, all new capabilities will be increasingly defined by what they contribute to the network and what they exploit on the network, and rather less by how fast and far they can fly. Moreover, the network will connect a range of actors drawn from a variety of organisations and nations. The legal consequences of this diverse group acting together will, therefore, need deep consideration, as will the determination of delegated authorities. If authority is overly centralised, the potential tempo of decision-making throughout the network will suffer, and the collective power of the network will be diminished.

The Network That Countered the Iraqi Scud Threat

The concept of a network extends beyond kit: beyond radios, gateways, datalinks and fibre optic cables. It is the purpose *not* the means of connection and communication that defines

the network. In 2002-3, the US and its partners developed a bespoke network to counter Saddam Hussein's Scud threat in the Western Desert of Iraq. The challenge was to deter Iraqi Scud activity and if this failed, to detect and destroy the Scuds, wherever they were deployed. The Western Desert was the focus area because Scuds sited there could reach a range of sensitive and critical targets in the Middle East, not least Israel. For the first time, an airman, General 'Buzz' Moseley, was designated the *supported* commander for the mission and the network was built, developed, exercised and rehearsed in Nevada.

There were 3 critical requirements of the network: detect the Scud, decide a response, then execute an attack, all within 10 minutes. This was delivered by a range of actors in the air and on the ground, connected together in a network of sensors, decision makers and the deliverers of lethal effect. The combination of the sheer expanse of the Western Desert and the tight timelines drove a philosophy of empowered, forward, persistent presence. Empowerment required downward delegation of decision-making authority to aircraft captains and the development of a system that circumnavigated any possible 'CAOC-idling loop'. A 'Time Sensitive Targeting' (TST) team was embedded within the CAOC to oversee and police the network. A 'Bullseye' system¹², familiar to anyone practised in air defence, was adapted for air-to-ground use, and every element of the system, individually and collectively, was exercised, refined and exercised again before it was deployed to the Middle East. In the event, whether through deterrence or not, no Scuds were employed in the Western Desert. The TST system was adapted, however, to provide highly responsive Close Air Support to forces on the ground and formed the basis of the solution to the 'Troops in Contact' challenge that was to dominate air power delivery in Iraq and Afghanistan.

Networked Enabled Warfare and The Next Generation Air Force

As we look beyond Typhoon and towards Tempest and our Next Generation Combat Air capabilities, we must think from the inside out; that is to say that we must start with the computer or the systems and the information exploitation and exchange capability we need before we build the platform around them. We must also consider connectivity from the outset, including how we connect to a range of offboard systems, whether they be swarming UAVs or other systems in the space or cyber domains. The Next Generation Air Force may not enjoy the same degree of technical superiority over our adversaries we have experienced in recent years, but through the development of Network Enabled Warfare it can retain its competitive advantage by better integrating human and machine into networks, by exploiting the analytical capacity and capabilities resident in the UK, and by ensuring the right information is available to the right person at the right time, and in the right domain.

My Eighth Air Truth: The rapid delivery of understanding in the battle space is a unique strength of air (and space) forces, but ambiguity will continue to challenge decision makers.

The Clausewitzian 'fog of war' and the friction inherent in conflict make knowledge and understanding of the battlespace the vital ground of operations. For the counter-insurgency

operations in Afghanistan, it was this knowledge that drove the direction, timing and tempo of the campaign. The enduring nature of the operation allowed the deployment over time of significant numbers of troops and equipment which, when supported by an umbrella of persistent unblinking sensors on satellites and aircraft, delivered a level of insight not seen previously. However, high-readiness forces deploying into operational theatres at short notice, are much more dependent on the rapidly deployable ISTAR capability of our air and sea platforms.

In the case of Libya in 2011, the much reduced ground presence and the limited ability of maritime assets to look beyond the coastline, meant that the Alliance exploited the height and agility of NATO's air and space platforms. These platforms were equipped with cutting-edge sensor technology, staring persistently across most of the electromagnetic spectrum, and surveying vast areas deep into the country. Writing about the early operations in Afghanistan, but reflecting the experience over Libya, the eminent US historian Ben Lambeth observed that the transformation in modern operations has been, 'The dominance of fused information over platforms and munitions as the principal enabler of the campaign's success in the end'.¹³

RAF Analysts Making Sense

Whilst air force equipment is used to sense activity, it is the air force analysts in the air and on the ground who *make sense* of the activity, rinsing out every ounce of capability from the platforms, fusing the information to create knowledge and understanding of the battlespace. Critical to their efforts is the layering of assets and the generation of cross-cueing opportunities. Exploiting the synergies within the RAF's fleet of ISTAR aircraft, whilst operating within a coalition framework, was the primary purpose of the RAF's Project BIISTO (British Integrated ISTAR Support To Operations). The unintelligent tasking of RAF intelligence assets in Afghanistan in 2009 was the source of frustration and Project BIISTO involved a number of British officers, serving in a variety of headquarters, who 'massaged' tasking to better combine and exploit UK capabilities. For example, the all-weather wide area surveillance capability provided by the Sentinel was used to cue RAF manned and unmanned combat and reconnaissance aircraft, which were equipped with the high resolution electro-optical sensors necessary to identify enemy activity on the ground, which could then be dealt with through appropriate air or ground action.

Determining ground truth is fraught with challenge and the information available in war is rarely sufficient (or timely enough) to enable decision-making in the comfortable blanket of absolute knowledge. In Kosovo, NATO's aircraft attacked what was thought to be a Serbian military convoy, but turned out to be a line of civilian tractors and trailers, and in Afghanistan, coalition aircraft attacked a large group of so-called Taliban massing for an attack, which turned out to be villagers gathering around a fuel truck stuck in mud. On both occasions, commanders made the limited facts available fit a flawed hypothesis. In the case of Kosovo, the attack ceased when a formation of RAF Harriers arrived overhead and transmitted concerns about the convoy being targeted, demonstrating the value of a second opinion from the

third dimension. In the Afghanistan example, the aircrew suspected that all was not well but unfortunately accepted the judgement of the ground commander.

Red Card Holders

Whoever has the best available information should normally own the decision; however, the enormity of the consequences of decisions may require the authority to decide to be held at a higher level. If time allows, boards can convene and expert advice sought; however, often the time available is measured in seconds and minutes and judgments need to be based on a rapid conversation, not a well-constructed and prepared brief. During Operation Shader this has been a daily occurrence for the 'Red Card Holders', who demonstrated exceptional and persistent excellence in their decision-making, despite the ambiguous and often contradictory information at their disposal.

The Reaper Force

The quality of decision making of the 'Red Card Holders' in the CAOC has been matched by that in the cockpits of our aircraft over the battlefield and in the Reaper cabins stationed in Nevada and Lincolnshire. The Reaper operators, whilst many thousands of miles distant from the action, are arguably the RAF's deepest in-theatre experts. Most warfighters deploy episodically on operations; Reaper operators are employed permanently. Although they may not smell the cordite, they develop uncommon intuition and offer insights unmatched by those physically present on the battlefield. In Iraq and Afghanistan they played a critical role in the coalition's Counter-Improvised Explosive Device (C-IED) activity, using their persistent presence and pervasive sensors to establish an excellent understanding of 'normal activity' and thus enabling them to detect the abnormal and therefore the suspicious. This capability extends beyond the technical: on one night, a potential IED-planter was discovered digging a device into a field near an important road. An aircraft was on the verge of dealing with the bomber when an RAF Reaper arrived overhead and the crew used their deep operational experience to deduce that the bomber was in fact a farmer working in his field at night to avoid the high day-time temperatures. A second opinion from the third dimension can save lives. Experience counts too.

Decision Making at Home

At home, our National Representatives (NATREP) are RAF wing commanders who play a critical part in the command and control of domestic air policing. The more significant decisions are made at a higher level and the NATREP's challenge is to rapidly assimilate the facts and to simply and succinctly describe them to a higher-level decision maker in a way that allows for timely decision making. Difficult at the best of times, this was a particularly complex challenge during the execution of the Air Security Plan for the London Olympics in 2012, when the forces were diverse, including deployed ground-based air defence batteries, radars, visual observers, sniper-equipped helicopters and supersonic fighters. Critical to the effort was timely decision making; by that, I mean making decisions on the employment of lethal force that could affect thousands of lives within minutes and based on scant

information. Under such circumstances, to *not* make a decision was in itself a decision. Whilst the threat did not manifest itself during the London Olympics, the events of 9/11 underline the requirement to assemble and thoroughly exercise both the deployed forces and the decision makers, preparing them to employ lethal force with precision and good judgement. On a lighter note, our Olympic experience provided another example of inappropriately making facts fit the theory. One evening a suspicious light was spotted in the sky to the East of the Olympic stadium by one of the deployed visual observers. A Lynx helicopter was scrambled by the Air Command Operations Centre from the deck of HMS Ocean, which was at anchor in the Thames near Greenwich, and ordered to investigate. After a few minutes, the Lynx helicopter crew reported back that they were unable to intercept the aircraft as it was the planet Venus!



London Olympics 2012.



RAF100 Flypast.

My Ninth Air Truth: The future success of the RAF depends on transforming how we train.

In recent years, the RAF has been committed to operations at a level of tempo and complexity not seen in generations. Chests on the parade square are adorned with medals of all varieties, reflecting the exceptional quality and the quantity of the operational contribution made in the air and on the ground. Today, we have an air force with a level of combat experience that is the envy of air chiefs around the world. And yet, the necessity of placing an almost total focus on warfighting risks neglecting what Trenchard described as ‘the extreme importance of training’¹⁴ and believed would be the *making or marring* of the future of the Air Force. Today, technology, cost and, increasingly, the environment are driving the ‘extreme importance’ of a paradigm shift in how we train.

Advances in technology present both opportunity and threat: opportunities we are yet to seize and threats to which we must respond. Training must be included in this calculus. The most obvious technical opportunity rests within the synthetic environment. No longer should thinking about synthetic training be constrained to simulators, and no longer should synthetic training be dominated by the operations of individual devices. The rapid expansion of the gaming industry has resulted in synthetic environments with more than 10 million concurrent players. Add to this the advances in virtual reality and augmented reality and it

quickly feels like our current thinking on simulators is on a level with the ZX Spectrum in the world of Apple and Google. Moreover, and following on from the growth of E-sports, is it inconceivable that E-wars will be fought in the virtual battlespace?

RAF Synthetic Training

Synthetic training has played a critical role in the RAF since the 1930s. Indeed, following World War II, Air Marshal Robert Leckie said 'The Luftwaffe met its Waterloo on all the training fields of the free world where there was a battery of Link Trainers.'¹⁵ In the early 1990s, the RAF fielded cutting-edge technologies that tracked pilot retinas to deliver high resolution visual imagery in critical areas within the simulator field of view and played a central role in driving NATO efforts to better understand the opportunities provided by Mission Training through Distributed Synthetics. More recently, the RAF contributed to the Mace studies that informed SDSR 2010 and set a target of a 50:50 balance for RAF, RN and Army live:synthetic front-line training. Unfortunately, progress towards this ambitious target has retreated over time and we are many years from fielding distributed synthetics that connect a virtual network of disparate training audiences across the environments. Nevertheless, the Defence Operational Training Capability for the Air (DOTC(Air)) environment promises to deliver a step-change in how we train, exercise and rehearse. It will embrace the live and virtual environments and offers economic and efficient training at home and when deployed, including on-board the Queen Elizabeth Class aircraft carriers. Critical to the delivery of DOTC(Air) is the Air Battle Training Centre at RAF Waddington, which has played (and will continue to play) a critical role in the delivery of RAF Live-Virtual-Constructive collective training.

Protecting Capability

Part of the training challenge posed by technology is the need to protect sensitive capabilities, such as those possessed by the F-35 Lightning, which may be compromised during live training. A synthetic, secure environment is critical if we are to train, exercise and rehearse away from the persistent stare of malign actors. This must not drive training solutions confined to one aircraft type, such as the F-35, or isolate aircraft from other members of the network. The preparations for the Gorazde extraction in 1994/5 and the Western Desert of Iraq in 2002-3, teaches us the benefit, if not the necessity, of all players on the network being trained, exercised and rehearsed together. Moreover, the increasing performance of our aircraft and their weapons drives a demand for ever increasing volumes of airspace in which to train at a time when the rise in civil air travel and the associated protected airspace shows no sign of abating. Again, the synthetic environment offers an obvious alternative way to square the military training circle.

Credible Replication

Another challenge for training technology is the replication of the physiological and psychological experience of warfighting. A flight in the Typhoon simulator does little to prepare pilots for air combat fought at 9g. Moreover, no matter how demanding the instructor

or supervisor, a mistake in the simulator does not replicate the consequence of a mistake in the aircraft. When considered alongside the economic dimension, these factors support live flying and work to explore the concept of 'surrogacy'. Just as a Land Rover can be used to train soldiers in Foxhound combat vehicle operations, so could the Hawk T2 provide the physiological and psychological experience necessary to act as a surrogate training platform for Typhoon pilots.

Striking the Right Balance

Debates about the live-synthetic balance of flying have many more factors than space here to describe, including notably the issue of culture: we have yet to see the first 1,000 hours live/simulator badge presented to pilots. Live-synthetic discussions occasionally have Luddite resonance with the narrow-minded debates of yesteryear surrounding the introduction of female fast jet pilots and unmanned aircraft. Such arguments are unthinkable today as both are central and critical elements of the RAF front-line (although both still do not exist in the numbers we need). Decisions on synthetics today must be similarly forward looking.

Delivering Affordable and Relevant Training

Affordability remains an Achilles Heel of air power, so to remain relevant to the Nation's needs, the RAF needs to remain affordable and to counter the orthodoxy that the spiral development of capability is inevitably accompanied by spiralling costs, which can only be addressed through delay and/or descoping of programmes. The path to affordability has many different routes, of which synthetic training is a crucial one. We must ensure that every live flying hour is consumed because it is necessary *not* because it is possible. The key issue is to nail the requirement and to understand the benefits and risks associated with the various live:synthetic blends. Discussions on the live flying hour requirement must not suffer from the intellectually corrupt yesteryear defences of the *status quo*. We must question every live flight and consider carefully the value of every air show and flypast. The benefits could be great: a reduced requirement reduces the amount of live flying hours required from the aircraft fleet (and lowers the carbon footprint), which drives reduced maintenance and spares support, which could drive a reduction in support staff and reduced numbers of aircraft. There are risks, and it is very easy to adopt a highly efficient operating model for a peace-time air force, but one that is unable to surge and be sustained in times of conflict. A manning philosophy and contract solutions need to be developed that will ensure the air force can readily transition between the fundamentally different operating conditions of peace and war. Moreover, we need to think deeply how our peacetime posture would contribute to deterrence, if most of the training effort involves aircrew flying in simulators. As in most issues, it is a matter of balance. Technology provides opportunity, but the economics drive the necessity for change. Irrelevance and unaffordability are two sides of the same coin; the RAF must, therefore, deliver affordable air power if it is to remain relevant, and this requires a paradigm shift in the way we train, prepare and rehearse our forces.

My Tenth Air Truth: Day 1 is the most dangerous day of any operation.

A superior pilot is one who combines his superior knowledge with his superior judgement to avoid having to use his superior skill.

Frank Borman

The last three decades have been marked by enduring and slowly unfolding operations in the Balkans, the Middle East and Afghanistan. Consequently, the RAF has amassed deep wells of operational experience, little of which prepares you for Day 1 of a new operation. Day 1, that first day of an operation when the pulse races at the thought of flying over an unfamiliar country, facing a foe of uncertain capability and fighting spirit. Often the operation is preceded by days, if not months, of heightened tension and febrile public and parliamentary debate. Tactical plans may have been hurriedly prepared and, with delays, become incredibly clever but overly complex works of art that will fail to survive first contact with the enemy. 'H-Hour' is rarely known until the day of action. The challenge for any commander at the onset of an operation is to understand the level of risk acceptable to their Government and to ensure this judgement is translated in a way that makes sense and is replicated all the way from the CAOC to the cockpit. 'Press-on-itis' is a well-known condition that afflicts most aircrew at some point in their flying career. It happens on operations and in training, when the enthusiasm for the mission clouds one's judgement of the risks and is normally only diagnosed after the act. The prevalence of press-on-itis is at its greatest on Day 1, and what follows are my experiences of the Day 1 phenomenon.

Day 1: 30 August 1995

For me, my first Day 1 of combat was also the first Day 1 for the RAF's 'New Harrier'¹⁶ Force and the first Day 1 for NATO combat forces. Perhaps, therefore, 30 August 1995 stands as an exemplar of Day 1 risks. The Balkans had imploded over the summer of 1995. In July, the small Bosnian town of Srebrenica was 'ethnically cleansed' by forces under the command of the notorious war criminal General Ratko Mladic, and many thousands of Muslims were slaughtered; the UN peacekeeping mission was failing, and UN peacekeepers were being taken hostage; over 100,000 Croat soldiers attacked the Serbs in Krajina; and then many innocents were killed in the infamous mortar attack on a Sarajevo market square. The patience of the international community had exhausted, and NATO responded on 30 August 1995 with the launch of Operation Deliberate Force. On Day 1, I had the privilege of being the first RAF commander to lead a NATO mission in combat at the head of 'Strike Package Delta', a formation of 24 RAF, French and US aircraft, drawn from ships and land bases in Italy tasked to destroy a Serbian armaments storage facility near Sarajevo. The familiar practice of 'running for the spare' was well exercised that day as both my wingman and I swapped our broken aircraft for serviceable ones, minutes before the planned take-off time. Nothing in that mission went as planned or expected; all that *could* go wrong *did*. The weather was poor, the communications were jammed and a French aircraft in my formation was shot down as they attacked their target. Fortunately, both aircrew survived both the shootdown and the pot-shots taken at

them as they descended under their parachute canopies, but they endured an extended period of incarceration by the Serbs until they were released 4 months later. The French aircraft was flying ahead of me – the aforementioned delays on the ground meant that I filled the ‘tail-end charlie’ position. I now know that the wall of noise on the radio, a mix of a persistent and loud hissing sound interspersed with a heavily-accented French voice, was not enemy jamming but panicked friendly forces responding to the shoot down. Despite their efforts, it was only on landing that I realised an aircraft had been downed, which is slightly embarrassing and unfortunate given that I too was shot at by the same Serbian air defence unit on Mount Igman. Fortunately for me, my eagle-eyed wingman (a USMC pilot – Semper Fi) alerted me to the 2 SA-14 infra-red missiles arcing towards my aircraft, giving me time to defeat them. Undaunted by the experience, we pressed on and reattacked the target (what was that lesson from the Falklands about not reattacking?) with somewhat limited success.

Day 1: 24 March 1999

The opening day of Operation Allied Force also provided a good example of the ‘Day 1’ phenomenon. A combination of weather and ‘press-on-itis’ meant attacks continued to be prosecuted despite targets being obscured by smoke, leading to mission failure. Moreover, for the RAF Tornado aircrew, Day 1 operations involved flying from Germany to conduct long-range attacks in Serbia; it’s a long way to fly and not press on to the target. There are, of course, valid reasons to continue with an attack or a mission, particularly if friendly forces on the ground are under fire. This challenging risk calculus, whilst at its most uncertain on Day 1, applies throughout an operation. Balancing the risk to life against the risk to mission is never easy, particularly when that mission involves the saving and protecting of brave men and women on the ground. Nowhere is this challenge better demonstrated than by the considerable and courageous efforts of everyone involved in the operations of the helicopter-borne Medical Emergency Response Teams in Iraq and Afghanistan.

Day 1: 19 March 2003

The most effective antidote to ‘press-on-itis’ and Day 1 risks is preparation. This includes training, rehearsal, education, a deep understanding of ROE, the Targeting Directive and the well-articulated intent of commanders – all tested and debated in the crew room before you reach the briefing room, let alone the aircraft. Easier typed than delivered, but this is why I believe Day 1 of Operation Telic in the Western Desert of Iraq on 19 March 2003 went far smoother than was expected or feared. No force could have been better prepared. Much of the detail of that day and the rest of the warfighting phase of the operation remains obscured by the cloak of secrecy, but it is my view, as both a pilot during the Operation and as author of a subsequent MOD report¹⁷, that the lessons of 2003 are worthy of in-depth study and are entirely consistent with the truths above.

The Service Test

The RAF enters its second century as an organisation that is respected, valued and employed. But as we build towards the Next Generation Air Force, we must guard against prioritising

the business of Defence ahead of the business of warfighting. Rather, we would do well to remember Trenchard's challenge for the RAF in 1920:

'The test of every fighting Service is war. Its organization, training, distribution, systems of command and administration must always be primarily governed by this consideration. Peace has its own problems and difficulties, financial and other; but in solving them we must always keep war in the forefront of the picture and try to foresee its possibility, probability, locality and nature'.¹⁸

Whilst some consider truth to be a casualty of war, I contend that my 10 Air Truths are the conclusions of war. I accept also, however, that no one man has the monopoly on truth or wisdom and, as the Swedish scientist Jons Berzelius observed:

The habit of an opinion often leads to the complete conviction of its truth, it hides the weaker parts of it, and makes us incapable of accepting the proofs against it.

Notes

¹ Churchill, Winston. *The Gathering Storm*. Boston: Houghton Mifflin, 1985, page 100.

² Colourfully described by Squadron Leader Jerry Pook MBE DFC in *RAF Harrier Ground Attack: Falklands*. London: Pen & Sword Books. 2007.

³ Campbell, Alastair, and Richard Stott. *The Blair Years: Extracts from the Alastair Campbell Diaries*. London, Arrow Books, 2008, pages 362-404.

⁴ The British Army describes 77th Brigade's aim as 'to challenge the difficulties of modern warfare using non-lethal engagement and legitimate non-military levers as a means to adapt behaviours of the opposing forces and adversaries.' "77th Brigade." The British Army. Accessed August 12, 2019. <https://www.army.mod.uk/who-we-are/formations-divisions-brigades/6th-united-kingdom-division/77-brigade/>.

⁵ John Keegan, "Please Mr. Blair never take such a risk again," *The Daily Telegraph* (London), June 6, 1999.

⁶ Robertson, George. NATO Speech: 21 March 2000. March 24, 2000. Accessed August 12, 2019. <https://www.nato.int/docu/speech/2000/s000321a.htm>.

⁷ *ibid*.

⁸ Clausewitz, Carl Von, Michael Howard, and Peter Paret. *On War*. Princeton, NJ: Princeton University Press, 1989, page 88.

⁹ Professor Michael Howard, *Military Science in the Age of Peace*, (The RUSI Journal, Volume 19, No. 2, March 1974).

¹⁰ Rommel, Erwin; Liddell Hart, Basil Henry; and Paul Findlay. *The Rommel Papers*. New York: Da Capo, 2003.

¹¹ Royal Air Force. *Royal Air Force Strategy: Delivering a World-Class Air Force*. RAF High Wycombe Air Media Centre, Crown Copyright, 2007, page 23.

¹² The position of any activity of interest is provided by stating the bearing and range from a pre-defined position (the Bullseye).

¹³ Benjamin S Lambeth. *Air Power Against Terror*: Rand Corporation. 2005.

¹⁴ Trenchard Memorandum – Permanent Organisation of the Royal Air Force - 1919.

¹⁵ Van Hoek, Susan; Link, Marion Clayton (1993). *From Sky to Sea, A Story of Edwin Link* (2nd ed.). Flagstaff, AZ: Best Publishing Co.

¹⁶ Harrier GR5/7/9 or Harrier II (USMC).

¹⁷ Directorate of Operational Capability: *Op Telic Lessons Study Vol 1*. MOD. 2003.

¹⁸ *Aspects of Aviation*: An address by Trenchard to an Air Conference, 1920.

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