



Air and Space Power Review

Volume 27 Number 2

Winter 2025

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RAF Air and Space Power Review

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Director of Defence Studies (RAF)
Cormorant Building (Room 119)
Shrivenham, Swindon
Wiltshire, SN6 8LA

E-mail: CAS-ASDefenceStudies@mod.gov.uk

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E-mail: CAS-ASDefenceStudies@mod.gov.uk

Print: ISSN 2634-0968

Online: ISSN 2634-0976

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Introduction

by Group Captain John Shields, Director of Defence Studies (RAF)

A warm welcome to this edition of *Air and Space Power Review*. Following two special editions, to mark the retirement of Seb Cox as Head of the Air Historical Branch and more recently the 85th Anniversary of the Battle of Britain, we return to a more traditional broad mix of articles. As a historian myself, looking back at previous events can be very illuminating and interesting. The 'what' and the 'so what' tells the story and lessons of the past. However, history is a means to an end and not an end in itself. Therefore, it is imperative that we integrate the 'now what' and the relevance to the challenges we face today.



Our first article *More Than an Act of Faith: The Railway Research Service in the Second World War* is by Group Captain Sam Wallington. This essay looks at the role of military targeteers, the exploitation of civilian expertise, and the importance of multi-source intelligence. The second paper by Dr Richard Worrall - *The Fallout After the Oberhausen Operation: Churchill, Bomber Command and the Battle of the Ruhr in June 1943* studies the relationship between the politician and the military commander within the context of Bomber Command's performance, asking if there were grounds for criticism over policy and aims? *30 years of British involvement in Bosnia and Herzegovina and Why the Region is Important Today*, by Wing Commander Chloe Bridge, examines the complex issues of the region since the signing of the Dayton Accord. It looks at the problems within the area and puts current challenges into context explaining why this is still important to the security of the UK and Europe. Staying in the Balkans theatre, *Operation Allied Force – Lessons in Modern Airpower* by Colonel Daniel Krowinski USAF, reviews the role of NATO and the employment of air power during the 1999 conflict as well as identifying the lessons that remain pertinent to today's civilian and military leaders. The next article is a viewpoint by Flying Officer Joseph Brown entitled: *The Importance of Information Advantage in Enabling Air and Space Power*. In this essay, the author discusses the importance of Information Advantage and the dangers of not falling behind in what is becoming a more competitive domain, and the threat of Information Denial.

To conclude this section of papers, it gives me great pleasure to have the opportunity to publish last year's winning Gordon Shephard Memorial Essay Prize, for 2024: *A Framework for Protecting and Defending the UK's Space Interests* by Squadron Leader Mike Lambert. Opening with a fictional (but plausible) scenario, his essay considers the UK's Defensive Space Operations and Strategy and putting it into practice.

While the 2025 Gordon Shephard Memorial Essay competition will have closed by the time this edition gets distributed, the Internal Briefing Note detailing the 2026 competition, as well as the Salmond Prize, should have been promulgated. Also, as an Ex-officio member of the RAF Historical Society Committee, can I use this opportunity to also bring your attention to the Two Air Forces Award. Details of these essay prizes can be found at the back of this edition.

As mentioned in the last *Air and Space Power Review*, we will aim to publish a recent speech by the Chief of the Air Staff (CAS). On this occasion there is the opportunity to print one of the very first public speeches made by the newly appointed CAS, Air Chief Marshal Sir Harv Smyth. Just 88 days into his tenure, he presented the annual address to the Freeman Air and Space Institute at King's College London's Bush House in late November 2025, which sets out his intent and priorities, and I am sure will be of interest to many.

Book Reviews for this edition include: *Kabul: Final Call; The inside story of the withdrawal from Afghanistan August 2021* by Laurie Bristow, the last UK Ambassador in Afghanistan and a personal account of the final withdrawal in 2021. *Principles for Dealing with the Changing World Order: Why Nations Succeed and Fail* by Ray Dalio, encapsulated his experience as a financier to discuss how global systems work covering a breadth of perspectives with a relevance to us all. *Destined for War: Can America and China Escape Thucydides' Trap?* by Graham Allison, explores this concept in the context of contemporary US-China relations and relates this to the Thucydides's Trap: 'when a rising power threatens to displace a ruling one, the most likely outcome is war!' Our final book review, unfortunately delayed by the special editions, is *The Royal Auxiliary Air Force Commemorating 100 Years of Service*, by Dr Louise Wilkinson and Squadron Leader (Retd) Tony Freeman; an informative account to mark the centenary last year, acting as record and celebration of the RAuxAF's history and achievements.

I hope you enjoy the latest edition of ASPR.

Article

Much More Than an Act of Faith: The Railway Research Service in the Second World War

By Group Captain Sam Wallington

Biography: Group Captain Sam Wallington is an Intelligence Officer with over 20 years' experience in a range of fields including Intelligence, Surveillance, Reconnaissance (ISR), targeting, information warfare, and policy & strategy roles. He has completed operational tours across the Middle East, Afghanistan, and held appointments in a range of UK and Allied command and staff environments. He holds MAs in Defence Studies and in Intelligence & Security Studies and is currently serving as Personal Staff Officer to the Deputy Supreme Allied Commander Europe.

Abstract: The precise selection and prioritisation of targets is fundamental to the successful delivery of air power. The general absence of the Railway Research Service (RRS) from most histories of the Combined Bomber Offensive of the Second World War is therefore a puzzling lacuna, for this small band of civilians were at the very heart of Allied efforts to immobilise the Axis war economy. Using the archived private papers of the RRS's leader, this article begins to fill this gap in the historical record and thereby to throw new light on the process of target selection. It makes four observations from the RRS's service that are relevant to today's military targeteers: the need for long-term civilian expertise; the value of commercial and industrial experience; the criticality of data-driven advocacy free of ideological beliefs; and the importance of multi-source intelligence.

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Introduction

‘The choice of enemy targets, as I have already pointed out, is the most delicate operation of aerial warfare.’¹

‘If we spread out a map of the [European] railways, we perceive a network of black lines... At the cross-sections are cities. In the north of Germany this network of lines becomes ever more dense and its very centre may be compared to a spider in the middle of its web. This spider is Berlin...’²

The process of targeting – the selection and prioritisation of the right entities against which to apply the full range of effects available to a commander – is critical to modern warfare.³ As highlighted in the opening quotes, it has also been central to airpower thinking for over a century. Sustained success is not possible without the ability to pick such meaningful targets and then match them to the right weapons at the right moment. Targeting is challenging even for the most technologically advanced combatants, who are likely to be overwhelmed by the volume of data they must process to understand the battlespace, and will be constrained by their leaders’ political choices. In 1999, NATO’s targeting travails in the Balkans were an object lesson in this regard for the Alliance. More recently Russia’s failure to prioritise the Ukrainian targets effectively contributed to its failure to capture Kiev in the early months of the war.⁴

The story of the Railway Research Service (RRS), therefore, offers an important opportunity for today’s targeteers, to seek inspiration from the past. This little-known group of civilian experts was established before the war as an offshoot of the London School of Economics (LSE) to offer commercial insights to British companies about overseas railway procedures, and in turn increase profitability. Yet, during the Second World War, this small and unassuming team used its unique expertise to help steer the transportation campaigns of 1944 and 1945, in which Allied air forces flew some 10,498 sorties against an exceptionally complex and adaptive system: the continental railway network.⁵

The RRS has been neglected by historians. Contemporary air power advocates such as Lord Tedder,⁶ Sir Robert Saundby⁷ and Lord Zuckerman⁸ do not mention it in their post-war writings, and Richard Overy, Robert Pape and Tami Davis Biddle pay it relatively little attention. Robert Ehlers, in his excellent account of the Combined Bomber Offensive (CBO), highlights the value of the RRS to commanders, but portrays it as an intelligence organisation, which is not a full characterisation.⁹ Alfred Mierzejewski pays the RRS due regard, but overlooks its formative pre-war years.¹⁰



Air Marshal Sir Robert Saundby

This lacuna is unfortunate, because the inter- and intra-Allied arguments about what to target during the CBO were some of the most heated and intriguing of the Second World War. Senior air force officers aggressively promoted a range of competing target sets such as oil installations, ball-bearing factories and bridges, whilst their disciples wielded post-strike assessments in a series of fractious squabbles about prioritisation. National agendas, personal outlook, experience, ideology, science, and even class and education all became factors in a targeting debate that endured long after 1945.¹¹

This article therefore has a two-fold purpose. Firstly, it seeks to fill the gap in the historical record by explaining the role and influence of the RRS. It offers a brief outline of the transportation campaigns, explains the pre-war birth of the RRS, examines its wartime activities, and assesses the level of its influence on senior leaders. Secondly, this article offers three lessons about the RRS's work that should be considered by present-day air power advocates and targeteers. It draws heavily on nine principle series from the National Archives, especially AIR 40 and FO 1058, but more importantly the private papers of the RRS's Secretary held at the Imperial War Museum.

Context: railways and the transportation campaigns

The importance of railways to military operations dates back almost as far as their inception. By 1859, railways had already enabled the swift movement and subsequent success of French forces in the Franco-Austrian War.¹² During the First World War railways were an important target for the fledgling German Air Force – its night-time raid on the great Audruicq marshalling yards in the Pas-de-Calais destroyed some 37,000 tons of stored ammunition and 400 wagons in July 1916, with one eyewitness recalling the destructive effect of the 'terrific explosions... and showers of metal falling in all directions'.¹³ In the late 1930s, extensive bombing of railway lines between Canton, Kowloon and Hankow was central to Japanese strategy in the second Sino-Japanese conflict, although the British Air Attaché in Shanghai was bemused at how inefficiently the attacks were actually executed.¹⁴

By the outbreak of the Second World War, the Reichsbahn (German Railways) was absolutely critical to the health of the German state, because it allowed the efficient movement of coal and goods across a nation with a highly dispersed industrial base.¹⁵ Together with its connections to occupied European networks, the continental railway system offered an enticing target to Allied planners in early 1944. Degrading the railways would disrupt Axis reinforcement of the Normandy peninsula and thus directly support the D-Day landings. For Supreme Allied Commander General Eisenhower such disruption was the single most important task that air power could fulfil at that juncture in the war.¹⁶ Tedder, then Eisenhower's deputy, saw such attacks as a chance to apply lessons learned from interdicting the Italian railways in 1943; they would also demonstrate that air power could integrate seamlessly with land and maritime forces through a single 'comprehensive pattern' rather than conduct a 'patchwork quilt' of attacks against unconnected targets.¹⁷

Two distinct transportation campaigns took place. The first began some three months before D-Day itself and aimed to cut Normandy off from the Axis logistic machine, focusing primarily on French and Belgian railways. The second, which took place over the winter of 1944-45, focused on the Reichsbahn directly in order to prevent German forces from reconstituting and so defending Berlin itself. Some 31,000 tons of bombs were dropped during these campaigns.¹⁸

An assessment of the precise effect of these campaigns is beyond the scope of this article.¹⁹ That they had a considerable impact on the Axis war effort is, however, indisputable. Analysis by Supreme Headquarters Allied Expeditionary Forces (SHAEF) indicated that by late 1944 they had caused rail traffic in France's Nord region to drop from 9,000 to 2,000 weekly wagon loads of supplies to the front line.²⁰ Albert Speer, chief orchestrator of the German war economy, acknowledged the effectiveness of the campaigns in a note to High Command on 7 November 1944:

In addition to the bombing of production plants in the Ruhr, the systematic attacks carried out on railway installations are largely responsible for the critical situation. While the former can result in an appreciable drop in our total war output, the disruption of our communications may well lead to a production crisis which will gravely jeopardise our capacity to continue the war.²¹

On 2 January 1945, Army Group B reported to Berlin that, due to bombing, all traffic on railway lines west of the Rhine was at a standstill, a fact that the Government Code and Cypher School (GC & CS) at Bletchley Park intercepted and duly reported back to SHAEF.²² In turn, the lack of available rolling stock meant that coal piled up in Ruhr pit shafts, as German railways were unable to move it to factories where it was desperately needed. Webster and Frankland state that between August 1944 and February 1945 these stranded stockpiles increased from 415,000 tons to 2.75 million tons.²³

Yet knowing precisely *which* railway targets to bomb, and when, was the central challenge faced by those orchestrating the transportation campaigns. So vast and complex was the continental railway network that picking any particular node risked being, as one member of the Combined Strategic Targets Committee (CSTC) despaired, no more than 'an act of faith'.²⁴ The RRS played the central role in turning this seemingly wicked problem into a series of deliberate, evidence-based choices. Major General John Sinclair, who as Director of Military Intelligence during this period was well placed to judge, saw this ability as 'the greatest value' of the RRS.²⁵ So how did such a small and discreet group of civilians manage to have such impact?

Peacetime: a focus on commerce

The RRS was established in London in 1924 as the Railway Information Bureau under the auspices of the LSE. Its purpose was 'the study of Railway matters in the Dominions and foreign countries'.²⁶ This structure was for a trial period of three years, and it was funded principally by

the various British railway companies who were the RRS's main customer base. By providing insights into the commercial practices of overseas railway companies, the RRS offered its patrons a route to greater profitability in a highly competitive British market. It consisted of just six personnel: a Secretary, two research assistants, and three clerical staff.²⁷

The RRS's first and only Secretary was Charles Ely Rose Sherrington, who had won the Military Cross on the Western Front in 1916.²⁸ Wounded, he was subsequently posted as his battalion's Railway Transport Officer in a rear echelon role, where his knowledge of the French language and exposure to the French and Belgian railway systems enabled him to build up an in-depth understanding of continental transportation. After the war, he became an instructor at Cornell in the USA, before returning to Britain in 1924 to take up a post at the LSE as a lecturer in transportation.²⁹ His qualifications and experience uniquely qualified him to lead such a niche team as the RRS.

The establishment of the RRS reflected an increasing trend in British industry after the First World War to rely on data to drive decision-making rather than experience and intuition. The Great Depression and fear of social unrest was fundamental to this shift, as was a growing realisation that continental rivals had already adopted the use of empirical evidence to inform commercial strategy.³⁰ The increasing ability to record, transmit and interrogate information was another catalyst for this change.³¹ The rationalisation in 1923 of the twenty-six largest British railway companies into a 'Big Four' was in itself a mark of this desire for greater efficiency. This focus on data would pay dividends in the RRS's forthcoming debates on target selection. Housed in a neo-Georgian office block in Cowley Street in London, the RRS's peacetime outputs – regular bulletins, as well as bespoke responses to specific queries and evidence to Royal Commissions on various transport-related matters – sufficiently impressed its customers to fund it on a permanent basis. Upon the outbreak of war in 1939, the RRS was transferred almost immediately under the aegis of the Ministry of Economic Warfare (MEW).³²

Wartime: finding a new role

The MEW initially envisaged the RRS as a form of consultancy that could aid its understanding of the German war effort, with a dedicated section (MI 10b) of the Directorate of Military Intelligence tasked to enable RRS access to classified material.³³ This early phase included some notable successes: for example, RRS expertise helped GC & CS determine the actual significance of certain decrypted Enigma signals in early 1941. In this instance, the RRS explained that this particular set of German messages were movements orders and railway requirements, and so a harbinger of a major German campaign in the Balkans.³⁴ However, Sherrington quickly realised there was an opportunity to provide a far more comprehensive and revolutionary form of support to the War Office. At the height of the London Blitz he wrote that:

The assessment of the efficacy of air interference with transport movements by rail and water is a problem created by this war and has never previously been faced by

any General Staff. It demands the development of a new technique in intelligence methods, and there is no reason why Great Britain should not develop this field ahead of all other countries.³⁵

Sherrington was proposing, in effect, the first mass systemisation of what would now be recognised as Measurement of Effect for aerial bombardment, and his memorandum therefore stands as a significant milestone in the professionalisation of targeting. By 1941 the MEW Deputy Director-General, Geoffrey Vickers, was in discussion with the RRS on how to *proactively* plot the most efficient destruction of German railways. This approach was a step-change from the RRS's initial role of just supporting those military intelligence personnel who sought to understand the success of RAF raids.³⁶



Geoffrey Vickers, VC (later Sir)

By the middle of the war, the RRS had become a small but integral part of the Allied effort. Its work was important not just to those in the sphere of conventional conflict, but by others pursuing more cloak-and-dagger warfare. For example in 1942 Sir Charles Hambro, then a senior member of the Special Operations Executive, thanked the RRS: 'you work in secret and silence,' he noted approvingly, adding 'while many have the opportunity of seeing the results of your labour on paper only a few of us know the value of it all in practice'.³⁷ In early 1944 Sherrington's team was central to the drafting of the Transportation Plan itself, where it was referenced approvingly no less than five times in the Allied Expeditionary Air Force (AEAF) paper that Tedder used to persuade Eisenhower of the value of attacking railways above all other target sets.³⁸

The precision and relevance of RRS target nominations was validated in May 1944 when the RRS received a report from the Belgian Ministry of Defence in exile. This paper was an in-depth analysis of German munitions traffic on the Belgian rail network. Notably, it recommended twenty-one specific targets to cause 'grande perturbation' in the system, no less than eighteen of which had *already* been selected by the RRS for attack.³⁹ This independent confirmation of RRS thinking was clear validation of the value of Sherrington's team to the CBO.

When the CSTC was established in late 1944 to produce a single view of all target priorities for Allied air forces, the RRS became a leading voice in its Communications (i.e. transportation) sub-committee. The RRS also closely supported the tactical air power advocates of the AEAF and was so esteemed in this role that Sherrington's deputy was detached to provide direct support to SHAEF in person. The latter even produced a thought-provoking draft press release in appreciation of this individual, a Mr Brant. It is worth quoting at length for the light it throws on the value and consequence of even one RRS employee:

This man with the friendly smile and pleasant voice attends meetings of the senior air officers who direct the transport attacks. Seated at the conference table in the midst of high-ranking, be-ribboned officers, he looks rather out of place. But these officers listen with respect to his opinions.

When he points to the map and says 'If you put your bombs there, I think it will hurt most,' his judgement carries weight, for he has a perfect knowledge of the rail system of the Continent. His advice has already been of inestimable value in the preparation and execution of these attacks on communications...

... bridges, railway centres and junctions have been wrecked in the last two months. Great piers of masonry and steel girders have toppled into the French rivers. Vital links in the chain of communications have been severed.

Behind it all, is a plan – and helping in the evolution of that plan is the quiet little man in a navy blue suit.⁴⁰

By this point in the war RRS staff were reading several hundred pages of incoming information a day. They turned out extensive weekly bulletins and reports, as well as attending targeting meetings; and, most impressively, sustained their peacetime output as well. The RRS's sheer breadth of activity was clear too in the grateful thanks of the US Army in 1944, for whom the RRS had provided detailed advice and orientation on how to repair and operate an unfamiliar railway system in the aftermath of the D-Day landings.⁴¹

Meanwhile Sherrington's reputation meant he was selected to chair the inter-services Transportation Intelligence Committee (TIC), the body charged to provide a single authoritative view of Axis transportation. In a sign of the RRS's pre-eminence, the TIC's weekly meetings were hosted not at the War Office or MEW's premises, nor even at SHAEF, but at the RRS's Cowley Street offices.⁴² Sherrington's leadership of the TIC was so successful that this Joint template was exported beyond the European theatre. The War Office established an equivalent committee for the Far East, and another for the Middle East – testament to the success of Sherrington and the RRS.⁴³

The RRS's valedictory wartime report gives some sense of the sheer breadth and scale of its output, and how far it had developed from its humble beginnings. Initially, its reports had been just one or two typewritten pages, intended for a single section of the MEW, and focused solely on Germany. By 1945, its work had expanded to cover all areas of Axis occupation and were being distributed to over ninety Allied organisations. The RRS was, in effect, the primary judge of the impact that the Allies had on continental railways, and whilst it certainly had its competitors, it was generally accepted as *primus inter pares* by the war's end.⁴⁴ The RRS seems to have been a tightly-knit group: one employee recalled the

‘complete understanding and perfect teamwork’ within its offices, and of ‘the impression of the most peaceful atmosphere reigning... in the most trying period of our existence.’⁴⁵

The RRS in retrospect

The RRS was the recipient of a diverse range of grateful acknowledgements in the immediate aftermath of the war. C E Stevens, one of the black propaganda specialists of the Political Warfare Executive, noted after VE Day that ‘no intelligence source was more co-operative’ than the RRS, and added: ‘It was a kind of proverb in the Secret Unit that I served during those years as Economic Intelligence Assessor: ‘Railway Research will never let us down.’ And it never did.’⁴⁶

Tedder too was fulsome on his praise amongst the air chiefs. ‘The Air Forces,’ he wrote in 1945 ‘both British and American, that executed this attack [the transportation campaigns] owe an enormous debt to the advice and guidance of the Railway Research Service. Neither I nor any of my senior Staff Officers will ever forget the devoted assistance that you and Brant gave us.’⁴⁷

Sherrington was appointed OBE in the 1946 New Year Honours List in recognition of his service, and the RRS returned to its original *raison d’être*, the provision of insights into overseas railway practices. Demand for this service remained strong: indeed between 1947 and 1949 the RRS received around 400 formal requests a year, which were dealt with by the same six staff who had served in the war.⁴⁸

However, the tendrils of secret work continued to reach out to the service, as the intelligence community sought to retain RRS expertise. The first head of the Joint Intelligence Bureau (the forerunner to today’s Defence Intelligence) wrote to the Minister for Transport in 1950, thanking him for the RRS’s ongoing support – and asking that its hugely valuable records be preserved for use ‘at this time of heightened international tension.’⁴⁹ In this context, the RRS was an excellent example of the most pressing challenge for the intelligence community after the war: the maintenance of niche capabilities, proven during wartime, in an era of straitened budgets and inter-government politicking.⁵⁰ Sherrington was invited to lecture at the National War College in Washington DC in 1949 on his experiences, suggesting that the US targeting community appreciated the lessons of the RRS story too.⁵¹

Ultimately, the RRS was subsumed into the wider technical departments of a single unified British Railways, where its unique stand-alone existence came to a close. Its story, nonetheless, offers fascinating insights for air power advocates and planners. Michael Howard’s strictures on too freely drawing conclusions from the ‘chaotic truth’ of the past must be borne in mind here; and yet, as he went on to state, ‘some attempt must be made to sort order out of chaos.’⁵² Three lessons for today’s warfighters are therefore tendered.

Unpicking complex targets systems require long-term civilian expertise

The first lesson is the enduring value of long-term specialist civilian expertise for unpicking complex target systems, rather than reliance on transitory military personnel. The RAF knew in

the inter-war period that targeting required considerable preparation, and the Commandant of the Staff College, Air Commodore Edgar Ludlow-Hewitt, acknowledged the need for a 'robust intelligence network' to enable this.⁵³ However, the service proved unequal to the task of establishing such an entity. This situation was vividly demonstrated in the production of the Western Air Plans by the Air Staff of the late 1930s, which lacked a detailed strategy or specific target sets for transportation nodes, or even any sense of what effect might actually be caused by such bombing.⁵⁴



Edgar Ludlow-Hewitt
(later Air Chief Marshal, Sir)

Robertson and others suggest that this failure to understand *how* to bring a transport network grinding to a halt was the by-product of senior officers' desire to focus on developing strategic bombing theory, rather than on the practicalities of actually implementing it. As there is no evidence that the RAF was aware of the RRS before the war, its subsequent utilisation must be considered a serendipitous convergence of need and resource, driven partly by Sherrington's foresight and partly by the growing desperation of the bombing community.

For example, because the RRS's civilian personnel had been able to maintain a single focus in the pre-war period, they were able to build up a depth of understanding far in excess of that of military intelligence personnel who were moved between postings. The RRS's ability to leverage its corporate memory and think beyond periods of days or weeks was clear in their first report on the transportation campaign for the month of July 1944. Rather than considering such an analysis in terms of a single month in isolation, the RRS saw July as another data point in the context of multiple sub-campaigns, and therefore an opportunity to 'conclude a study which has covered a period of two to three years [author's emphasis]'.⁵⁵

Merely reading reports in the UK was no substitute for the personal experience of Sherrington and his team. Sherrington was not shy in making this first-hand knowledge plain; he responded acridly in 1944 to a critique from another group of targeteers by noting such a challenge would not have come from 'those who have held executive railway experience or who are familiar with railway working... [or] ... by those who have undergone conditions in actual front-line warfare'.⁵⁶

Although there were certainly other sources of advice for air commanders, they lacked the depth of long-term knowledge that the RRS possessed. Vincent Orange accurately describes such alternatives as 'alleged experts... over-stimulated by their first brush with the real world, especially in wartime... ignorant of transport systems (to say nothing of military operations)'.⁵⁷ What the RRS's tiny pool of civilian experts offered was, therefore, an antidote to this: solid,

dependable, ceaseless data-driven advice, served without glitz but backed by the remorseless power of evidence.

The enduring value of long-term specialist civilian expertise is therefore an obvious lesson for the present-day warfighter, especially as potential target systems become ever more complex. Whilst there is broad acceptance that artificial intelligence has a role in supporting military decision-making, the RRS experience suggests that Artificial Intelligence should not be relied upon for targeting support. The clearest example of this comes from late 1944, when SHAEF staff were planning against the possibility of German locomotives being brought west across Europe to replace destroyed French engines. The available intelligence suggested to some that this was a genuine threat, but Sherrington was able to assuage their concerns by pointing out that wider German locomotives would simply not fit through narrower French tunnels and sidings.⁵⁸

The RRS was vital not just for its knowledge but its ability to parse that knowledge and apply it to a given situation. As the pool of data available to present-day planners becomes ever greater, so the quality of human judgement will be ever-more important in selecting what to strike, especially when the environment will be dynamic and ambiguous.⁵⁹

The value of external thinking

The second lesson is the importance of welcoming alternative, unorthodox approaches into the ordered realm of military planning.

The idea of reaching out to industry and academia was not a new one in principle; British military thinkers had contacted economists, bankers and academics in the ten years before the First World War for planning advice.⁶⁰ For the inter-war RAF the idea of doing so again to understand potential target systems was not an appealing one. Intelligence was in any case a dubious career field for an RAF officer, likely to brand one as 'an oddball unsuitable for higher command'.⁶¹ Technical researchers and scientists were a step further removed, perceived as too different in approach and methodology to be of worth beyond solving tactical issues. As the RAF staff college journal *The Hawk* put it, 'the scientist is reluctant to give his talents to the arts of destruction'.⁶² Analysis of the RRS's activities suggest four reasons for its success at overcoming this reluctance, notwithstanding the exigencies of wartime.

Firstly, the RRS was a small group without political agenda. It did not display egotism, nor take to bureaucratic infighting with zest, unlike some other targeting organisations such as the US Enemy Objectives Unit.⁶³ The RRS's status as a civilian organisation outside of military power hierarchies placed it apart from inter-service and factional arguments, and thus protected its output from politicisation. From a transactional cost theory perspective, the RRS was an almost perfect example of a unit that generated low friction and had clearly defined property rights – and was thus able to maximise its value and minimise any perceptions that it was a threat to others.⁶⁴

Secondly, the RRS brought something innovative to targeting practice, by pioneering what would now be considered a *systems approach*. This technique considered the continental rail system as a single collection of elements, interdependencies and functions; and then assessed how that system's interdependencies would guide an aerial attack to have the greatest overall effect on that collection.⁶⁵ Such an approach was clear in Sherrington's writings from as early as the 1920s, when he repeatedly characterised the 'Big Four' aggregation in terms of systems, and systems-of-systems terms, rather than in the more usual structural language.⁶⁶ Such thinking contrasted sharply with those who resorted to past experience or pseudo-psychological reasoning to lobby for specific targets such as bridges or morale bombing. The RRS approach instead considered the railways as a *dynamic* system rather than a static one. Its staff embraced the challenge of assessing a target that was constantly being disrupted and evolving thanks to their own efforts.

Thirdly, the RRS built a reputation for utter objectivity in its work, which was an appealing characteristic in view of the bull market in targeting strategies that developed around oil, rail, aircraft production, ball bearings, morale, and other pet strategies. Air Chief Marshal Sir Arthur Harris for example grew tired of what he saw as the subjective bulletins of the MEW, which led him to describe their economists as 'amateurish, ignorant, irresponsible, mendacious'.⁶⁷ The RRS however demonstrated throughout the war an impressive degree of impartiality. Its bulletins and assessments were marked by a tone of considered judgement and measured objectivity. The economist Edward Radice, one of MEW's own specialists, praised the RRS for its 'disinterestedness and objectivity [which] set up a standard for all of us to follow'.⁶⁸ This trait continued long after the war, too, as was clear in a letter from the General Manager of the Southern Railway to the new national Railway Executive. In it, he stressed the RRS's utter focus on 'objectivity', that it was trusted worldwide for its 'antithesis to publicity', that its conclusions were never 'coloured in order to prove a point', and that its reports 'cannot be bought'.⁶⁹

Finally, the RRS had two senior sponsor-advocates who could ensure its conclusions were listened to by air commanders. Zuckerman was the high-profile scientific brain with the willingness and fluency to be the RRS's proponent against competing targeting theories. For example, he defended the RRS during an argument over spare capacity in the French and German rail systems by suggesting that certain MEW and Air Ministry individuals were either professionally incompetent or deliberately seeking to mislead the AEAF.⁷⁰ Tedder was the influential professional with Eisenhower's ear, able to put RRS thinking into the wider strategic context. For example, his note of 24 March 1944 emphasised RRS influence in the Transportation plan, being based on 'systematic attacks, not against any single component of railway organisation such as locomotives or bridges, but against the whole Railway complex...'.⁷¹

For the present-day warfighter an obvious consideration presents itself from this analysis. Senior commanders should value the insights of unorthodox outside advisors, especially

when faced with complex operational problems. This approach should especially be the case in a joint force with a shrinking headcount, for such a force may have less capacity to even consider external advice. However, as the RRS showed, such external bodies can help unlock an adversary system to in turn achieve a strategic outcome. Commanders who are prepared to offer a platform to the RRSs of the future are more likely to achieve their objectives.

It follows that Defence should continue to build multiple pools of on-call niche expertise that can exist and thrive outside formal military structures. Such pools will be a more flexible resource than formally established regular units, likely to be cheaper to maintain, and more inclined to stay immersed in a particular field of interest. Although there are already several outstanding examples of such pools within the reserve forces, the next logical step is to accelerate their growth further, and to mandate their participation in training and exercising.⁷² By normalising their involvement, Defence will be preparing for the likely complex target sets of future conflicts across all domains. Such pools will also be a valuable asset for sharing and fusing with other NATO members, and in so doing assist the wider alliance to deter and defend against adversaries. Loch Johnson, the *eminence grise* of post-Cold War intelligence academics, has described this tendency of governments to seek help in academia in particular as being ‘as natural as plants should turn toward the sun’.⁷³



Loch Johnson

Preparing to operate without secret information

The final lesson is that the most diverse possible range of data sources is needed to understand and then unpick complex target systems such as rail networks. Despite the challenge of understanding the continental rail network, with its hundreds of thousands of miles of track, rolling stock, buildings, cabling, processes, languages and people, the RRS was successful because it ingested every scrap of information it could get its hands on. This knowledge not only deepened the organisation’s pre-war understanding, but also allowed it to assess the value of linkages between different elements of the system, and thus to identify its vulnerabilities.

This data omnivorousness was in marked contrast to other actors who sought to steer the CBO. Before the war, for example, the Air Ministry had little time for human intelligence (HUMINT), no matter how reliable or credible.⁷⁴ The insights from Ultra signals intelligence (SIGINT) were for a time so startling that some senior commanders were reluctant to trust it; at first it appeared, as Michael Handel has said, ‘just too good to be true’.⁷⁵ Moreover, General Henry Arnold, commander of US Army Air Forces, simply discounted imagery intelligence (IMINT) when it did not show the damage he believed his bombers had done against aircraft factories.⁷⁶

The RRS heavily utilised such traditional sources of secret intelligence in its work. For example, in May 1945 IMINT revealed to its personnel how the Reichsbahn was forced to use stretches of branch lines to stable 'dead' locomotives (those beyond reasonable prospect of efficient repair) rather than have them clog marshalling yards, with no less than 215 stabled end-to-end on a stretch of track just 4.3km long.⁷⁷ This situation was a clear indicator of a collapsing German repair effort, and the success of efforts to target engineering sheds. Similarly, the RRS also utilised covert HUMINT reporting from Germany ('secret ground sources') in the later years of the war, noting that although their quantity was 'infinitesimal' compared to that available from France and Belgium, 'their quality [was] quite incomparable'.⁷⁸ Furthermore, SIGINT from GC & CS was of value too for the wider targeting enterprise; in January 1945 it exposed bomb damage to the vital Ruedesheim railway bridge across the Rhine that could not be seen in aerial photographs. This intelligence allowed specialists to assess that rail traffic would be interrupted for eight or nine days, which meant that bomber attention could safely be diverted elsewhere.⁷⁹

However, key to the RRS's success was its use of non-traditional sources of information. It absorbed captured German railway maps and purloined timetables, newspaper cuttings from overseas, adverts in the transport press, and consular reporting from states bordering occupied countries.⁸⁰ Refugee reports added additional detail, such as the movement of German troops and the production rates of locomotives.⁸¹ The organisation was likely so proactive in this regard because it had 'made do' pre-war with unclassified information. Its sudden access to secret data during the war therefore became as an additional benefit rather than a dependency.



Billancourt Renault factory following the bomber raid

The present-day warfighter must plan for an environment that will be ever-more contested. Targeteers should, therefore, follow the RRS example and become comfortable relying heavily on non-traditional sources of intelligence, as airborne ISR, overhead sensing and access to HUMINT may be degraded by the adversary. Securing access to grey literature (non-commercial information not easily accessible from conventional publishers) in the run-up to a conflict will be critical. Buried in such material will be crucial data points for complex systems such as transportation networks, industrial enterprises, defence infrastructure and communication grids.⁸² A fine example of this from April 1943 was Bomber Command's highly successful raid on the Billancourt Renault factory that was planned using extensive building schematics supplied by the company's pre-war insurer, Lloyds of London.⁸³ Commercially-sourced intelligence (CSINT) will become increasingly important too, provided that market forces ensure it is both cost-effective and reliable. Indeed, the RRS was in fact one of the first CSINT providers in its pre-war guise, when it supplemented its income by selling insights to railway companies in South America who were keen to accelerate their own development.

Conclusions

This article has attempted to throw light on work of the RRS and its role within the CBO, and to draw meaningful lessons from its work that are relevant to present-day warfighters and targeteers. The RRS occupied a unique place within a complex air power ecosystem, and effectively leveraged its knowledge, objectivity, dedication and connections to make a meaningful difference to the war effort. The scale and scope of its output belied its relatively small size, and the plaudits it won during the war, and the demand for its services after 1945, are a testament to its reputation and success.

Railways continue to be fundamental to the way peer adversaries prepare for and wage war. Russia has relied heavily on its extensive network to provide logistical support to its illegal invasion of Ukraine, and China has developed its domestic network with regard to how that would support mobilisation of its forces in a future conflict.⁸⁴ The lessons of the RRS should therefore hold especial resonance to the targeteers and air planners of today.

The RRS's lack of prominence in major air power histories is puzzling. It has perhaps suffered from what Joseph Caddell has described as 'Sherlock Syndrome,' where sudden flashes of inspiration or heroic deeds in the field, no matter how minor in impact, acquire a glamour that overshadows far more influential but less appealing office-based intelligence work.⁸⁵ Unlike the public narratives of the Special Operations Executive or Bletchley Park, the RRS's understated but irrefutable scholarship has faded with the passage of time. Perhaps, this is not surprising; the RRS did not seek publicity and carried on throughout the war and beyond 'with its light under a whole host of bushels' as the deputy General Manager of one British railway company observed; 'one day we must see to it that the full story is told.'⁸⁶ This article hopes to be the first step in that process.

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Article

The Fallout After from the Oberhausen Operation: Churchill, Bomber Command and the Battle of the Ruhr in June 1943

By Dr Richard Worrall

Biography: Dr Richard John Worrall studied history at the LSE and received his Master's in History from King's College London. He undertook his DPhil at the University of Oxford, which was received in 2008. He teaches at the University of Salford and has written several books and articles on RAF Bomber Command during the Second World War.

Abstract: Within many accounts on the history of RAF Bomber Command during the Second World War, the Battle of the Ruhr has been depicted as an unqualified success – a notable benchmark in the destruction of Germany inflicted by the RAF's strategic bombing offensive. Yet behind the scenes the Chief of the Air Staff, Sir Charles Portal, by mid-June 1943, had to defend the Commander-in-Chief Bomber Command, Sir Arthur Harris, from attacks by the Prime Minister over the bomber force's performance. This article focuses on what lay behind Winston Churchill's complaints; why were they made; and how did the Air Ministry and HQ Bomber Command ultimately address them? Did Churchill's criticism have any validity, or was Harris endeavouring to maintain the bombing offensive in increasingly difficult circumstances?

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Introduction

Bomber Command are still working under the restriction laid down by the Prime Minister that no due weather risks are to be taken . . . [I]n reality [this] sets the commanders concerned a problem which can only be solved either by exercising what must on many occasions appear to be undue caution – after the event – or alternatively they must resort more or less to crystal-gazing.

Harris-Portal, 26 October 1941¹

It looks as if this month will be a pretty poor one for Bomber Command.

Churchill-Portal, 16 June 1943²

On 14/15 June 1943, RAF Bomber Command attacked the industrial city of Oberhausen, in the centre of the Ruhr. Smaller than the average attack in the air campaign against Germany's primary industrial area, the raid was carried out by a force of 197 Lancasters led by six *Oboe* Mosquitoes, which operated in a nearly full moon but partially cloudy conditions. Consequently, the Pathfinder Force (PFF) aircraft dropped sky-markers to illuminate the target, and the attack was delivered in just 19 minutes. The short duration came about because the Mosquitoes refreshed the markers continuously for all the Lancasters, the majority of which attacked exactly on time. Sky-marking – a technique that frequently had mixed results – had facilitated an attack the British official historians describe as 'surprisingly effective'.³ Indeed, daylight photographs taken on 18 and 20 June had revealed 'the centre of the town' as devastated, with heavy damage to many industries, public buildings and some 1,700 houses. Yet the cost to the Lancaster force – in many ways Bomber Command's prized possession – was high at 8.4% (17 aircraft). Operating with cloud cover below them, the clear visibility above this saw the bright moonlight illuminate the British aircraft against the grey background, and nine were shot down by the Luftwaffe's nightfighters. At least five bombers were also shot down by flak and another 37 aircraft damaged by it, 'probably due', noted the official raid report, 'to the use of only one type of aircraft bombing from a narrow height band, and to the sky-marking technique which probably induced barrage fire round the [sky-] markers'.⁴ In essence, the senior leadership of Bomber Command had taken a considerable risk in carrying out this operation but had done so because of the continual requirement of maintaining the bomber offensive on Germany.



RAF Mosquito

The operation against Oberhausen represented another episode in Bomber Command's Battle of the Ruhr, which began on 5/6 March and would only terminate on 29/30 July 1943.

For Harris, this campaign represented 'an impressive victory',⁵ whilst the British official history noted how the Battle of the Ruhr demonstrated that Bomber Command could now make 'a whole series of consistent and pulverising blows among which the failures were much rarer than the successes'.⁶ Subsequent historians have expressed similarly favourable judgements about this air campaign; for Dudley Saward it was 'the highly successful Ruhr campaign'; in Denis Richards' opinion 'there can be no doubt [it] ... was a major victory for Bomber Command'; and John Terraine writes there was 'no doubt at all that ... Germany was now being severely hurt'; more recently Richard Overly observes how 'the attacks on the Ruhr-Rhineland [in 1943] were the first raids to inflict serious levels of destruction' on a German urban area.

Above all Harris' biographer, Henry Probert, concludes that by June 1943 this air campaign had placed Harris 'in a strong position'. 'At this moment, at the height of the Battle of the Ruhr', Probert concludes, 'he [Harris] was delivering the goods and everybody knew it'.⁷



Air Chief Marshal Sir Arthur Harris
C-in-C Bomber Command

The documentary evidence shows a somewhat different story, however. On 17 June Portal ended a long letter to Churchill by stating:

I am sure that your comments on the course of these operations do not indicate any lack of confidence in him [Harris] or any doubt that he has done, and always will do, his best to deliver the maximum weight of bombs on Germany with the minimum losses under all conditions. I think he deserves and needs the full support of higher authority in the very severe battle which he has to fight.⁸

How then can we explain these final sentences of Portal's letter? Why had the Chief of the Air Staff (CAS) felt compelled to defend the Commander-in-Chief (C-in-C) Bomber Command, at a time when seemingly the British bomber offensive had been going so well? What had transpired that, in effect, turns Probert's opinion very much on its head? Certainly, intense correspondence between Churchill and Portal was nothing new. Denis Richards, in his solid biography of the CAS, writes how the numerous letters between them suggested 'a domineering Prime Minister dealing ... with a Chief of [the Air] Staff who politely refuses to be dominated, and who by his skill, good manners and patience usually ends up the victor in the argument'. Portal deployed straight facts to deflate Churchill's 'occasional unfairness and mistakes ... [as well as] inaccurate statements and unjust accusations about the Royal Air Force'. To illustrate this point, Richards selects three examples of debates that came to be conducted over numerous pieces of correspondence between the Prime Minister and the CAS – November 1940, September/October 1941, and March/April 1945⁹ – but crucially the

discussion from June 1943, which this article examines, is overlooked. This is a significant omission because the debate, far from ending 'harmoniously', culminated in Portal having to defend the C-in-C Bomber Command in the face of significant criticism from Churchill.

The debate began on 15 June when Portal informed Churchill about a four-day 'lull' in bomber operations because of the need to fit K-type *Oboe* and to install *Monica*, which was a radar instrument carried in the bombers warning the crew about an approaching night fighter.¹⁰ Both devices were needed for maintaining *Oboe's* continued success over the Ruhr and for assisting in lowering the aircraft casualty-rate, respectively. Churchill's response showed little sympathy with Portal's request to pause operations; worse still, it unleashed further complaints from the Prime Minister about Bomber Command. Bad weather earlier in the month had already led to a 13-day pause in operations. Churchill regretted 'advantage' had not been taken of this, especially he somehow believed that meteorological forecasts that indicated unsuitable weather could be obtained at least four-days in advance. '[I]t is rather disappointing now if the weather is going to turn good to stop all the operations', he commented. Wanting statistics on the bomb-tonnage dropped for that month and how this compared with the previous two, the Prime Minister emphasised how the only attacks of June had seen the effort progressively lower from 800 aircraft to forces of 400 and 200 (against Düsseldorf on 11/12 June, Bochum on 12/13 June and Oberhausen on 13/14 June, respectively). '[O]ne does not understand why the rate of action should be so low ... after so long an interruption', and he ended with the jibing remark that this state of affairs hardly gave credence for 'the enormous claims that are made for the achievements of Bomber Command and the part they play in the war'.¹¹ Yet in expressing such comments, it must be questioned as to whether Churchill understood the technical dimensions behind the bombing war. Certainly he seemed to imply that, during periods of poorer weather, it was better to not operate than to do so with a progressively lowering operational effort. Thus, this crisis during the Battle of the Ruhr was as much about Churchill's misunderstanding of the detail on how Bomber Command operationally functioned than about anything else. Indeed, in response Portal felt compelled to point out that 'the record of operations [hitherto in June 1943] ... may be disappointing in comparison with past achievements but it serves to illustrate the extreme difficulties with which the Commander-in-Chief has been faced'.¹²



Air Chief Marshal Sir Charles Portal
Chief in the Air Staff

Churchill's views on the bomber offensive had always been contradictory, of course, which is a trend that several historians have long identified. Tami Davis-Biddle observes how this was because he had 'never been able to dismiss from his own mind questions about the ethics of bombing ... [and these] worries and ruminations would cause him to be erratic in his attitudes

during the war'.¹³ Yet the archival records reveal Churchill's truculence was formed less by the moral qualms of bombing and more from frustration about Bomber Command's ability to operate both consistently and heavily. On 1 November 1940, for example, he told Portal 'it is a scandal' that with the 'immense masses of material provided' the bomb tonnage dropped was so 'pitifully small'.¹⁴ The following day came further condemnation, namely that 'it constitutes a serious reproach [on the RAF] that only such limited results can be shown for so much money and material [expended]'.¹⁵ The following summer, once the findings of the Butt Report had revealed the considerable inaccuracy of Bomber Command's efforts, saw Churchill write:

it is very disputable whether bombing by itself will be a decisive factor in the present war. On the contrary, all that we have learnt since the war began shows that its effects, both physical and moral[e], are greatly exaggerated.¹⁶

Alarming as these words were to the Air Staff, Churchill soon changed his view and even provided the reassurance that 'one has to do the best one can ... [in which the] only plan is to persevere'.¹⁷ 'Persevere' Bomber Command certainly did, until the disaster on 7/8 November 1941 when the heavy losses incurred by the raid on Berlin saw the Prime Minister inflict the 'conservation order' on the bomber force during winter 1941/42. His reasoning behind this decision was ironic – in view of what he would come to argue in June 1943. For on 11 November 1941, Churchill told the Secretary of State for Air, Sir Archibald Sinclair, and Portal that 'I have several times in Cabinet deprecated forcing the night bombing of Germany without due regard to weather conditions ... There is no need to fight the weather and the enemy at the same time'.¹⁸



Sir Archibald Sinclair
Secretary of State for Air

However, by the following spring Churchill had reinvigorated his enthusiasm for Bomber Command and reactivated the 'full bombing of Germany', subject to the caveat of 'not incurring heavy losses owing to bad weather and enemy resistance combined'.¹⁹ Given this stipulation it must be wondered as to whether Harris was actually doing anything wrong in June 1943 by deciding to either not operate at all in very poor weather conditions or using only his best aircraft (the Lancaster), and in fact was conforming to long-standing instructions given by the Prime Minister. Nonetheless, it was on the whims and fancies of Britain's mercurial wartime leader that the bomber offensive came to rest. In late-March 1943, having read Harris' paper on the anti-U-Boat offensive, Portal replied that it remained vital that 'nothing that is said on our side should antagonise the Prime Minister, on whose continued belief in the bomber offensive we so largely depend'.²⁰ Key to sustaining this support were the frequent pronouncements from the Air Ministry about the success – be it delivered or promised for

the future – of Bomber Command's work. 'All of us here are constantly striving to increase the punch of the bomber offensive', Sinclair told him on 5 June 1943.²¹

Yet doing so was becoming problematic, and by June 1943 all could see how the Battle of the Ruhr had become increasingly costly. About this time in the bomber offensive, Harris himself later wrote how 'once again [his force was] getting very near the danger line when expansion would be seriously affected unless the losses could be cut down'.²² Interrogation of a Luftwaffe night fighter crew, undertaken at Farnborough at this time, had confirmed the effectiveness of the Ground Control Interception (GCI) system of the Kammhuber Line and the tactic of attacking a British bomber was from below and to the rear. HQ Bomber Command was soon informed about the need for 'effective counter-action', in which the devices of *Monica* and *Boozer* would prove a 'great advantage'.

So too would the installation of a better rear-turret – the existing one having been inspected by the German aircrew who were 'amazed at the restricted vision from the turret and condemned it vigorously'.²³ On 12 June, the Assistant Chief of the Air Staff (Operations), Air Vice-Marshal Norman Bottomley, raised the issue of Bomber Command's rising losses with Portal and Harris. Opening somewhat provocatively by turning Harris' long-standing argument about the bomber-stream being composed of large numbers and tightly concentrated on its head, the ACAS (Ops) stated that the Air Staff had 'always looked forward to the time' when a force of 900-1,000 bombers 'would inevitably reduce the percentage of casualties'. Yet the large attack on Düsseldorf on 11/12 June had seen five per cent losses, when the Air Ministry had expected lower. Harris in response brought up the long-standing rear-turret issue, in which a new design featured enhanced rear and downward views and armament of .5 inch machine-guns. Having received no guidance from the Air Ministry he had approached the turret manufacture, Frazer-Nash, about this.²⁴ Little was officially decided however, and the rear-turret issue simply floated on throughout 1943 and 1944.²⁵ Nevertheless, the fact remained that the loss-rate of 8.4% on the Oberhausen operation showed all too clearly that something else was urgently required.

This came in the form of installing *Monica*, and this requirement was sanctioned by Portal – but, in so doing, it triggered a four-day pause in operations.²⁶ In other words, the British bomber force was to be grounded whilst vital work was being undertaken to better protect it. As early as April 1943 *Monica* was considered for making its operational debut but had been deemed unreliable and likely to cause interference with *Oboe*, which was, after all, the vital tool for inflicting destruction on the Ruhr. The Air Ministry nonetheless informed HQ Bomber



Kammhuber Line officially designated Himmelbett

Command that interference between the two devices could only be overcome 'by introducing KA *Oboe* and re-allocating present *Oboe* frequencies', a change that needed four-days' worth of modifications to the ground-stations. This work was deemed as being particularly suitable for the moon period of mid-June, when operating in the light nights of summer against the Ruhr was highly risky.²⁷ Thus it was technical updates, needed for the understandable reasons of both bomber defence and prolonging the operational life of its most accurate bombing-aid, which caused Portal to inform Churchill about the need of Bomber Command to temporarily halt its operations.²⁸

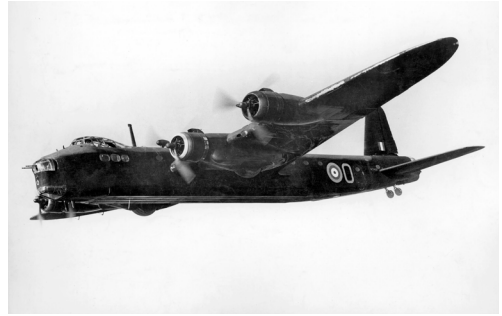
This failed to secure a sympathetic response, however. Serviceability of the bomber force and its impact on lowering the operational effort, in fact, had long been a Churchillian gripe. On 7 January 1943, for example, he wrote testily to Portal, complaining that:

Considering that Bomber Command have done hardly any flying in the last month worth speaking of, it is astonishing that only 547 aircraft should be serviceable and fit for operations out of an establishment of 808 ... I quite understand not going out in impossible weather but then the result should be a strong accumulation, whereas an increasingly low standard of readiness prevails.²⁹

This overlooked several things, of course, not least the complexities of the aircraft themselves which, at this time, saw all three heavy-bomber types bedevilled by several technical ailments. With Churchill away at the Casablanca Conference, Sinclair did not respond until 5 February and then only to defend Bomber Command by citing statistics on its performance during the remainder of January 1943, with 3,171 sorties compared to 2,224 twelve months before.³⁰ This was precisely the sort of statistical evidence used regularly by those seeking to refute accusations from Churchill about Bomber Command's 'inadequate' performance, and led to a tendency of the Command to salvage poor months by making over-large attacks to boost the monthly figures on sortie-rates (as this article will go on to show).

Nonetheless, the four-day 'lull' in operations coincided with pressure on Harris to account for the restricted geographical pattern of his operations at this time. The C-in-C's answer came in a well-argued letter to Portal on 16 June, which gave a detailed explanation of the operational limitations and showed an absolutely mastery of his Command's techniques and technicalities. Noting how this stemmed from queries from Portal 'as to why I have selected particular targets on particular occasions' (although the origins of this may also have stemmed from Churchill and/or other figures within the Air Ministry), Harris opened by stating 'the short nights are our handicap', restricting targets to not beyond a circular-line running from Emden-Münster-Dortmund, and onto a point between Bonn and Koblenz, this being given the term the 'operational arc'. Promising to send maps showing this restriction, which might be needed by Portal should he face 'quick demands' in Chiefs of Staff (COS) meetings over 'what can be done at any time of the year', the analysis then discussed the limitations and capabilities of Bomber Command's aircraft. The inadequacies of the Stirlings and Wellingtons

added further restrictions on the depth of penetration; in contrast, the Lancasters, with their faster speed and better range, could go a further 50 miles into Germany. Consequently, this accounted for sometimes sending an all-Lancaster force that, being a smaller formation, also needed 'less time over the target'.³¹ Accepting these explanations, the CAS informed Churchill the following day about Harris' decision-making on target selection. '[T]he Commander-in-Chief is,



RAF Stirling Bomber

Portal wrote, 'confronted with many difficulties which at the moment militate against heavy and continuous bombing of German objectives. Owing to the short hours of darkness he is restricted to a rather shallow dept of penetration into Germany ... He cannot therefore freely choose alternative areas of good weather.'³²

Yet, in one sense Portal's comments were revealing by highlighting, albeit inadvertently, a fundamental weakness of Bomber Command. For it surely crossed Churchill's mind as to how a supposedly war-winning weapon, which the senior airmen had frequently told him that Bomber Command was, could operate to its full potential under such restrictions imposed by the weather.³³

Indeed, these considerations – the operational radius, the moonlight and the weather – thus explain how Harris conducted the Battle of the Ruhr during June 1943. Archival records show how poor weather forecasts cancelled numerous attacks – against Oberhausen on 5/6 June, and on Münster and Oberhausen the following night. A raid on Münster and Mülheim, set for 7/8 June, was halted as the aircrew waited for the buses needed to take them to their parked aircraft, and a further attempt on Münster was also 'scrubbed' the following night. The joint-attack on 9/10 June, to Essen and Münster (again), was similarly aborted – the scribe of 83 Squadron writing that 'disheartened is hardly the word'.³⁴ Responding to Churchill's critical minute of 16 June, Portal was perfectly correct in pointing out that, despite the 'exceptionally disappointing' weather conditions, 'no possible opportunity was missed for trying to operate'.³⁵ Finally, on 11/12 June the first operation of that month was carried out, with a 'maximum effort' of 883 aircraft (from a total establishment strength of 887) being sent to Düsseldorf and Münster. The following night's attack on Bochum, however, saw the bombing force reduced to 504 aircraft because 'heavy icing cloud was forecast at heights which precluded the operation of the Stirlings and Wellingtons'.³⁶ Thus, the operational consideration concerning cloud was not solely about its thickness but also the altitude of the cloud cover itself. As Harris explained to Portal, such an issue meant that:

If the clouds are below 15,000 ft the whole force can be employed subject to the number of *Oboe* aircraft and the amount of darkness available. If the cloud height

is 18,000 ft only Halifaxes and Lancasters can be employed and if it is 20,000 ft only Lancasters. These limiting factors show why on occasions a smaller force [of just Lancasters] ... [are] sometimes to be employed if we are to maintain the offensive in periods of [sic] cloudy weather.³⁷



RAF Halifax bomber

This description explains exactly what happened on 14/15 June when the forecast, which predicted 10/10ths medium-cloud with tops up to 25,000 ft, and likely icing and isolated thunderstorms, meant Harris despatched just his Lancasters because only those aircraft 'could operate above cloud at those heights'.³⁸ Harris' Despatch, in addition, states 'while the *'Oboe'* Mosquitos could operate at great heights above the clouds, the number of main force aircraft able to bomb on the sky-markers dropped by those twin-engined aircraft progressively reduced as the height of the cloud-tops increased'. 'The net effect, the C-in-C wrote, was that 'to maintain the offensive in periods of cloudy weather I had sometimes to employ a smaller [all-Lancaster] force' precisely in order to have bombers at the altitude needed for bombing on sky-markers.³⁹ Portal informed Churchill about these considerations on 17 June, and emphasised that 'if he [Harris] attacks with cloud cover the flare marker technique [consequently] restricts the numbers [of bombers] attacking'.⁴⁰

The marking technique used also impacted on the choice of target selected. Clear nights, when ground-marking could be used, meant choosing 'the most valuable target on which the heaviest [bombing] concentration is required'. In contrast cloudy conditions meant 'a scattered area target or a very large town' was the best choice of target for the sky-marking method, in which, as Harris reasoned, 'even a very scattered raid is likely to do worthwhile damage'.⁴¹ Applied to the Ruhr, such thinking meant targets possessed their own geographical characteristics; sprawling places like Duisburg and Gelsenkirchen, for example, did not require a tight bombing concentration in an attack. Oberhausen (codenamed *Gillaroo*) was similar, a winding 30-square mile conurbation, wedged between Duisburg and Essen, and north of Mülheim. Possessing 'no closely built-up zones ... [and] spread out over a very wide area', Oberhausen henceforth was a particularly suitable target for sky-marking, especially as it was 'comparatively thinly populated' (192,000 inhabitants) and contained numerous other facilities, such as converging railway-lines and canals, and important industries, namely the *Gutehoffnungshütte* Iron and Steel Works (one of the largest in Germany), a large coking plant, and the boiler works of *Babcock und Wilcox*. All told, sprawling Oberhausen was ranked 'the fifth most important industrial town in the Ruhr'.⁴² In contrast, Bochum, Cologne, Dortmund, Düsseldorf and Essen were considered 'most profitable' for ground-marking because of their readily identifiable city centres and industrial areas, although pressure to keep the campaign going would see Harris attack

Cologne on 16/17 June using the sky-marking method because, after all, it allowed damage to 'some parts of the Ruhr where almost any bomb within 10 or 15 miles is likely to do some good'.⁴³

It can therefore be seen that Bomber Command was attempting to operate as effectively as it possibly could during this tricky summer month of June. Yet it must be established as to exactly why Churchill was seemingly so testy over the bomber offensive at this time? The answer lies in politics, both in the domestic and international spheres, all of which had conspired to make Bomber Command's difficulties in June 1943 especially poorly-timed for the Prime Minister. For during this month, Churchill gave two speeches outlining the latest war situation. One, delivered to the House of Commons on 8 June, highlighted the decisions reached at the Trident Conference in Washington only weeks before. Specifically on Bomber Command the Prime Minister emphasised the bomb-tonnage dropped in a single attack had doubled from 1,050 tons in May 1942 to 2,500 tons a year later. '[T]he enemy', Churchill trumpeted, were consequently finding that bombing was now 'the first cause of their ruin'. 'It is necessary for me to make it plain', he continued, '[that] nothing will turn us from our endeavour and intention to accomplish the complete destruction of our foes by bombs from the air'.⁴⁴ The second came a few weeks later, namely the so-called 'We Seek No Profit' speech, comprised 4,700 words and given in 45 minutes at the Guildhall.⁴⁵ In the days before its delivery, Portal had bombarded the Prime Minister with all sorts of statistics, especially ones that attempted to place a different gloss on Bomber Command's difficult month. Sent on 24 June, the first set of figures emphasised how the RAF's effort against Germany from 1 January to 31 May 1943 outweighed the Luftwaffe's attacks on Britain during the same time by 'almost' 40:1.⁴⁶ The second batch of statistics, sent the following day, highlighted that Bomber Command's performance during May 1943 had seen 12,862 tons of bombs dropped – 'greater than ever before' – and beating the previous record of 11,193 tons from the month before.⁴⁷ Finally, on 27 June Portal presented Churchill with updated figures for the month, emphasising that in the previous week 7,187 tons of bombs had been dropped, which had gone some way towards making the monthly total now look far more respectable. Indeed, that week's effort, the CAS emphasised, was 'the greatest they [Bomber Command] have ever done', and he asked the Prime Minister to send a message of congratulations to the aircrew.⁴⁸ In the past Churchill would likely have done so, but on this occasion he instead thought otherwise. 'I may refer to this at the Guildhall',⁴⁹ he scrawled on this minute, and he would do so, emphasising particularly the heavy attack made against Düsseldorf on 11/12 June in which 2,101 tons of bombs had been dropped on the city. Churchill's Guildhall speech also contained the remark that 'there is no city of Germany that will be free from the threat of the utmost application of exterminating force' – a sinister line that had in fact originally been written by the Director of Bomber Operations at the Air Ministry, Air Commodore Sydney Bufton.⁵⁰

Such speeches had international audiences, of course, particularly the leaders and peoples of Britain's allies within the Grand Alliance. On the American side, the first one had been

delivered just weeks after Churchill's visit to Washington for the Trident Conference, where major decisions about the direction of the Anglo-American Combined Bomber Offensive (CBO) had been taken. During his time in America, Churchill (accompanied by Portal) received regular accounts that spoke in glowing terms about the latest destruction inflicted on the Ruhr, no doubt intending that such information could be used for strengthening the British voice in these high-level Anglo-American talks. The 'especially



Bomb damage at Bochum Steelworks

good' bomb-plot from the Duisburg operation of 26/27 April and the photographic evidence of 'very serious' damage to Bochum's steelworks on 13/14 May, Harris informed Portal in mid-May, 'should at least be enough to make it clear that if the USAAF gets its reinforcements quickly, the Germans cannot take it for very long'.⁵¹ A week later, Sinclair sent details to the Prime Minister about the 'very heavy attack last night on Dortmund', in which a huge force of 826 bombers had dropped over 2,000 tons of bombs on the city that had seen 'very dense' smoke up to 15,000ft over it.⁵² Thus, as the British official historians point out, 'by the middle of May when the Combined Chiefs of Staff were reviewing the Pointblank Plan in Washington [in order to formulate a new bombing directive focusing on GAF targets], Sir Arthur Harris was, without exaggeration, able to describe the destruction which had been caused in the Ruhr as 'staggering'.⁵³ Such considerations were important in the power-dynamic between Britain and America within the Grand Alliance, for senior figures on both sides knew privately the latter's military strength would outweigh the former's over the long-term. Nonetheless, in the interim it remained important for the British – particularly Churchill – to make sure they remained the dominant partner for as long as possible during 1943, and certainly the progress of the CBO seemed one such area where this could be demonstrated.

However, once back in London Churchill had to grapple with Bomber Command's operational difficulties that far from assisted his wider diplomatic intentions and calculations. Operationally, it was also awkward given that the US VIIIth Bomber Command had, at that very moment, asked for Bomber Command's cooperation in attacking industrial targets that lay beyond *Oboe* range, particularly the factories in Leipzig and Schweinfurt producing fighter-aircraft and ball-bearings, respectively.⁵⁴ Attacking such distant targets was something certain figures within the Air Ministry also wanted, and they had one important ally on the British side, namely the Prime Minister. Churchill, keen to see the bomber offensive moving beyond the Ruhr for his own reasons, soon wrote to Sir Robert Renwick whose team at the Telecommunications Research Establishment (TRE) had developed many of Bomber Command's navigational devices. '[A]s we extend our main radius of operations beyond *Oboe* range it [H2S] will become more and more important', he wrote tellingly. The crux of the matter then came, for Churchill then stated that 'I do not wish to interfere with your

endeavours to extend the range of *Oboe*, which has paid such a magnificent dividend but I am anxious that you should spare no pains to speed up [an] improved H2S ... [which is] important in increasing our striking power'.⁵⁵ The Prime Minister favoured H2S over *Oboe* precisely so Bomber Command could move onto attacking targets that were of direct relevance to the recently agreed Anglo-American *Pointblank* Directive.

Political calculations were also evident with Churchill's handing of the Soviets too, in which a clear trend had been established for using news about the RAF's bombing of Germany to smoothen over crises in wartime Anglo-Soviet relations. Richard Overy writes how at the Moscow Conference in summer 1942 strategic bombing represented *the* measure used by Churchill for appeasing a dismayed Stalin, who had just been informed that a Second Front in Western Europe would not occur in 1942.⁵⁶ Later, in spring 1943 (which represented a time of acute difficulty between the British and Soviet Governments over the Polish issue), Churchill recounted to the Soviet leader how the Krupp Works at Essen had just had 900 tons of bombs dropped on it, before finishing by stating that 'our bombing of Germany will increase in scale month by month and that we are able to find the targets with much more certainty'; a promise made that only time would tell as to whether it could be fulfilled.⁵⁷ In fact, the 'lull' in bomber operations during June 1943 occurred at one of the worst moments in Anglo-Soviet relations during the war, largely because of the non-appearance of a Second Front in Western Europe during that year too. Yet now Churchill had little by the way of good reports on bombing Germany for despatch to Moscow to pacify the Soviet leadership. In a telegram to Stalin, drafted on 13 June but held in abeyance for a week (perhaps to allow for better bombing results to materialise), the best that could be written was a statement about 'understand[ing] your disappointment' on the Second Front followed by the now hollow-sounding words that Bomber Command was 'ruining a large part of the cities and munitions centres of Germany, which may well have a decisive effect by sapping German resistance on all Fronts'. He then ended with another promise – described by Reynolds and Pleshakov as being representative of one of 'the usual slippery Churchillisms' – that 'by this coming autumn this great air offensive should have produced a massive return'. The usefulness of the bomber offensive to assuage Stalin's disappointment over Anglo-American decisions had now become based on future actions, not actual results.⁵⁸

Harris' explanation about the difficulties in operating during the high-summer nonetheless received a soothing reply from Portal on 18 June. Reassuring the C-in-C that 'my enquiries have not been prompted by criticism in any form', which seems unlikely, and instead came from 'personal interest' and 'questions from other quarters', Portal then divulged a clue as to the identity of the 'other quarters' by revealing the detailed explanation would be forwarded to Churchill, who would 'be interested to read [it]'.⁵⁹ The Prime Minister seemingly did not however,⁶⁰ and instead tasked Lord Cherwell – one of Churchill's chief scientific advisers but also akin to being his private 'trouble-shooter' on Bomber Command⁶¹ – to assess its contents and outline the key reasons that lay behind the restricted choice of targets. Cherwell highlighted the most important, which comprised such factors as 'the present

short nights confine us to targets no further than the Ruhr' and 'on cloudy and windy nights when we have to use sky-markers (flares, which drift away) it is only worthwhile to go to large towns'. 'In general', Cherwell observed, 'the C-in-C's policy seems to me thoroughly sound'.⁶²

The night following Churchill being informed about Bomber Command's four-day operational pause, Harris still operated by attacking Cologne. On this occasion, an all-Lancaster force of 212 aircraft was despatched because the forecast predicted cloud rising up to great heights. In addition, the sky-marking method was to use H2S because, the raid report noted, 'it was impossible to use *Oboe* on this night as the system was in course of being modified to Mk IK'. Thus, it was clear that, although without *Oboe*, Harris still felt the need to operate,⁶³ notwithstanding having indicated in his 16 June letter that Cologne was not a particularly well-suited target for a sky-marking attack. Contradicting his own view, Harris was clearly under pressure to continue to do at least something against a target in Germany.

In the end, despite Bomber Command's difficulties during the first half of June 1943, the month would see a record number of sorties despatched (5,816 as opposed to 5,130 in May and 5,571 in April).⁶⁴ Such statistics give a clear indication as to what happened next operationally. The Prime Minister's obsession with figures on sorties undertaken and bombs dropped came to carry important consequences for the smaller towns of the Ruhr/Rhineland area. To 'save' the month Harris launched vast one-raid blows on secondary targets. He would also adopt the 'repeat-attack' method for destroying a larger city, namely a series of raids against Cologne.

Whilst earlier attacks in the Battle of the Ruhr involved 400-450 aircraft against the main industrial centres, in contrast exceptionally large forces were now sent to bomb the smaller towns: 705 aircraft to Krefeld (21/22 June), 557 to Mülheim (22/23 June), 630 to Wuppertal-Elberfeld (24/25 June), and 473 to Gelsenkirchen (25/26 June). It was little wonder Sinclair described this period to the War Cabinet as 'without parallel up to date ... a record month both in sorties and bomb tonnage; 6,000 sorties were flown and 14,224 tons of bombs were dropped'. Viewed in no



Bomb damage in the Ruhr

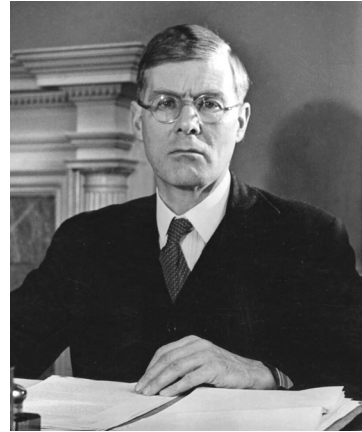
other way this represented a savage response by Bomber Command to Churchillian criticism. The justifications given for these attacks were, moreover, equally brutal. Bombing Krefeld, Sinclair wrote, had come about because it remained 'an intact area from which assistance to Düsseldorf and the Ruhr could be drawn'. Phrased like this, it sounded more like destruction for its own sake – and certainly the outcome, as revealed by daylight photography, was 'well over half' the town destroyed with many residential properties being 'very badly' hit.

More telling, the Secretary of State for Air noted it was 'unlikely that the entire weight of bombs would be concentrated on a target of this size', in reference to the raid on Mülheim. This suggests a force of 557 aircraft was far too large for attacking this secondary target; indeed, the northerly direction of approach to Mülheim had been deliberately chosen precisely so the bombing 'creepback' would fall on neighbouring Oberhausen. Yet the essential point was to get the operating statistics increased, whilst simultaneously destroying a small town in one large attack.⁶⁵ The latter was admitted as much by Sinclair's description of Bomber Command's later attacks on Aachen and Remscheid (bombed on 13/14 and 30/31 July respectively), targets described as possessing 'a different kind of importance'. 'Following as they did on the annihilation of Wuppertal and Krefeld [in late-June]', the Secretary of State for Air wrote starkly, 'they drove home the lesson [to the German civilian population] that a single successful attack can write off an industrial city of considerable size and value in a single night', which caused 'a stimulating effect' on the evacuation of other small towns in the Ruhr/Rhineland thereby impacting detrimentally on the area's war-production.⁶⁶

Cologne meanwhile was attacked four times in three weeks by forces of 202 bombers (16/17 June), 608 (28/29 June), 653 (3/4 July), and 282 (8/9 July), a large number of sorties concentrated on one target that was a precursor to Operation *Gomorra* against Hamburg undertaken some two-weeks' later, which featured a similar number of attacks in just 10 days. The benefit of 'repeat-attacks' on the same target over a short time period, in other words the bombing being concentrated in both 'time' and 'space', was explained in a memorandum by HQ Bomber Command dated 5 July 1943. The paper spelt out a crude logic for attacking cities, namely that if a town such as Krefeld, with its population of 170,000, required just one large attack to ensure its destruction then a city the size of Cologne, which had 900,000 residents, needed at least five raids to ensure its destruction. Fundamentally, 'repeat-attacks' were viewed as likely to cause significant 'cumulative' damage to a city's industries, infrastructure and morale, and offered further 'immense advantages' by preventing the authorities from repairing and re-organising local infrastructure and calming and re-housing the civilian population.⁶⁷

It was at this juncture that Harris received congratulations from Lord Trenchard on the work Bomber Command had 'done this year ... [that] will bring about a great shortening of the war, saving millions of casualties'. This communication was sent as a 'morale-booster' for the C-in-C, in which such an esteemed authority gave reassurance and positive sentiments at the end of what had been a difficult month. Trenchard further added that 'everybody at last seems to be convinced that the direction of the Air Force has been sound',⁶⁸ which nonetheless hardly seems an accurate portrayal of Churchill's opinion on the bombing offensive over the previous few weeks. Indeed, Sinclair, Portal and Harris still believed that Bomber Command's doubters, of which the Prime Minister was one, still needed a 'conversion'. For this reason, it is noticeable that an information campaign was henceforth undertaken over the following months designed to convince the sceptics over what had been achieved by attacking the Ruhr. This was enshrined in HQ Bomber Command's Weekly Digests and Quarterly Reviews,

the Air Ministry's Narrative of Operations, which were all circulated widely in Whitehall, as well as Sinclair's bi-weekly reviews on Bomber Command activities that he submitted to the War Cabinet. On 30 June, for example, the Secretary of State for Air reported told his ministerial colleagues that final assessment of the photographic evidence had confirmed 'success on a vast scale' had been inflicted on Dortmund, Düsseldorf and Oberhausen. However, most notable in this paper was the incorporation of an overall review on the total achievements of the strategic bombing campaign against the Ruhr. Key passages, underlined in pencil on the original document by Sir Edward Bridges, the War Cabinet Secretary, stated:



Sir Edward Bridges
War Cabinet Secretary

[T]he cities of the Ruhr are now for the **most part unfit for human habitation by civilised peace time standards** ... **The battle has therefore reached the point at which it is of extreme importance for us to maintain destruction at a greater pace than the enemy can carry out even such reconstruction as will enable the bare physical needs of large numbers of workers to be met. This, coupled with the progressive wrecking of plants and factories, will break down the resistance of the Ruhr, which is probably the toughest in Germany** ... [In response] Nazi propaganda has successfully produced a front-line mentality in the Ruhr.⁶⁹

Even in late-August, when Operation *Gomorrah* had now redefined the benchmark of Bomber Command's destructive capabilities, the Digest still reverted back to providing descriptions of what had been inflicted on the Ruhr. A special feature titled 'Results of the Bomber Offensive on German War Production during June, 1943', which utilised analysis from the Ministry of Economic Warfare (MEW), was written to correct any negative impressions about Bomber Command's poor performance during that month. In considerable detail, it cited the effect of bombing on the Ruhr's transport system, its public-utilities, coal and coke production, and the output of iron and steel.⁷⁰ For good measure, this review article was repeated verbatim in Sinclair's update for the War Cabinet of mid-September 1943.⁷¹ Moreover Harris, having then just suffered another setback by having to pullback from the Battle of Berlin, also circulated figures to show Bomber Command's performance from precisely the 19 June, when the enforced operational 'lull' was over, to 18 September, a period that had seen 44,639 tons of bombs dropped on Germany and, in his words, had witnessed Krefeld, Cologne, Wuppertal-Elberfeld and Hamburg having 'all been virtually wiped out'.⁷² Claims about past successes, the British Official History states, were in fact being used for 'the reinforced application of the bombing policy which he [Harris] believed was alone capable of producing final victory'.⁷³

'If we can keep this up', Harris bullishly told Portal on 15 May, then 'it cannot fail to be lethal'; with 1,000 American heavy-bombers added to the mix 'we could walk through Germany before Xmas'.⁷⁴ Yet, after this confident announcement, the following weeks showed how quickly fortunes in the air campaign could rapidly change, and in response how reactionary Portal and Harris were to any sign of prime ministerial disillusionment with it by moving quickly to refute Churchill's assertions. What conclusions can therefore be drawn from Bomber Command's difficult month of June 1943? In essence, several things need to be considered. The first issue is a general one, namely the depth to which Churchill understood the specific operational and technical aspects of bombing operations. His unsympathetic responses during June 1943, soon filtering into harsh criticism of the Command, revealed someone who possessed only a finite comprehension of its difficulties, in which poor weather gravely affected its operational intensity, the hours of darkness hampered its geographical radius of operations, and the rising losses brought about its need to install technical devices for better protection against the Luftwaffe. These problems, furthermore, meant on some occasions only a force composed of Lancasters could be sent, designed purely 'to keep the pot boiling' as Harris told Portal.⁷⁵ But whilst the airmen saw this as doing something to maintain the air offensive in the best way possible during times of difficult conditions, Churchill perceived this simply as evidence of a chronic tailing off in the operational effort. Of course, in sending just Lancasters this revealed only too clearly just how numerically modest the best part of Bomber Command still was, even in mid-1943, when only 220 were in frontline service (which itself was a testimony on how far operations had chewed through the 600-odd Lancasters that had been produced since January 1943).⁷⁶ In fact, Portal was quick to seize on the need for more machines from the Avro production line. On 25 June, he sent Churchill statistics on Bomber Command's performance for May, which showed this bomber aircraft remained superior to all others, suffering a 3.7% loss rate with a ratio of 93 tons of bombs dropped per aircraft lost. The Stirling was 7% and 42 tons, the Halifax an even more worrying 7.4% and 34 tons, and the Wellington at 6% and 21 tons. These figures, Portal emphasised, 'dispose of the suggestion, which has been made in the past, that we might afford to continue the use of obsolescent bombers against the Ruhr'.⁷⁷ Yet, in response Churchill offered the astonishing observation that, although 'it is better to have only the best', 'if the best were lacking, it would be necessary to use the second and third best and pay the price'⁷⁸ – in itself an incredible statement that suggests a willingness to sacrifice aircrew in sub-standard equipment.

Churchill, of course, primarily viewed the bomber offensive through lenses that were adjusted to a political focus. In mid-June 1943, the Prime Minister perceived the bombing effort was faltering at a time of acute difficulty with the Soviets over grand-strategy and the Second Front. Difficulties with Moscow were, of course, nothing new and the bomber offensive had frequently been Churchill's way of assuaging Stalin's disappointment over Anglo-American decisions, such as the cancellation of Arctic Convoys that accounted for frequent messages and statistics to Stalin throughout winter 1942/43. But June 1943 brought this to a shuddering halt, and strategic bombing was thereby unable to play the important political role that Churchill wished. Behind this lay another calculation however, one vital for future Allied military

operations. On 14 June he wrote a minute ostensibly on the effect of aerial bombardment on beach-defences but which is more notable for containing a direct castigation of Harris. 'The opinion of C-in-C', he stated:

is influenced by the fact he wishes everything [to be] concentrated on the bombing of Germany, and he would consider the opening of large-scale military operations in Europe a disaster. This may be natural from his point of view, but we must not allow such localised opinions to obstruct our thoughts.'⁷⁹

Vincent Orange is thus perfectly correct in his observation that 'even in the middle of June 1943, Churchill had begun to have doubts' about what Portal and Harris were telling him about the British bomber offensive,⁸⁰ which in no way represented the primary road to victory.

The top-level criticism of Bomber Command's performance nonetheless spilled over into its immediate operational performance during the rest of June, in which huge attacks were made on the smaller towns of the Ruhr/Rhineland. In modern military slang this represented clear 'overkill' on modest-sized targets, but Harris was out to prove a point about the efficacy of strategic bombing and, moreover, sought to boost the monthly statistics on sorties undertaken and bomb tonnage dropped. Thus, what was done to Krefeld, Mülheim and Wuppertal transformed Bomber Command's performance from being, in Churchill's words, 'a pretty poor one',⁸¹ to a record month two weeks later. These attacks, coupled with the series of raids made against Cologne, saw Harris tell Trenchard on 10 July that 'I really feel that lately we have been getting somewhere'.⁸² A difficult period, hardly indicative of Harris being 'in a strong position' and 'delivering the goods',⁸³ had been surmounted. But the C-in-C still required a monumental

*Appendix: Bombing Raids Statistics 1943

Month	Total Sorties	Missing				Damaged
		Total	Fighters	Flak	Not Enemy Action	Total Damaged
January	2,556	96	10	21	0	229
February	5,030	101	22	23	1	271
March	5,174	161	64	46	3	481
April	5,571	253	75	79	0	543
May	5,130	234	131	76	1	500
June	5,816	275	142	70	2	662
July	6,170	188	81	51	0	505
August	7,807	275	141	55	6	415
September	5,513	191	48	32	3	301

victory – a genuine standout performance – in order to get Bomber Command firmly back into the Prime Minister's good books. That would be Operation *Gomorrah* – the fiery destruction of Hamburg.

Notes

¹ Portal Papers [hereafter P.P.], Folder 2, Harris-Portal, 26/04/41.

² PREM3/11/12, Churchill-Portal, 16/06/43.

³ C. Webster/N. Frankland, *The Strategic Air Offensive against Germany 1939-1945* [hereafter S.A.O.G.], vol. II: *Endeavour* (London, 1961), p. 132.

⁴ AIR14/3410, Bomber Command Report on Night Operation 14/15th June, 1943.

OBERHAUSEN : Cologne : Minelaying, 5/09/43; CAB66/39/23, W.P.(43)323, Summary of Operations of Bomber Command For Fortnight Ending 1200 Hours Sunday, 4th July, 1943, Memorandum by the Secretary of State for Air, 20/07/43.

⁵ A. Harris, *Bomber Offensive* (Barnsley, 2005 ed.), p. 148.

⁶ Webster/Frankland, S.A.O.G., vol. II: *Endeavour*, p. 108.

⁷ H. Probert, *Bomber Harris: His Life and Times* (London, 2006ed.), p. 257; Richard Overy, *The Bombing War: Europe 1939-1945* (London, 2013), p. 323; Denis Richards, *The Hardest Victory: RAF Bomber Command in the Second World War* (London, 2001ed.), p. 173; D. Saward, *Victory Denied: The Rise of Air Power and the Defeat of Germany* (London, 1985), pp. 305-8; J. Terraine, *The Right Side of the Line: The Royal Air Force in the European War 1939-1945* (London, 1985), pp. 318-19.

⁸ PREM3/11/12, Portal-Churchill, 17/06/43. On this Churchill scribbled out a one word comment and wrote 'put by'. The draft of this minute show the final sentence was a handwritten addition by Portal.

⁹ D. Richards, *Portal of Hungerford* (London, 1977), pp. 184-93.

¹⁰ PREM3/11/12, Portal-Churchill, 15/06/43.

¹¹ PREM3/11/12, Churchill-Portal, 16/06/43.

¹² PREM3/11/12, Portal-Churchill, 17/06/43.

¹³ T. Davis-Biddle, 'Dresden 1945: Reality, History and Memory', *The Journal of Military History*, vol. 72 (no.2), p. 446.

¹⁴ P.P., Folder 2, Churchill-Sinclair & Portal, 1/11/40.

¹⁵ P.P., Folder 2, Churchill-Portal, 2/11/40. See also Churchill-Portal, 23/11/40; Churchill-Sinclair/Portal/Beaverbrook, 30/12/40.

¹⁶ P.P., Folder 2, Churchill-Portal, 27/09/41.

¹⁷ CHAR20/36/10, Churchill-Portal, 7/10/41.

¹⁸ CHAR20/36/11, Churchill-Sinclair/Portal, 11/11/41.

¹⁹ PREM3/11/3, Churchill-Sinclair/Portal, 14/02/42.

²⁰ P.P., Folder 10, Portal-Harris, 27/03/43.

²¹ AIR20/2796, Sinclair-Churchill, 5/06/43.

²² Harris, *Bomber Offensive*, pp. 172-3.

²³ AIR14/615, Wing/Cdr G.B. Tait-Grp/Capt. M.E. Marwood-Elton, 5/06/43.

²⁴ AIR2/5525, Bottomley-A.C.A.S.(T.R.), 13/06/43. A further meeting was held on 24 June, which included representatives from the MAP. Harris stated 'the existing turrets were useless for night

operations.' The nightfighter's attacking position underneath the bomber, before pulling-up to open fire, meant the rear-gunner was 'unable to see the enemy aircraft' and the bomber crew only knew they were being attacked when 'the shots began to take effect'. See AIR2/5525, Bomber Defence Policy Minutes of a Meeting Held at the Air Ministry, Whitehall, at 1500 Hours on Thursday 24 June 1943, undated.

²⁵ See, for example, AIR8/789, Evill-Harris, 23/10/43; ACAS(TR)-VCAS, Bomber Defence Policy, 2/11/43.

²⁶ PREM3/11/12, Portal-Churchill, 17/06/43.

²⁷ AIR14/615, Air Ministry-HQ Bomber Command, 30/04/43. See also AIR20/3363, Minutes of ACAS(Ops)' Conference – 11 May 1943, 11/05/43.

²⁸ There was, of course, another defensive measure that could be used, namely *Window*. But Churchill proved difficult at this point over sanctioning its early usage by Bomber Command, ostensibly because of fear of prejudicing Operation *Husky*. The debate over *Window* occurred simultaneously with the 'lull' in bomber operations, and certainly the Prime Minister was making the Air Ministry wait for a final decision, often deploying bureaucratic obstacles to provoke further delay. Reading between-the-lines, the message does seem to be one of Bomber Command having not done enough to make the risk of early usage worthwhile. See CAB80/70, C.O.S.(43)325 (O), 'Window', 21/06/43; [and] Annex I, Hollis-Churchill, Use of 'Window' on Bomber Operations, 16/06/43; [and] Annex II, Cherwell-Churchill, 17/06/43; CAB79/88, C.O.S.(43)135th Meeting, Item 1: 'Window', 23/06/43.

²⁹ P.P., Folder 4, Churchill-Portal, 7/01/43. Churchill monitored Bomber Command's front-line squadron strength, see PREM3/29/4. Similarly, Harris maintained his own private record on this subject. See Harris Papers [hereafter H.P.], H96, Bomber Command daily serviceability analysis, 24 June 1943 to 13 July 1943. This detailed such things as Operationally Serviceable, Repairable by Unit, Requiring Major Inspection, Needing Engine Changing, Awaiting Crew Trials or Air Test, Repair of Enemy Action Damage, and Being Modified – issues which Churchill overlooked. No explanation was given as to why this file closed on 13 July.

³⁰ P.P., Folder 4, Sinclair-Churchill, 5/02/43.

³¹ P.P., Folder 10, Harris-Portal, 16/06/43.

³² PREM3/11/12, Portal-Churchill, 17/06/43.

³³ PREM3/11/12, Portal-Churchill, 17/06/43.

³⁴ AIR27/687/11, 83 Squadron O.R.B. The operation to Münster was finally carried out on 11/12 June, which was a mass test of 8 Group's H2S-equipped on a distinctive urban area surrounded by open countryside. In contrast, 'the whole [Ruhr] area from Dortmund to Duisburg produces a blaze of reaction' making it difficult to identify the precise aiming-point using H2S. See P.P., Folder 10, Harris-Portal, 16/06/43.

³⁵ PREM3/11/12, Portal-Churchill, 17/06/43.

³⁶ PREM3/11/12, Portal-Churchill, 17/06/43.

³⁷ P.P., Folder 10, Harris-Portal, 16/06/43.

³⁸ PREM3/11/12, Portal-Churchill, 17/06/43.

³⁹ A.T. Harris, *Despatch on War Operations 23rd February, 1942, to 8th May, 1945*, with introductions by S. Cox and H. Boog (London, 1995), pp. 15-17.

⁴⁰ PREM3/11/12, Portal-Churchill, 17/06/43.

⁴¹ P.P., Folder 10, Harris-Portal, 16/06/43.

⁴² CAB66/39/38, W.P.(43)338, Summary of Operations of Bomber Command For Fortnight Ending 1200 Hours Sunday, 18th July, 1943, Memorandum by the Secretary of State for Air, 25/07/43; AWM, Operations No.460 Squadron, 14th June 1943. Oberhausen was behind Essen, Dortmund, Duisburg and Bochum.

⁴³ P.P., Folder 10, Harris-Portal, 16/06/43.

⁴⁴ AIR19/181, Parliamentary Debate, Official Report, 8/06/43.

⁴⁵ CHAR9/194B, [handwritten reference note for Prime Minister's speech, unsigned & undated].

⁴⁶ PREM3/14/5, Portal-Churchill, 24/06/43.

⁴⁷ AIR20/2796, Portal-Churchill, 25/06/43.

⁴⁸ PREM3/14/5, Portal-Churchill, 27/06/43.

⁴⁹ *Ibid.* In so doing it may be wondered whether the Prime Minister was adopting a clever ruse, namely by outlining a better bombing effort over the previous week so it laid down to Bomber Command a commitment in front of public opinion to sustain this better level of performance.

⁵⁰ 'We Seek No Profit' Speech by Winston Churchill, London Guildhall, 30/06/43. See also AIR19/181, Bufton-A.P.S. to S. of S., 29/06/43. All facts and statistics in this speech had been given by the Air Ministry beforehand.

⁵¹ H.P., H82, Harris-Portal, 15/05/43. See also PREM3/14/5, Air Ministry-Britman, Washington, 14/05/43. This informed Churchill that 'Harris believes that Wednesday night's attack on Duisburg was the heaviest blow which Bomber Command has yet delivered ... The plotting of the night photographs has just been finished. It is best plot that Harris has yet seen. 30 photographs are right on the bull's eye, 300 photographs are unplottable showing nothing but flame and smoke. 2. P.R.U. yesterday found fires still burning in Duisburg'.

⁵² PREM3/14/5, Air Ministry-Britman, Washington, 24/05/43.

⁵³ Webster & Frankland, *S.A.O.G., vol. II: Endeavour*, p. 25. See also CAB80/70, C.C.S.217, Plan For Combined Bomber Offensive from the United Kingdom, 14/05/43; and Enclosures 'A' and 'B'; C.C.S. 87th Meeting, Item 7: Plan for Combined Bomber Offensive from the United Kingdom, 18/05/43.

⁵⁴ AIR20/3360, Bottomley-Harris, 4/06/43.

⁵⁵ CHAR20/94A, Churchill-Renwick, 4/07/43.

⁵⁶ R. Overy, 'The Air War in Europe, 1939-1945', in, J.A. Olsen (ed.), *A History of Air Warfare* (Washington D.C.: Potomac, 2010), p. 45.

⁵⁷ FO954/32A/111, Churchill-Stalin, 6/04/43. Just under two weeks later, the Soviet leader was similarly informed about Bomber Command having 'struck three good blows this week' with Churchill re-emphasising 'my assurance that the attacks will continue throughout the summer on an ever-increasing scale. See FO954/32A/122, Churchill-Stalin, 18/04/43.

⁵⁸ D. Reynolds/V. Pleshakov (eds.), *The Kremlin Letters: Stalin's Wartime Correspondence with Churchill and Roosevelt* (New Haven, 2018), pp. 254-276. From late-June, Stalin stopped all correspondence with both Western leaders for some two months.

⁵⁹ P.P., Folder 10, Portal-Harris, 18/06/43. Portal closed the reply by hoping the new technical

devices, particularly H2S and Booser, would prove beneficial, and 'that the fitting of Monica is going well'. In an accompanying minute enclosing Harris' letter, the CAS told Churchill 'Following my minute of yesterday about the four days' lull in Bomber Command, I send you a copy of a letter I have received from Harris. It is rather long and to some extent technical, but if you have the time I think it may interest you to read it'. See PREM3/14/5, Portal-Churchill, 18/06/45.

⁶⁰ PREM3/14/5, Portal-Churchill, 18/06/43. On this note, the Prime Minister scrawled 'Lord C. to tell me shortly.'

⁶¹ Cherwell had, of course, been instrumental in commissioning the enquiry by D.M. Butt into Bomber Command's performance in August 1941. See Webster/Frankland, *S.A.O.G., vol. I – Preparation* (London, 1961), p. 178.

⁶² PREM3/14/5, Cherwell-Churchill, 24/06/43.

⁶³ AIR/3410, Bomber Command Report on Night Operations, 16/17 June 1943: COLOGNE, 4/09/43. This noted 'the subsequently inaccurate release of the sky-markers and green T.I.'s resulted in scattered bombing' because seven Pathfinder aircraft had dropped their sky-markers blindly on H2S. With the remaining nine Pathfinder aircraft facing various kinds of problems, the net effect, which consistently bedevilled sky-marking attacks, was the marking being 'neither adequate nor continuous.'

⁶⁴ Webster/Frankland, *S.A.O.G., vol. IV: Annexes & Appendices* (London, 1961), pp. 429-39.

This was even more remarkable considering Portal told Churchill on 24 June that 5,180 tons of bombs had been dropped in June hitherto, which compared to 11,468 tons in April and 12,920 tons in May. No doubt alarmed Churchill circled all these figures. See PREM3/11/12, Portal-Churchill, 17/06/43.

⁶⁵ CAB66/39/23, W.P.(43)323, Summary of Operations of Bomber Command For Fortnight Ending 1200 Hours Sunday, 4th July, 1943, Memorandum by the Secretary of State for Air, 20/07/43.

⁶⁶ H.P., H129, *Bomber Command Quarterly Review No. 6, July-Aug-Sept 1943*. By 1940s standards, these reviews represented 'glossy' brochures on Bomber Command's activities and the overall effects of bombing, and were circulated widely throughout Whitehall. This edition commented that 'the destruction of Cologne and Köln-Deutz as economic assets to Germany completed the main purpose of the Ruhr and Rhineland offensive.'

⁶⁷ AIR20/8148, 'Repeat' Attacks by Bomber Command, 5/07/43.

⁶⁸ H.P., H50, Trenchard-Harris, 29/06/43.

⁶⁹ CAB66/38/31, W.P.(43)281, Summary of Operations of Bomber Command, Fortnight Ending 1200 Hours, Sunday 20th June, 1943, Memorandum by Secretary of State for Air, 28/06/43.

⁷⁰ P.P., Folder 13, Bomber Command Digest No.72, 29/08/43.

⁷¹ W.P.(43)397, Summary of Operations of Bomber Command For Fortnight Ending 1200 Hours, Sunday, 29th August, 1943, Memorandum by the Secretary of State for Air, 14/09/43.

⁷² H.P., H35, Harris-R. Brooke-Popham, 20/09/43.

⁷³ Webster & Frankland, *S.A.O.G., vol. II: Endeavour*, p. 47.

⁷⁴ AIR14/3538, Harris-Portal, 15/05/43.

⁷⁵ P.P., Folder 10, Harris-Portal, 14/03/43.

⁷⁶ Harris Papers, H85, Freeman-Harris, 24/08/43. Freeman finished by stating 'our deliveries therefore have been 87 more than you were entitled to expect at the beginning of the year . . . What more can I do for you?'. Responding Harris handwrote 'Many more!'

⁷⁷ AIR20/2796, Portal-Churchill, 25/06/43. Ten-days earlier, the Australian Minister for External Affairs, Dr Herbert Evatt, had arrived in London with a request for heavy-bombers for the RAAF, and to stop this Portal used the argument that increasingly powerful German air-defences meant 'we owe it to our bomber force to give them the greatest possible support and reinforcement.' See P.P., Folder 4, Portal-Churchill, 16/06/43.

⁷⁸ AIR20/2796, Churchill-Portal, 26/06/43. He also suggested Portal's argument 'lost much of its force' if the German air-defences were approached 'from an angle where they are not operative'; by implication, this meant attacking targets beyond the Ruhr.

⁷⁹ CAB80/70, C.O.S.(43)305(O), Churchill-Ismay, Overseas Operations – Preliminary Air Bombardment, 14/06/43.

⁸⁰ V. Orange, *Churchill and his Airmen: Relationships, Intrigue and Policy Making 1914-1945* (Barnsley, 2013), p. 222.

⁸¹ PREM3/11/12, Churchill-Portal, 16/06/43.

⁸² H.P., H50, Harris-Trenchard, 10/07/43.

⁸³ Probert, *Bomber Harris*, p. 257.

Article

30 years of British Involvement in Bosnia and Herzegovina and Why the Region is Important Today

By: Wing Commander Chloé Bridge

Biography: Wing Commander Chloé Bridge has operational experience in Afghanistan, West Africa, and the Middle East. Serving in multiple roles in the UK and overseas, she is a CAS Fellow, having graduated with a MA from King's College London. She has also previously been awarded an OSCE/UNODA¹ Scholarship for Peace and Security.

Abstract: The UK's involvement in Bosnia and Herzegovina (BiH) spans over 30 years originating from its military support during the 1992-1995 conflict. Following the end of the Bosnian War 30 years ago, the Dayton Accords were signed but the agreements only ceased direct hostilities, with BiH experiencing political upheaval post-conflict. These historical and complex issues remain today with a strong secessionist movement threatening to break up the country. Nonetheless, BiH remains an important part of the Western Balkans (WB) for the UK. As such, this viewpoint will detail the UK's historical involvement in BiH which will contextualise current challenges. Specific reasons will be detailed surrounding the UK's relationship to the country, ultimately concluding that BiH is important for the security of UK and Europe.

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Introduction

The Bosnian War between 1992-1995 was at the time the deadliest conflict on European soil since the Second World War, resulting in approximately 100,000 dead.² It is also a conflict that is often forgotten within UK history books despite the significant British military involvement and continued impacts that persist today. After extensive international diplomatic, economic, and military efforts, the General Framework Agreement for Peace in BiH, otherwise known as the Dayton Accords, was signed in 1995. This ceased hostilities however, 30 years later, the Western Balkans (WB)³ and specifically BiH, have seen increased tensions in the form of a strong secessionist movement which threatens stability and peace. Whilst the guns fell silent in 1995, the country and its politicians cannot seem to heal from the wounds of the past.

The current war in Ukraine has dramatically altered the security environment within Europe and brought a new form of instability. Just a few hundred miles away from Ukraine, the current geopolitical situation in BiH is a potential area of uncertainty but just like most areas of instability the root causes of the country's current challenges are historical, complicated, and nuanced. It is therefore critical to understand BiH's complex past to contextualise current challenges. The UK's involvement within the region spans over 30 years and there are no indications that this will stop. Today, some parts of the WB represent a heightened area of geostrategic rivalry which is vulnerable to internal and external destabilising influences and actors.⁴ As such, this viewpoint will serve as a brief summary of the UK's historical involvement in BiH before offering justification for why the country remains important today. Ultimately, it will conclude that BiH is extensively linked to UK and European security.



Current Map of the Western Balkans including the two entities of BiH – the Federation of Bosnia and Herzegovina and Republika Srpska
(Credit: House of Lords 2018)

The Post-Cold War Era in Europe

Following the collapse of the Soviet Union in 1991, Europe had the opportunity to form new military partnerships and improve Euro-Atlantic political integrations. However, peace and security took on new forms post-Cold War where Europe and the United States (US) had to

quickly adapt from taking a purely defensive stance to playing a larger more diverse and active role within the international community. The lack of a focused singular threat was replaced with multiple 'flash points of violence and tensions' around the world relating to self-determination and nationalism. The 1990s proved to be just as destabilising and uncertain as noted by then North Atlantic Treaty Organisation's (NATO) Secretary General, Manfred Wörner: 'The collapse of Soviet Communism has left us with a paradox: There is less threat, but also less peace'.⁵

In central and southeast Europe, the dissolution of the Socialist Federal Republic of Yugoslavia (SFRY) in the early 1990s and its subsequent challenges would see many Western countries play an extensive role. The breakup of the former republics of the non-aligned but previously communist SFRY, which included Slovenia, Croatia, BiH, Serbia (with two autonomous provinces of Kosovo and Vojvodina), Montenegro and Macedonia, created considerable ethnic tensions and the rise of nationalism. Slovenia and Croatia declared independence first on 25 June 1991 and although there was a brief war in Slovenia, a more protracted war in Croatia had started that would last until 1995. In both cases, nationalists fought against the majority Serb Yugoslav People's Army (JNA), the formal military of the SFRY.

Following Slovenia and Croatia, BiH declared independence in March 1992 and in April, the US and European Economic Community recognised it as a separate state. However, territorial claims and ethnic divisions between BiH's three main ethnic groups, the Bosnian Muslims/Bosniaks, Catholic Croats, and Orthodox Serbs, resulted in a large scale international armed conflict between April 1992 and December 1995. On one side, the Army of the Republic of BiH (ARBiH) and the Croatian Defence Council (HVO) fought against the JNA, which was later renamed Bosnian Serb Army or VRS. Evidence of extreme human rights abuses and the Bosnian Serb siege of BiH's capital city of Sarajevo resulted in a significant humanitarian crisis.

Initially, the international community saw the breakup of the SFRY as a series of civil wars and ones that did not involve outside intervention. British Secretary of State for Defence, Malcolm Rifkind, through the early stages consistently called the conflict a civil war despite the British Government recognising Bosnia as an independent state.⁶ Furthermore, the US also saw these conflicts as European problems and not ones that would directly impact US national security interests, noted by the prominent American negotiator and diplomat Richard Holbrooke.⁷ As such, Western countries were slow to act but the deteriorating crisis that emerged within BiH forced the international community to intervene and gradually use United Nations (UN) peacekeepers and NATO military forces as tools to leverage peace.

The Bosnian War

During the war, NATO, and specifically air power, deployed in support of the United Nations Protection Force (UNPROFOR) peacekeeping mission. Utilising a range of NATO capabilities with UN Security Council authority, air power was used as an escalatory tool to deter Bosnian

Serb aggression, enforce a no-fly zone under Operation Deny Flight, and then eventually bomb Bosnian Serb targets on the ground as part of Operation Deliberate Force. The UK contributed various platforms to NATO and UNPROFOR operations that included attack aircraft (Tornados, Harriers, Sea Harriers, Jaguars), air mobility (TriStars and Hercules C-130K), Intelligence Surveillance and Reconnaissance assets (Sentry), and support helicopters (Pumas, Chinooks, and Sea Kings). Unfortunately, on 16 April 1994, Bosnian Serb forces shot down a British Sea Harrier with an SA-16 shoulder launched surface-to-air missile.⁸ This was the first time a NATO plane had been downed in the conflict but the pilot, Lieutenant Nick Richardson, ejected and was safely evacuated.

The UK's contribution to the Bosnian War was not just limited to NATO as troops and equipment were supplied to the UN. The UK deployed a battlegroup as part of UNPROFOR under Operation Grapple with Senior British Officers also filling the ranks including Lieutenant General Sir Michael Rose who was the Commander of all UN forces in BiH between 1994-95. Air power was also used for Operation Cheshire in which the Royal Air Force delivered vital aid to the besieged city of Sarajevo using C-130s. It was the longest running airlift in the RAF's history, with over 26,000 tonnes of supplies dropped between 1992–1996.⁹

In trying to resolve the Bosnian War, the international community was mired by political disagreement which meant it acted slowly. The UN adopted a position of impartiality within BiH with UNPROFOR's commander from March 1995, General Bernard Janvier, commenting that NATO should, '*inflict pain but not death*' against the Bosnian Serbs.¹⁰ This attempt to 'level the playing field' was designed to remove the Bosnian Serb military advantage rather than completely defeat it. Political disagreement and Rules of Engagement constraints placed on NATO (such as a challenging approvals process to authorise close air support) led to the military alliance being unable to demonstrate its full military capability. Nonetheless, NATO air power and the UK's contribution played a significant part in bringing all warring factions to the Dayton Accords especially after Operation Deliberate Force in 1995.

One of the main belligerents within the conflict was Serbian President, Slobodan Milošević. Exercising influence over the Bosnian Serbs in terms of military and economic support, which was later rescinded, Milošević acted on behalf of the Bosnian Serb civilian and military leadership which resulted in his attendance and eventual signing of the Dayton Accords in 1995.

The Dayton Accords, agreed in Ohio but signed in Paris in December 1995, ceased hostilities within BiH and created military and political frameworks for the country. One of the most important but controversial part of the Accords, which remains contested today, was the creation of two entities consisting of a Bosnian Croat Federation and a Serb Republic or Republika Srpska (RS) separated by the Inter-Entity Boundary Line. The Accords also adopted a tripartite presidency meaning that one Bosnian Muslim, one Serb, and one Croat would be elected as the Heads of State. The Office of the High Representative (OHR), appointed by

the Peace Implementation Council Steering Group, of which the UK is a member, was also created to oversee the civilian aspects of the Accords. Furthermore, the Brčko District, which was created in 2000, is multi-ethnic and self-governing but is still considered part of both the Federation and the RS. Overall, BiH's political structures since 1995 was and remains overly complex, bureaucratic and divisive.

Post-Conflict

The international community's focus post-conflict was implementing the Dayton Accords. From a military perspective, British troop numbers within UNPROFOR reduced after the war and NATO's role turned from fighting force to solely peacekeeping. Between December 1995 and December 2004 NATO led, on behalf of the UN, the Implementation Force (IFOR), later named the Stabilisation Force (SFOR), with a mandate to implement the military aspects agreed within the Dayton Accords. This included deterring further hostilities and supporting civilian peace efforts. In 2004, a European Union (EU) led military operation took over the role of maintaining a stable and secure environment in BiH from NATO. This was named EU Force (EUFOR) Operation Althea, where it remains today contributing to a Safe and Secure Environment. However, NATO still provides logistical and command support to EUFOR from its headquarters in Sarajevo. Despite the UK's involvement in Operation Althea ending in December 2020, British military presence remains in country in support of building capabilities within the BiH Armed Forces.

From a political and economic perspective, European integration of the WB started in the late 1990s but progress has been arguably slow. In 1999, BiH entered into the Stabilisation and Association Process to improve political and legal ties with the eventual aim of joining the EU. In December 2022, the European Council granted candidacy to BiH, having originally applied in 2016. The EU-WB Summit held in December 2023 reaffirmed the intent to bring the entirety of the WB closer to the EU to reinforce security, build resilience, and to mitigate the impact of the war in Ukraine.¹¹

The Importance for the UK

The UK has played a major and active role in stabilising and securing peace within BiH for three decades. As such, there are several reasons why this part of the WB continues to be important for the UK.

Firstly, the British Government has an enduring commitment to BiH after its significant military support during the Bosnian War. As the UK was a signatory of the Dayton Accords and an architect of restoring political and economic frameworks immediately afterwards, there is significant commitment and continued strategic investment within BiH, not to mention that the UK is a permanent member of the UN Security Council. Both British and American authorities are committed to the territorial integrity of the Dayton Accords and specifically ensuring BiH remains a single sovereign state made of two entities and three constituent peoples. This was reaffirmed recently by Dame Karen Pierce, UK Special Envoy for the Western

Balkans, when she visited the country in March 2025.¹² This continued British rhetoric has been necessary following political turbulence caused by RS's succession intentions.

Under the leadership of Milorad Dodik, who was the President of RS most recently between 2022-June 2025, the Bosnian Serbs took a more aggressive separatist stance. RS's boycott of institutions, its anti-Dayton stance, and legislation to disassociate from the Federation of Bosnia and Herzegovina seen in May 2024 have contributed to an unstable and uncertain sovereign state. However, Dodik was convinced by the Court of Bosnia and Herzegovina in early 2025 for refusing to implement decisions made by Christian Schmidt, the High Representative for BiH in 2023. His presidency of RS was terminated in June 2025 and he was barred from holding political office for six years. An interim President was installed in October 2025. The UK recently commented that they welcome timely presidential elections within RS with an opportunity to form a new government which will be constructive for all within BiH.¹³ Although there are some who do not believe that any successor will be able to resolve the deep and historical divisions between the two entities.

The Dayton Accords have held for nearly 30 years despite calls to review the agreements. The US think tank, The Wilson Centre, had argued that the 'Dayton arrangements are associated less with peace than with dysfunction', stating that they were a truce not a settlement.¹⁴ Conversely, this report was written in 2020 prior to Russia's illegal invasion of Ukraine in 2022 so it would be valuable to see an updated perspective given the changes in the European security landscape.

The second reason why BiH is important is that the British Government has a strategic responsibility to European security especially after Russia's annexation of Crimea in 2014 and illegal invasion of Ukraine in February 2022. In 2018, a House of Lords report into the UK and the future of the WB provides insights into external influences that may impact regional stability.¹⁵ Various academic witnesses provided mixed discourse to the extent of Russian influence within BiH with a consensus that it was unhelpful and did not provide alternative solutions in bringing peace and stability to the country.¹⁶ The British Government has increasingly been concerned over Russian influences within BiH. British military personnel were sent to BiH in 2018 to ensure free and fair elections and were sent once again in 2022 where counter-disinformation experts were offered to improve the country's ability to resist malign actors.¹⁷ In June 2022, the then UK Prime Minister, Boris Johnson, stated: 'We cannot allow the WB to become another playground for Putin's pernicious pursuits. By fanning the flames of secessionism and sectarianism Russia seeks to reverse the gains of the last three decades in BiH, gains that have brought more stability to our whole continent.'¹⁸

In March 2023, the UK released the Integrated Review Refresh (IRR) which signalled the UK's clearest intent to contest malign Russian influence with an updated strategy that focused on the WB to 'boost their prosperity, security and resilience to Russian interference'.¹⁹ In September 2025, the NATO Parliamentary Assembly highlighted that the WB is, 'increasingly vulnerable

to malign external influence.²⁰ However, with Dodik being stripped of the presidency of RS, Russian and other external influences have been subdued for now. It is also noteworthy that the Strategic Defence Review, which was released by the British Government in 2025, does not mention 'malign actors'. This more in-depth review following the IRR makes no direct reference to the WB but instead alludes to Russia's intent to, 're-establish spheres of influence in its near-abroad and disrupt the international order to the UK and its allies' disadvantage.²¹

One way the British Government seeks to counter any malign influence within the WB is to support BiH's Euro-Atlantic integration via NATO and EU memberships. NATO membership and co-operation are likely to improve the peace and stability of the WB and so the UK has a vested interest in supporting BiH in its journey towards NATO.²² However, progress has been slow. BiH had aspirations to join NATO and entered the Partnership for Peace programme in 2006 and in 2010 was invited to join the Membership Action Plan, although support to join the military alliance has since been challenging resulting in the policy becoming divisive. For several years, RS has adopted a stance of military neutrality which will make it even more challenging for BiH to join NATO. Given Russia's illegal invasion of Ukraine, NATO agreed in 2022 to boost BiH's resilience by developing a new Defence Capacity Building package which covers cyber defence, countering terrorism, and crisis management.

A similar situation for BiH's accession into the EU exists with progress stalled and actively undermined despite the UK's House of Lords determining that 'EU membership is the most reliable path for WB countries to achieve security, stability, and prosperity.'²³ Every year, the UN Security Council vote on extending the mandate of the EU's peacekeeping mission in BiH for another 12 months. In November 2025, the UN Security Council unanimously adopted to extend the mandate of EUFOR Althea thus reinforcing intent to ensure BiH remains a peaceful and stable part of the WB. Furthermore, the EU continues to support BiH to satisfy all of the 'Copenhagen Criteria' with the European Parliament commenting that it, 'reaffirms its strong support for BiH's EU accession bid ... but calls for implementation of the necessary constitutional and electoral reforms, and for efforts to strengthen democratic institutions and the rule of law, and to fight corruption and organised crime.'²⁴ A revised timeline for BiH's accession into the EU has yet to be determined.

BiH's continued political instability, its exposure to malign actors, and its lack of membership within NATO and the EU will continue to present challenges and opportunities for the UK, Europe and the US.

Finally, the Bosnian War serves as a reminder of the horrors of a regional conflict where hatred and ethnic tensions resulted in significant loss of life and suffering. A multitude of war crimes were prosecuted within the International Criminal Tribunal for the Former Yugoslavia between 1993 and 2017. Furthermore, the UK must never forget the sacrifices of the 59 British troops that lost their lives during the Bosnian War and post-conflict stabilisation and peacekeeping efforts.²⁵

Conclusion

BiH has had a turbulent 30 years since the dissolution of the SFRY. It is disappointing that, whilst fighting stopped in Europe's deadliest conflict at the time since the Second World War, the country and ultimately the people continue to suffer the consequences of political instability. The Dayton Accords succeeded in ceasing hostilities 30 years ago, but the core agreements remain contested and divisive. A strong secessionist movement threatens to break up the two entities and has the potential to destabilise the region.

This viewpoint has not offered solutions to the current issues, nor has it explored the wider WB region especially the notable challenges within Kosovo where there is a significant NATO deployment. Instead, this viewpoint has provided an overview of the UK's historical involvement from the Bosnian War through post-conflict as it is critical to understand the country's complex past to contextualise current challenges. One of the most important aspects relating to BiH is its relationship to UK and European security. The security of UK and Europe is complex and multi-faceted but continued commitment to support BiH's territorial integrity to prevent conflict, contesting external malign actors, the importance of Euro-Atlantic integration, and the sacrifice of British troops are just some of the reasons for why the UK must continue to understand this part of the continent.

We live in a dangerous, distracting, volatile, and unpredictable world. As such, it's vital, especially for policymakers and military leaders, to understand BiH's historical and complex challenges within the wider WB given the potential instability and potential future conflict within Europe.

Notes

¹ Organisation for Security and Cooperation in Europe/United Nations Office for Disarmament Affairs.

² UK Parliament, *End of the Bosnian War: 25 years on*, Nov 20.

³ Defined by the EU as six countries: Albania, Bosnia & Herzegovina (BiH), Montenegro, Kosovo, North Macedonia and Serbia. Croatia joined the EU in 2013 so are not included within this definition.

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⁷ Richard Holbrooke, *To End a War*, Random House, 1998, xv.

⁸ Fleet Air Arm Officers' Association, *On this day 16 April 1994*.

⁹ RAF Benevolent Fund, *RAF's Longest Running Airlift Helped save the people of Sarajevo*, Apr 15.

¹⁰ Mark Conversino, *Executing Deliberate Force, 30 August–14 September 1995*, in *Deliberate Force A Case Study in Effective Air Campaigning*, edited by Robert Owen, Air University Press, 2000, 133.

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¹⁴ The Wilson Centre, *Fixing Dayton: A New Deal for Bosnia and Herzegovina*, March 2020, p. 1.

¹⁵ House of Lords Select Committee on International Relations, *The UK and the future of the Western Balkans*, January 2018.

¹⁶ House of Lords Select Committee on International Relations, *The UK and the future of the Western Balkans*, January 2018, p. 24.

¹⁷ No 10 Downing Street, *UK deploys military experts to counter Russian malign influence in Bosnia and Herzegovina*, June 2022.

¹⁸ Ibid.

¹⁹ HM Government, *Integrated Review Refresh 2023 Responding to a more contested and volatile world*, March 2023, p. 42.

²⁰ NATO Parliamentary Assembly, *2025 - REVISED - WESTERN BALKANS: 30 YEARS SINCE SIGNING OF THE DAYTON ACCORDS*, September 2025.

²¹ Strategic Defence Review, *Making Britain Safer: secure at home, strong abroad*, June 2025, p. 28.

²² House of Lords Select Committee on International Relations, *The UK and the future of the Western Balkans*, January 2018, p. 17.

²³ House of Lords Select Committee on International Relations, *The UK and the future of the Western Balkans*, January 2018, p. 20.

²⁴ European Parliament, *Albania, Bosnia and Herzegovina, and North Macedonia must step up reforms*, July 2025.

²⁵ National Army Museum, *Bosnia*,

Article

Operation Allied Force – Lessons in Modern Air Power

By Colonel Daniel S. Krowinski, USAF

Air University – Air War College – Kenny Air Power Strategy Seminar – 17 April 2024

Biography: Colonel Daniel ‘Ape’ Krowinski was commissioned in the United States Air Force in 2003 following graduation from The Ohio State University. A qualified F-16 command pilot he has flown more than 2,800 hours in a variety of theatres worldwide, including a number of combat operations. He is a graduate of the US Air Force Air War College, winning the Air Force Historical Society Award. Presently, he is the Deputy Division Chief, J82 Programs and Evaluations for North American Aerospace Defense Command (NORAD) and United States Northern Command (USNORTHCOM), Peterson Space Force Base, Colorado.

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Introduction

Operation Allied Force (OAF) occurred between the North Atlantic Treaty Organization (NATO) and the Federal Republic of Yugoslavia (FRY) forces from 24 March to 10 June 1999. Lasting only 78 days, it was the first significant conflict in which air power was the sole component employed, the first conflict NATO had fought against a sovereign nation, and the first considerable conflict conducted for humanitarian objectives.¹ Predictably, following the conclusion of OAF, some experts were eager to highlight it as a watershed moment emphasizing air power as the primary factor in achieving victory and vindicating the predictions of early air power theorists such as Giulio Douhet and Billy Mitchell.

‘There are certain dates in the history of warfare that mark real turning points. Now there is a new date to fix on the calendar: June 3, 1999, when the capitulation of President Milosevic proved that a war can be won by air power alone. ...All this can be said without reservation, and should be conceded by the doubters, of whom I was one, with generosity...This was a victory through air power!’² - John Keegan, military historian and author.

Conversely, detractors point out the many dysfunctions of NATO’s air campaign and its inability to stop the ethnic cleansing and forced displacement of over one million Kosovar Albanians.

The Kosovo experience should go down as ‘possibly the worst way we employed our military forces in history’³ - Admiral Leighton Smith, Commander NATO forces during Operation Deliberate Force.

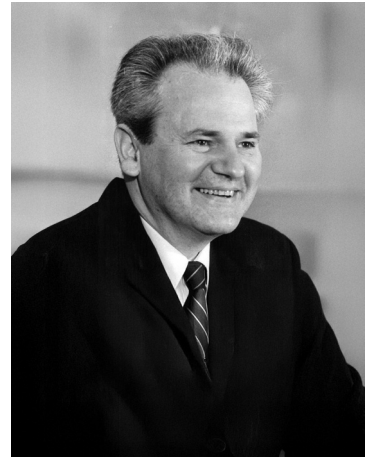
Though NATO eventually achieved its stated objectives, its victory was not guaranteed, and NATO very well could have lost the war. The Alliance stumbled into war unprepared for the conflict that ensued with ill-defined strategic objectives and lacking a coherent strategy, instead expecting that a few days of bombing would suffice to coerce Serbian President Slobodan Milosevic to concede to NATO demands. Consequently, NATO achieved victory through a combination of factors: a steadily increasing air power campaign targeting Serbian infrastructure and industries around Belgrade, putting pressure on Milosevic’s associates and weakening his domestic support; the U.N. tribunal indicted Milosevic as a war criminal, leading to the subsequent loss of Moscow’s support; the increasing likelihood of a NATO ground invasion; and Milosevic impatiently accelerating his ethnic cleansing campaign which had the effect of hardening NATO’s collective resolve when it otherwise may have faltered.⁴ However, the question remains unanswered as to whether air



Admiral Leighton W Smith USN

power was the primary factor forcing Milosevic to capitulate. Daalder and O'Hanlon provide an adept analogy to answer this question:

Air power might best be thought of as the force driving Milosevic into a dead-end corridor and threatening to crush him against the far wall. But had NATO not remained unified, Russia not joined hands with NATO in the diplomatic endgame, and the Alliance not begun to develop a credible threat of a ground invasion, Milosevic might have found doors through which to escape from the corridor despite the aerial punishment.⁵



Slobodan Milosevic

It is the interplay and combination of these factors that Daalder and O'Hanlon claim are essential to understand why NATO prevailed. Thus, this paper contends that although OAF ultimately succeeded, it fell well short of being an ideal campaign due to NATO's unpreparedness for the conflict, adoption of a flawed strategy, and hampering by coalition dynamics. To grasp the precarious position NATO found itself in during the conflict, one must first understand just how unprepared for war NATO was.

NATO Unprepared For War

NATO was objectively unprepared for the war that ensued, resulting from a flawed assumption that Milosevic was susceptible to coercion, overconfidence in the efficacy of air power as a coercive tool, and failure to adhere to the established Joint Planning doctrine. Admittedly, every strategy evolves throughout a conflict due to changing conditions. Still, the following data illustrates the extent to which NATO's strategy changed during OAF, thus reflecting both its adaptability and its unpreparedness at the start of the war. NATO believed the conflict would last three to four days at most, but instead lasted 78 days.⁶ The initial force composition consisted of approximately 430 combat and support aircraft but ended with nearly 1,000.⁷ The Combined Air Operations Center (CAOC) began with a staff of 400 personnel but grew to over 1,400 people by the war's end.⁸ The master target list expanded from 169 targets at the beginning of OAF to nearly 1,000 by early June.⁹ NATO attacked and damaged more infrastructure targets in the last week of OAF than in the entire first two months of the air campaign.¹⁰ Lastly, the number of Kosovar Albanians forcibly displaced increased from fewer than 100,000 people before the start of OAF to more than 500,000 people less than a month later.¹¹

Why did NATO assume Milosevic was so susceptible to coercion? Foremost, NATO leaders conflated their experience from the Bosnian War four years prior with the situation in Kosovo in terms of Milosevic's depth of commitment, vulnerability to coercion, and air power's perceived

decisive role in Operation Deliberate Force (ODF). Unlike Kosovo, Bosnia did not hold nearly the same value for Milosevic. Before ODF began, Milosevic had indicated to US negotiators that he would compromise with the international community to end the war.¹² Additionally, a ground force of ten thousand United Nations Protection Force (UNPROFOR) troops enabled the effectiveness of air power in ODF. It also coincided with two Croat-Bosniak ground offensives against the Serbs.¹³ The presence of ground forces contrasts with OAF, where President Clinton publicly ruled out the use of troops on the eve of the war.¹⁴ The belief that the situation in Kosovo was similar to that in Bosnia is reflected in General Clark's (Commander in Chief, Europe (CINCEUR) and Supreme Allied Commander Europe (SACEUR)) direction to General Jumper (Commander, United States Air Forces in Europe (COMUSAFE)) to develop an air campaign plan against Yugoslavia to 'halt or degrade a systematic Serb campaign of ethnic cleansing in Kosovo with the intent that the air strike would be coercive in nature, *on the Bosnia model* [emphasis added], providing a strong incentive for Milosevic to halt operations'.¹⁵ While subtle, this comment indicates a belief that the context and circumstances surrounding Kosovo and Bosnia were more similar than not and, therefore, that the strategy that worked in Bosnia would also work in Kosovo but without the presence of ground forces.



General Wesley Clark

NATO also failed to understand the historical and cultural significance of Kosovo to the Serbian identity. Dating back to the year 1389, Polje Kosovo is where the Ottoman Turks defeated the Serbs, thus cementing Ottoman control for more than five centuries. In the early 20th century, Serbia finally regained control of Kosovo from the Turks when the Ottoman Empire dissolved.¹⁶ In April 1987, Milosevic, then chief of the Serbian Communist Party, told a crowd of fifteen thousand supporters, 'Yugoslavia does not exist without Kosovo', decrying Kosovar Albanian calls for Independence.¹⁷ Moreover, Milosevic chose Polje Kosovo to hold his election victory rally in 1989 on the 600th anniversary of the battle with the Turks. He drew a crowd of over 250,000 supporters and began his campaign for a 'Greater Serbia'.¹⁸ Therefore, Kosovo held



immense value to Serbian historical and cultural identity and was critical to Milosevic's political livelihood. The importance of Kosovo became apparent to General Naumann, chairman of the NATO Military Standing Committee, in meetings he had with Milosevic in early 1999, in which he reported that 'as soon as you mentioned Kosovo in a way which may have triggered the thought in his mind that he may lose Kosovo one day, he got very emotional. He told us, I don't know how often, that Kosovo is really the cradle of Serb culture and religion.'¹⁹ Consequently, it is within this context that Milosevic's commitment to retaining control of Kosovo, as well as his hostility to its ethnic Albanian population, can be understood.

Why did NATO believe that air power alone would be effective in Kosovo? America's faith in the efficacy of air power came of age in the first Gulf War (Operation Desert Storm, 1991). Applying new technologies such as stealth, precision-guided munitions (PGMs), datalinks, and global positioning systems enabled a strategy of overwhelming parallel attacks against multiple centers of gravity simultaneously. Air power proved it could attack strategic targets and achieve decisive results with high accuracy and relatively low risk to friendly forces while minimizing collateral damage. Therefore, political leaders saw in air power the possibility of employing military force without the risk and cost associated with committing ground forces and managing the war in near real-time, giving them political flexibility and increased maneuver space.²⁰ Military historian Eliot Cohen captured the essence of air power's allure in 1994 when he wrote, 'Air power is an unusually seductive form of military strength, in part because, like modern courtship, it appears to offer gratification without commitment'.²¹ The success of air power in Desert Storm and the perceived decisive role it played in Bosnia, when combined with the faulty evaluation of Kosovo's importance to Serb identity and Milosevic's susceptibility to coercion, led political and military leaders alike to believe air power alone would be successful in OAF. NATO was so confident that Milosevic would cede to its demands from the mere threat of airstrikes, that senior US military leadership told operational planners they believed the likelihood of conflict was only about 30 to 40 per cent.²²

Lastly, the joint operational planning process was not adhered to per established doctrine, resulting in an ad hoc, incomplete, and flawed strategy.²³ As part of USAFE staff, the 32d Air Operations Squadron (AOS) undertook the campaign and contingency planning for the air component, Joint Task Force Sky Anvil. The Commander of the 32d AOS stated the initial tasking from CINCEUR was to 'develop a plan for a very limited, signal sending, single strike/raid against a few communications nodes that would degrade Serbian President Milosevic's ability to command and control his forces in Kosovo'.²⁴ This guidance ran counter to the accepted practice and value of effects-based targeting. Furthermore, no Warning or Planning Orders were issued, resulting in the planners failing to get adequate support from outside agencies such as intelligence organizations, an absence of priorities, and no established command relationships.²⁵ Remarkably, the issuance of the first official military message traffic as Alert and Pre-deployment orders did not occur until early 1999.²⁶ In his memoirs, General Clark does not dispute that there was inadequate planning for OAF:

'The Desert Storm team had been assembled and was scrambling on the offensive plan and techniques for months before it attacked Iraq in 1991. We hadn't had that luxury. Our force came together at the last minute. ... We were fighting, planning, and adapting simultaneously.'²⁷ However, Clark attributes this deficiency to political constraints: In the case of Kosovo, there simply was no detailed planning. There was no strategic consensus in Washington. Even if there had been, US-only planning would have been unrealistic since we never had any intention of fighting alone. Nor could we have done effective US planning without visiting the theater, which was impossible under the restrictive provisions of the Roberts Amendment, which forbade spending money for intervention in the Balkans unless certain prerequisites and reporting requirements had been complied with. Detailed NATO planning would have required political authorization that just wasn't possible. ... In Europe and the United States, repeated political concerns inhibited the kind of detailed NATO planning in the summer and fall of 1998 that might have promoted a more credible and more effective threat.²⁸

Regardless of the reason, the failure to adhere to US or NATO joint planning doctrine deprived military commanders of a thorough analysis and understanding of the strategic and operational environments. The net result was a de-facto strategy of coercion and gradualism with no contingency plan for the extended conflict that ensued.

Flawed Strategy

'The starting point to understanding all operations in the Balkans in the 1990s, including the NATO bombings of 1995 and 1999, was that they were without strategies.'²⁹ - General Rupert Smith, Deputy Supreme Allied Commander Europe during OAF.

'We had no strategy because three nights of demonstration of resolve does not require strategy.'³⁰ - Lieutenant General Michael Short, Combined Force Air Component Commander during OAF.

Following the failed negotiations in February 1999, NATO's strategy entailed a phased air campaign of gradual escalation in the number, type, and location of targets attacked to coerce Milosevic to return to the negotiating table. Phase One aimed to establish air superiority over Kosovo, degrade command and control capabilities and integrated air defense systems, and attrit enemy forces in Kosovo. Phase Two authorized strikes against military targets south of latitude forty-four degrees north, and Phase Three expanded allowable strikes against high-value targets throughout the FRY to include Belgrade.³¹ However, the strategy was hindered during the first month of OAF by a lack of clear strategic guidance, dwindling credibility, as well as operational and environmental factors.



General Rupert Smith

From the outset, military leaders and planners lacked clear strategic guidance, defined political objectives, or a desired end-state for the Balkans.³² It was not until the start of OAF in late March that President Clinton announced NATO's strategic goals were to 'demonstrate the seriousness of NATO's purpose so that the Serbian leaders understand the imperative of reversing course, [to] deter an even bloodier offensive against innocent civilians in Kosovo, and, if necessary, to seriously damage the Serb military's capacity to harm the people of Kosovo.'³³ However, after the first few days of bombing, it became apparent that NATO was failing to achieve its goals, as evidenced by the Serbian ground forces' intensified attacks, forcing tens of thousands of Kosovar Albanians to flee across the borders into refugee camps.³⁴ Moreover, General Clark observed that after six weeks of bombing, there were more Serbian forces in Kosovo than when OAF had begun.³⁵ Eventually, at the NATO summit in Washington nearly one month into the war, the Alliance formally agreed on the campaign objectives: '(1) Stopping the violence in Kosovo; (2) withdrawing Serb military, police, and paramilitary from the province; (3) stationing an international military presence there; (4) allowing all Kosovar Albanians safe return home; and (5) working toward a political settlement based on the talks outside Paris (Rambouillet)'.³⁶ This lack of strategic guidance during the planning process and changing objectives made crafting and executing an effective military strategy difficult.

An effective strategy of coercion requires an in-depth understanding of what the enemy values as well as how much cost they are willing to bear. Pape explains that coercion 'seeks to affect the behavior of an opponent by manipulating costs and benefits'.³⁷ As previously stated, NATO failed to grasp Kosovo's value to Serbia and the lengths Milosevic would go to retain it. The proposal offered at the Rambouillet peace talks in February 1999 included a provision for establishing a democratic Kosovo government, which, in effect, would mean Kosovo's loss from Serbia. This change significantly altered Milosevic's balance of costs and benefits.³⁸ If he complied, it would almost certainly mean an end to his political career, not to mention the implicit significance of Kosovo to Serbian identity. Whereas if he defied NATO's demands, Milosevic had concluded the Alliance lacked the resolve and credibility to carry through with its threats of force. Hence, NATO's strategy of coercion lacked the one thing it needed to succeed: credibility. Pape says, 'In principle the coercer can raise the probability that the threatened costs will actually be inflicted, but in practice the more important question is usually whether the coercer can inflict sufficient damage to compel concessions. Extremely high credibility that the coercer will impose damage is normally a minimum requirement'.³⁹ However, numerous events occurred throughout the year preceding OAF that signaled a lack of US and NATO credibility for Milosevic.

First, in response to a massacre of 24 villagers near Drenica, Kosovo, in March 1998, NATO conducted Operation Determined Falcon. In mid-June, Determined Falcon was an aerial exercise comprising eighty NATO aircraft operating over Albania and Macedonia, intending to demonstrate NATO's power projection capabilities and resolve.⁴⁰ General Naumann later testified in a Senate hearing that 'Milosevic rightly concluded that the NATO threat was a bluff...and finished his summer offensive'.⁴¹ In the months following Operation Determined

Falcon, Serbian forces continued their offensive against the Kosovo Liberation Army (KLA), in the process indiscriminately shelling villages and driving Kosovars from their homes. By August, approximately 460,000 Kosovars had been forcefully displaced within the province or had fled across the borders.⁴²

Second, in August 1998, in retaliation for the bombing of two US embassies in Africa, the US conducted cruise missile strikes against suspected terrorist camps in Afghanistan and Sudan. Then, in December 1998, in response to Iraq banning United Nations (UN) inspections, the US led a four-day air operation called Desert Fox in which 650 sorties attacked Iraqi military and logistical facilities. Despite the attacks, Saddam Hussein continued to refuse UN weapons inspector's access. According to Daalder and O'Hanlon, 'These generally unsuccessful attacks did little to enhance the credibility of the United States. They were designed more to punish, and to 'send a message,' than to compel an adversary to change his behavior or directly achieve concrete strategic objectives.'⁴³ Furthermore, Henriksen's research revealed that after collaborating with Baghdad over intelligence data on US air strikes, Serbian officials were decidedly not impressed by the US attacks against Iraq and thus did not fear NATO's threats.⁴⁴

Third, only days before the start of OAF did the US reposition its only aircraft carrier in the region out of the Mediterranean.⁴⁵ The Roosevelt carrier group would return to the Adriatic within combat range of Serbia on 5 April.

Fourth, the US and several other NATO leaders were opposed to the use of ground forces, perceiving they lacked public and political support for anything other than airstrikes. As a result, President Clinton publicly announced he did not intend to use ground troops in Kosovo.⁴⁶ Regardless of the rationale and decision to not use ground troops, publicly announcing this decision runs counter to one of the core principles of joint operations: the element of surprise. From this public statement, Milosevic gleaned two important pieces of information. His forces would be unopposed by NATO on the ground, and NATO's depth of commitment and risk tolerance were low.



President Bill Clinton

Next, apprehensive partners and political hesitation within the Alliance further hampered NATO's credibility due to a gradualist approach. For example, some NATO allies were hesitant to attack anything other than the Serbian forces committing atrocities in Kosovo.⁴⁷ Additionally, Italy indicated in the opening days of OAF that they would likely confront a 'governmental crisis if the bombing were escalated'.⁴⁸ For US Air Force leaders in particular, the gradualist approach was all the more unpalatable due to its resemblance to Operation Rolling Thunder in Vietnam.

Pape explains the problem with a gradualist approach is 'the pattern of gradually increasing damage which is supposed to increase the credibility of threatened future damage is actually more likely to reduce credibility because the coercer's restraint tends to be attributed to political constraints rather than free strategic choice'.⁴⁹ These events almost certainly reinforced Milosevic's perception that NATO lacked resolve and credibility should conflict ensue. In a meeting with German Foreign Minister Fischer in March, Milosevic commented, 'I can stand death, lots of it, but you can't'.⁵⁰

Finally, several operational and environmental factors limited the effectiveness of NATO's strategy. General Clark designated the Serbian Third Army as the primary military objective at the outset, giving air power the formidable task of finding, fixing, and engaging a dispersed enemy hiding amongst the population.⁵¹ This task was nearly impossible at times for numerous reasons. First, most NATO aircraft were required to remain above fifteen thousand feet to minimize the threat posed by anti-aircraft artillery and shoulder-fired missiles.⁵² From this altitude, pilots using binoculars and aircraft sensors had limited ability to find and discriminate dispersed Serbian military and police from the local populations. Second, the weather in the Balkans tends to be very poor throughout the Spring months. Over Kosovo, 'there was 50–100 per cent cloud cover 72 per cent of the time, and only 21 of 78 days had good overall weather. In all, 3,766 planned sorties, including 1,029 sorties characterized as 'close air support' were aborted due to weather. Not until May did the weather become consistently favorable'.⁵³ Third, the requirement to minimize collateral damage and civilian casualties mandated the use of laser-guided bombs in many cases.⁵⁴ However, poor weather and rugged terrain adversely impacted the effectiveness of these weapons. Fourth, without the shaping presence of friendly ground troops, Serbian forces were free to use camouflage and concealment, dispersal, and deception tactics. Vehicles and equipment minimized movement by day, remaining hidden among civilian structures or under cover of dense foliage; instead, they utilized night or bad weather to mask their movements from the NATO aircraft above.⁵⁵ Milosevic understood the fragility of NATO's cohesion and the impact civilian casualties would have on public opinion. Therefore, he deliberately placed military equipment near civilian structures to increase the possibility of NATO bombs killing innocent civilians and was ready to turn any resulting tragedies into propaganda to sway world opinion against NATO.⁵⁶

The amalgamation of the above factors helps to understand why NATO's strategy failed in the first month of the campaign to achieve its original goals of demonstrating NATO's seriousness, deterring further aggressions against innocent civilians in Kosovo, and significantly damaging Serb military capacity. NATO's ineffectiveness may have helped to encourage Milosevic to escalate his attacks against the KLA and ethnic cleansing of Kosovar Albanians. Ironically, Milosevic's tactical success proved to be a strategic mistake because the worsening humanitarian situation and atrocities served to strengthen NATO's resolve to prevail.⁵⁷ At the NATO summit on 24 April, which also happened to be its 50th anniversary, the Alliance's leaders recognized that their credibility and existence were now at stake. The US and its NATO partners emerged from the summit with a renewed determination to prevail. As a result,

additional sanctions were imposed on Serbia, banning oil sales and freezing financial accounts. Additionally, General Clark's request for more aircraft was approved and the military could escalate its attacks against critical infrastructure and strategic leadership targets.⁵⁸

Coalition Dynamics

'There is only one thing worse than fighting with allies, and that is fighting without them.'

- Winston Churchill.

Complications stemming from coalition dynamics permeated throughout OAF from the strategic level down to the tactical, often reducing the operational effectiveness and efficiency of the air campaign. To begin with, coalition friction and interoperability problems occurred because of what Olsen calls the 'air power differential', referring to a widening capability gap between the US and other NATO countries.⁵⁹ For example, some air forces lacked secure communications capability, some could not operate in the weather or at night, many lacked PGMs and laser designation capability, many more lacked specialized electronic warfare and suppression of enemy air defense aircraft, and all but the US lacked stealth aircraft.⁶⁰ Several of these disparities were non-critical because the Serbian threat was much less capable by comparison. In contrast, the requirement to minimize collateral damage accentuated the asymmetry of PGM-capable aircraft. Fortunately, 90 per cent of US strike aircraft were PGM capable compared to only 10 per cent less than ten years earlier in Desert Storm.⁶¹ However, besides the US, only France and Britain were able to employ PGMs, but to a much lesser extent. These weapons consisted primarily of laser-guided bombs, which still required good weather and clear line-of-sight from the lasing platform to the target. The limitation manifested as a lack of laser-capable aircraft as well as a dwindling stockpile of PGMs by the war's end.⁶² Furthermore, only the US possessed an all-weather PGM capability in the form of the new GPS-guided joint direct attack munition. Lastly, the US was the only country that possessed stealth aircraft. Due to the need to maintain the secrecy and security of the B-2 and F-117 programs, the US did not include missions involving these platforms in the NATO Air-tasking Order (ATO). Instead, European Command (EUCOM)



B-2 Bomber



Lockheed F-117 Nighthawk

decided to implement a separate US-only ATO without the knowledge of the NATO CAOC.⁶³ One year following OAF, Lieutenant General Michael Short commented on the adverse effects of running a dual-ATO and unilateral operation unbeknownst to the allies:

'If we are to be a team, we can't just be a team on paper. We need to be a coalition command structure. We should never again, never again, run a US-only command structure inside of a NATO alliance. We should not try to run that rabbit up our allies' legs and pull it out of their hat ever again... We inserted in the middle of that staff a US-only operation whose commander was a Navy admiral... We called it a joint task force, and they were given operational level responsibility for running a NATO war. We can never do that again to our allies, or we will not have allies.'⁶⁴

Though deemed necessary by the US to protect its security interests, the dual-ATO approach violated the principle of unity of command and caused much consternation among NATO allies.

The strategy adopted was a manifestation of NATO's vulnerability and hence the requirement to protect alliance cohesion. However, it was very much at odds with accepted principles of war and US air power doctrine. According to the British Defence Committee report, 'The overriding need to maintain Alliance unity resulted in strong political control being exerted over the conduct of the campaign, both in NATO and amongst the individual nations.'⁶⁵ The report continues, 'The failure of the North Atlantic Council to reach an early consensus on its policy on recourse to military means, and the inhibitions within NATO on military contingency planning which might have assisted the process of reaching that consensus, undoubtedly hobbled the Alliance during its early attempts to develop a strategy for addressing the crisis in Kosovo.'⁶⁶ As a result, General Clark stated that from the start of OAF, most of the military principles of war were violated and the resulting campaign was a continual process of adaptation driven by political dynamics.⁶⁷ Furthermore, targeting became so constrained by individual NATO countries that they exerted a veto power (also referred to as 'red card') over the type of targets and individual missions.⁶⁸ One example of this dynamic occurred when the Dutch government refused to approve the bombing of the Serbian presidential palace because it reportedly contained a Rembrandt painting.⁶⁹ This degree of political oversight and direct involvement in the targeting process sometimes caused missions to be launched under 'pending approval' status and even recalled mid-flight.⁷⁰ General Short was perhaps the most outspoken critic of NATO's administration of the war, admonishing members who exercised their veto power at the last minute or disapproved of particular targets the NATO air planners wished to attack.⁷¹ General Clark, on the other hand, while sympathetic to Lieutenant General Short's frustrations, acknowledged the reality that the military strategy was subservient to political constraints and operating as an alliance:

'Once the threshold is crossed and you are going to use force, that force has to be as decisive as possible in attaining your military objectives,' he said. In the case of Kosovo,

however, he argues, 'the consensus of 19 nations was required to approve action, and many countries had preconceptions about how to apply force. Every single nation had a domestic political constituency, and every single nation had a different set of political problems. In some there were government coalitions. In others there were historic relationships. Some bore the agony of defeat in a previous conflict and the word 'war' couldn't be mentioned'.⁷²

While friction and constraints are an unavoidable consequence of operating as a coalition, that does not mean that civilian and military leaders should be resigned to accepting poor military strategy. During his final press conference, General Naumann shared this sentiment, stating, 'We need to find a way to reconcile the conditions of a coalition war with the principle of military operations such as surprise and overwhelming force. We did not apply either in Operation Allied Force and this cost time, effort, and potentially additional casualties'.⁷³



General Klaus Naumann

Implication for Great Power Competition

While some may view OAF as a unique event, the conflict and air campaign hold strategic implications that resonate in the context of great power competition with the People's Republic of China (PRC) and Russia. America's adversaries have gleaned valuable lessons from OAF, lessons they could potentially use against the US and NATO in future conflicts.

First, PRC President Xi Jinping's public comments about Taiwan's historical and cultural significance are striking in their resemblance to Milosevic's claims about Kosovo. Xi has urged the Taiwanese people to accept it 'must and will be' reunited with China, that Taiwanese people 'must understand that independence will only bring hardship', and that unification is 'an inevitable requirement for the great rejuvenation of the Chinese people'.⁷⁴ Like Milosevic, such statements give insight into Taiwan's value to Xi Jinping and must be considered by US civilian and military leaders when developing a strategy of deterrence and coercion.

Second, potential adversaries have learned the value of exploiting asymmetric warfare against the US and NATO, creating seams, and manipulating public opinion to fracture alliance cohesion. Lambeth expands on the many lessons OAF affords our adversaries, arguing,

'They would copy Serbian tactics of dispersal, concealment, mobility, decoys, and deployment among civilian communities. They would deploy mobile [Surface-to-Air Missiles], not depend on static installations and traditional [Air Defense] command and control, seeking preservation rather than conventional engagements.

Observing the vulnerability of democratic public opinion to casualties and apparent lack of success when a nation's vital interests were not at stake, they would elevate manipulation of the media to a primary strategic instrument. They would note the fragility of a NATO consensus when operations fell outside the original NATO mutual defense security area.⁷⁵

Much of Lambeth's assessment accurately describes the People Liberation Army's (PLA) development since OAF and portended the PRC's observed strategy throughout the Pacific. For example, most of the PLA's surface-to-air missile systems are highly mobile, their command-and-control network is redundant and resilient, and they have developed scores of countermeasures and capabilities to disrupt the US ability to employ PGMs and power project abroad effectively. Furthermore, the PRC continues to utilize economic and military coercion against many countries throughout the Indo-Pacific the US would likely rely on for access, basing, and overflight in a potential conflict with China and seek to exploit any weakness and trepidation among allies and partners.⁷⁶

From OAF, the PRC and Russia have learned to exploit the characteristics of limited proxy wars instead of direct conflict with the US. They have also determined that exploiting critical US and NATO vulnerabilities such as political constraints, concern for escalation, and alliance cohesion is possible. For example, throughout the Ukraine conflict, Russia has repeatedly threatened both horizontal and vertical escalation in response to NATO providing military assistance and aid to Ukraine.⁷⁷ As the US and NATO reorient to great power competition, they would do well to remember the lessons offered by OAF and, perhaps more importantly, the lessons its adversaries learned from it.

Conclusion

OAF can be judged both a success and a failure depending on the perspective one takes. At the strategic level, in the strictest sense, OAF can be considered a highly successful air campaign that coerced Milosevic to surrender and agree to NATO's demands. NATO successfully adapted and maintained its cohesion despite a severely flawed strategy at the outset. Coalition air forces dropped 28,000 munitions, yet less than five hundred civilians died as a direct result of NATO airstrikes.⁷⁸ Enemy fire downed only two manned aircraft out of over 38,000 sorties flown in the air campaign, resulting in no lives lost.⁷⁹ From that perspective, it is no wonder US Secretary of Defense Cohen referred to OAF as 'the most precise application of air power in history'.⁸⁰ However, measuring OAF's success simply by the outcome fails to capture the inadequacies



US Secretary of Defense
William Cohen

at the operational level. The air campaign was largely ineffective at destroying dispersed Serbian forces in Kosovo or stopping the ethnic cleansing and forced relocations, evidenced by the fact that the bulk of the Serb ethnic cleansing occurred during the eleven weeks of OAF.⁸¹ Though many contributing factors led to NATO's early ineffectiveness, the root cause may very well be the inability of the civilian and military leaders to reconcile the political constraints against military doctrine. This civil-military relationship and friction applies to every conflict and is a dynamic that senior military leaders must learn to navigate to be effective.

Now, over 25 years removed from OAF, the enduring relevance to the future operating environment is clear. The campaign illustrated the ever-present tension between political constraints and military doctrine, and the debilitating effect it can have on formulating an effective strategy when unreconciled. Moreover, OAF demonstrated the limits of air power when fighting against an asymmetric threat without the shaping presence of ground forces. Furthermore, the war showed the ineffectiveness of a coercive strategy when credibility is in doubt. Arguably, the most significant lesson from OAF that will remain applicable to the future operating environment is that no military operation can be more effective than the strategy it is supporting. Daalder and O'Hanlon rightly noted, 'Though it is true that the military instrument must always be subordinate to political constraints, making war by accepting political constraints that impede sound military preparations can be a prescription for defeat—and nearly was in this case.'⁸² In the case of OAF, NATO was very fortunate in that it had an overwhelming military advantage and Milosevic made critical errors. To avoid this scenario in the future, careful analysis and a balancing act are required. Military professionals and civilian policymakers must have a frank dialogue to assess the risk and impact of political constraints on military strategy.

Since the conclusion of OAF, air power has continued to increase its capability to deliver precision strikes that minimize collateral damage with relatively low cost, low risk, and low commitment. Operations Odyssey Dawn and Unified Protector over Libya in 2011 was the first-ever air campaign in which 100 percent of the strikes used precision-guided munitions.⁸³ Yet, while these characteristics continue to make air power an attractive tool to civilian leadership, it also obscures the critical thing air power cannot do. Air power alone cannot affect local politics or perform stability operations once the bombing has stopped. And so, the question leaders must ask before committing air power to achieve a political end-state is, just because we can do something, should we?

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Viewpoint

The Importance of Information Advantage in Enabling Air and Space Power

By Flying Officer Joseph R Brown

Biography: Flying Officer Joseph Brown is an ex-Trade Group 4 Cyberspace Engineering Technician, who later commissioned as an Engineering Officer (Communications Electronics). Following success on the RAF's sponsored degree scheme and initial officer training, he was posted to his first command of RAF St Mawgan's Digital Support Flight.

Abstract: Information Advantage (IA) is vital for the exercise of Air and Space Power. Without investment in this form of Cyber Power, the UK is liable to fall behind its international partners in a highly contested domain. IA can be viewed through four lenses: Information as an Effector, Information as an Enabler, Information Denial, and Information Resilience. The successful exploitation of all four lenses will enable decisive IA for the UK. However, the primary IA threat to the RAF and wider UK comes from Information Denial, from a lack of Information Resilience. To overcome this, the UK could collaborate to deploy its own Global Navigation Satellite System (GNSS), more accurate and secure than Global Positioning System's (GPS). Also, the RAF would be more resilient if it reduced reliance on the space domain. This could be achieved by re-developing and modernising cold war era systems and processes to operate in austere conditions.

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Introduction and Context

'Where is the knowledge we have lost in information?' – T S Eliot

Throughout history, effective flows of information would enable battle winning decisions to be made, corporate empires to be formed,¹ and scientific ideas to be shared across continents. Today, this long-standing military and civil edge has been named 'Information Advantage.'

Information Advantage (IA) is defined as 'The credible advantage gained through the continuous, adaptive, decisive and resilient employment of information and information systems.'² Its status in UK doctrine was borne from the idea that modern warfare is as much about kinetic effects and successful tactical successes as it is about controlling the competing narratives.³ For example, at the time of writing, the overwhelming tactical success of Israel against Palestine has not necessarily been matched with their strategic goal of maintaining a favourable perception on the world stage.⁴ This is much like the USA against Vietnam in the mid-20th century.

This essay will explore contemporary defence doctrine and real-life examples to view IA from the perspective of Air and Space Power. Air Power is 'The ability to use air capabilities in and from the air, to influence the behaviour of actors and the course of events';⁵ where Space Power is 'Exerting Influence in, from, or through space'.⁶ Both forms of National Power can use and contribute to IA in different areas, called lenses; the essay will begin by outlining these four lenses of IA before exploring a case study to analyse the Information Denial lens in practice. This critical evaluation of present-day Eastern Europe and the Middle East will use real world scenarios to discuss and justify what that could then mean for hypothetical RAF deployed Force Elements (FEs) and air assets.

Evaluation of this is important because of the rise of sub-threshold and 'grey space' action against the UK and its interests. The ability to disrupt and deter its adversaries, without the use of kinetic force, is vital to maintaining freedom of action and a leading position on the world stage – well implemented IA is one of the best vehicles for this.

However, the main IA threat to the RAF and the wider UK comes from an over exposure to the threat of Information Denial, as well as a lack of Information Resilience against it. For example, as can be observed in the ongoing conflict in Ukraine, where GNSS and Precision Navigation and Timing (PNT) services from space can be jammed or spoofed. In the event of future conflict, it is almost certain that this would degrade the RAF's ability to project Air Power by reducing the accuracy of its Air and Land navigation systems and Precision Guided Munitions (PGMs), such as Paveway IV, which relies on the USA's GPS.

Two considerations are proposed to ensure that the UK is resilient against this threat of Information Denial and that it is better prepared for future conflict in the short to medium term.

In order to reduce this risk (and compete with new capabilities like India's NavIC constellation), the UK could collaborate to deploy its own GNSS, more accurate and secure than GPS. This would be enabled by continuing the pursuit of a sovereign space launch capability, following Virgin Orbit's failed first attempt from Cornwall Spaceport in 2023. Furthermore, the RAF would benefit from a reduction its overall reliance on the space domain. It can achieve this by re-developing agile systems and processes which can operate in austere conditions.

The geo-political landscape is the most uncertain and dangerous it has been since the end of the cold war; the 'peace dividend' which began in the 1990s has ended and bolstering resilience to enhance the UK's ability to respond to attack cannot happen overnight. Therefore, as conflict appears as more of a possibility in the short to medium term, greater capabilities for IA should be considered, funded, and developed now.

Analysis

Lenses of IA in the context of Air and Space Power

Information both enables and is an individual instrument of National Power.⁷ It underpins the UK's efforts in hard, soft, and smart power and when viewed in the context of the RAF, it is essential to enabling all roles of Air Power.⁸ For example, control of the air is arguably the most significant role of air power for enabling the other three to take place. It requires information to be available at the correct time, at the correct classification and in the correct format to plan well considered and decisive Air Tasking Orders and make most effective use of, sometimes, finite military resources.

Although, when it comes to IA specifically, it is JCN 2-18⁹ which details the (currently conceptual) idea that IA can be enacted in four distinct ways: information can be viewed as an enabler, as an effector, for resilience, and for denial.

Information as an Enabler

The Information as an Enabler lens views information as something which can be used to help facilitate decision making, by providing greater situational awareness and therefore priming a commander with evidence to justify their choices, increasing the likelihood that those choices are correct with respect to fulfilling the senior commander's intent, orders, or wider mission objectives.

With an approximation to the Air Power tenant 'Speed', US forces used networked Command and Control (C2) systems to integrate air and ground strikes during the Iraq war in 2003. Real time sensor feeds and digital communications allowed the intelligence cycle to be shortened significantly compared with analogue methods.¹⁰ This meant commanders could strike the Iraqi air defences within minutes of detection. Because their intelligence and response processes were so much shorter than their adversary's, it paralysed the counterattack, and operational success was achieved sooner than originally anticipated during planning.

Information as an Effector

Secondly, information can be used as an Effector. This lens conceptualises the idea that data, which has been processed into information, has the ability to affect human beings on a cognitive level and can change their 'understanding, perceptions and behaviour'.¹¹ This is comparable to the Air Power tenet 'Agility' as information can be repurposed multiple times to have different effects on different audiences; Figure 1 below shows the layers which make up the Information Environment and it is at the 'people' level that this would take place which, if delivered to or denied from the target audience, would alter the way in which they interact at the social layer.

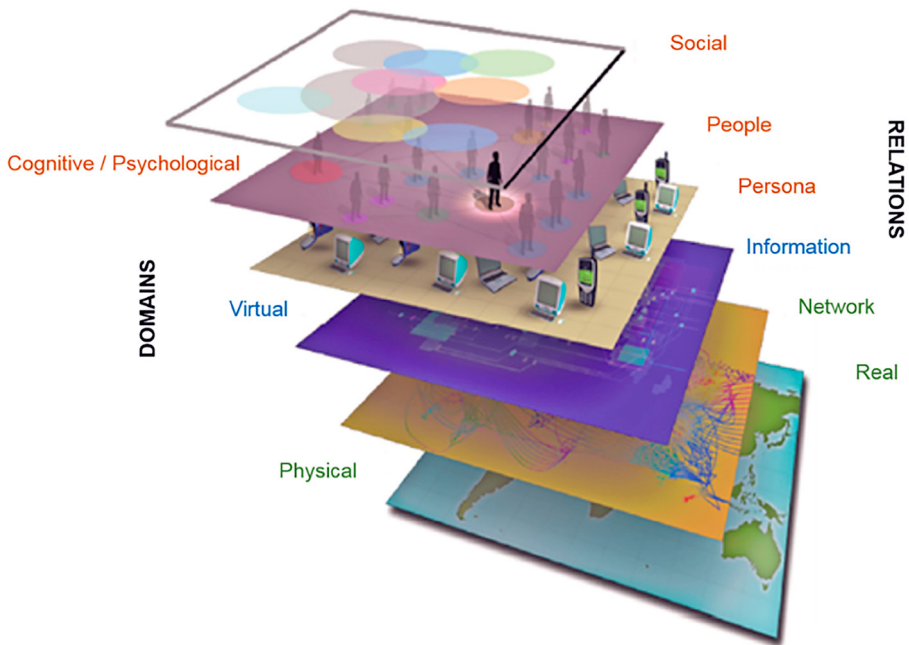


Figure 1 – The Information Environment.¹²

Cooperation between military organisations such as 77 Brigade, Partners Across Government, and civil agencies such as the Secret Intelligence Service are vital to success in this area of IA as they help to fuse together both kinetic and non-kinetic effects in a way which most effectively achieves the UK's desired influence.¹³ Examples of this being implemented to aid strategic goals are littered throughout military history, such as the British Special Operations Executive (SOE) utilising over 200 radio frequencies allocated to them for clandestine activities in Second World War occupied Europe,¹⁴ or the modern day Government Communications Headquarters (GCHQ) working to deny and degrade ISIS' online presence.¹⁵ Although, Psychological operations (PSYOPS), the UK and NATO's policy of which is contained within Allied Joint Doctrine for Psychological Operations (AJP-3.10.1), do not always achieve the intended effect. This was most recently seen in the CIA's attempt to undermine the integrity of the Communist

Party of China (CCP)¹⁶ and lessons identified from this should be implemented into UK stakeholder organisation's future operational planning.

Information Denial

Thirdly, an adversary's information can be denied, giving the UK and Friendly Force Elements a decisive edge and maintain the element of surprise. It is the 'Availability' of the Central Intelligence Agency (CIA) triad which is attacked in this lens. It also includes deception through camouflage, concealment and jamming techniques. Additionally, it may offer cost saving benefits when compared to traditional kinetic military activities,¹⁷ so there is a reasonable possibility that it will feature more highly in future conflict though it is not a new feature of warfare in and of itself. During Operation Orchard in 2007, the Israeli Air Force conducted an air to ground attack against a suspected Syrian nuclear reactor. The Syrian Air Defence RADARs (ADRs) were fed a false air picture for the duration of the attack sortie by Electronic Warfare methods, which included beaming Radio Frequency (RF) pulses into the ADRs to insert misleading target locations.¹⁸ This degraded the Syrian's situational awareness and thus commanders were unable to make effective decisions or react to the air incursion.

Additionally, the threat plane of Friendly FEs can be reduced by denying the enemy's information attack vectors, obfuscating service persons' personal data,¹⁹ and having a highly threat aware workforce. The most effective way of enabling this is through an active security culture.²⁰

Information Resilience

Finally, Information should be resilient against the aforementioned denial, whether that is from non-offensive disruption (for example a felled tree severing a telecommunications line) or malign attack. Resilient information flows can be achieved through having redundancy, achieved using a Primary, Alternative, Contingency, and Emergency (PACE) means of communication. For example, when the RAF was operating in Afghanistan during Op Toral, primary reach back to the UK was enabled by Host Nation Internet Bearer of Opportunity (HN IBoO). However, this connection was unreliable as the Taliban would climb the telegraph poles and deny information by simply snipping the wires which they themselves did not rely upon. Once specialist software detected the lack of network control messages back and forth, the reach back would automatically failover to Reacher satellite communications. This had issues, namely with respect to limited bandwidth and having to enact a priority of services. However, alongside the contingency and emergency methods of enabling information to flow back to the UK, effective Information Resilience for the detachment was achieved and meant that commanders in both locations had access to the information they required, such as the NATO Recognised Air Picture needed for the safe conducting of air operations.

Good resilience is also a deterrent against attack and information denial – it would be a waste of resources to expend several expensive zero-day attacks to attempt to deny or degrade the

C2 of the UK's Quick Reaction Alert (QRA) chain if it is simply able to switch over to another method of communications. Or if robust Business Continuity Plans (BCPs) mean that kinetic or non-kinetic attack to a location merely reduces their output until the FEs have enacted their BCP, relocated and began operating again.

Case study

At the time of writing, Information Denial is occurring in conflict zones around the world.²¹ Commander of the Estonian Defence Force, General. M. Herem (equivalent to the UK's Chief of the Defence Staff) stated that Russia was employing Electronic Warfare (EW) tactics to disrupt GPS around the Baltic region.²² Similarly, Hamas has attempted to disrupt Israeli GPS services,²³ both showing that it is almost certain that Information Denial against Space services will be a hallmark of modern conflict going forwards.

Many contemporary military strategists and commanders agree that war in the medium term is highly likely, and that the world is in an environment akin to the mid-1930s.²⁴ If this is true, it would mean the UK would be in a state of war sooner than it takes to train an RAF fast jet pilot²⁵ and have little time for developing new Tools, Tactics and Procedures (TTPs). At the very least, the early weeks and months of a war would be fought using current capabilities, kit, and doctrine which leaves the MOD dependant on the US' GPS navigation for a range of purposes. This case study focuses on the affect these EW and Information Denial measures would have on the RAF's ability to project air power and perform, specifically, the attack role.

The Attack role's greatest challenge is the ability of the aircraft or its weapons to penetrate or counter an enemy's air defences²⁶ and preventing either from access to navigation data forms part of that air defence network. The Paveway IV munition has been most recently deployed on Operation Protective Guardian to strike against Houthi targets;²⁷ it is a GPS guided bomb capable of being launched from the Typhoon TGR4 and, in future, the Protector.²⁸ If PNT services from the US' GPS satellites were to be denied or degraded, the accuracy of the bomb would be reduced and it would have to rely on its inertial navigation system (INS), which would reduce the accuracy of the weapon to only 'Near precision'.²⁹ Precise accuracy changes from losing dual GPS/INS navigation are beyond the classification of this paper, however, any reduction would have damning second and third order effects.

Firstly, the risk profile of flying attack sorties in denied environments would increase, reducing the likelihood of commanders to approve kinetic effects missions with tight proximities to civilian infrastructure or sites protected under the Laws of Armed Conflict. That could prevent strategic effects from taking place and leaving the 'behaviour of actors', which do not align with the UKs interests, unchanged.

Furthermore, if the attacks using the Paveway IV munition were conducted, and they missed their target resulting in undue civilian death, the diplomatic incident which could follow would result in a loss of reputation for the RAF. At a time when the MOD has already had its

effectiveness questioned on the world stage,³⁰ this would reduce public support for the military and in turn discourage recruitment and retention.

Other roles, such as Air Transport, would be negatively affected by this form of Information Denial too. During the writing of this paper, Russian GPS jamming occurred above NATO airspace, as seen in Figure 2 below. The UK's Secretary of State for Defence's RAF Envoy aircraft had its location data degraded in an apparent show of force or perhaps an accidental emanation of jamming signals. Regardless of the intent, this occurrence demonstrates the vulnerabilities of unhardened air assets³¹ to a universally available, inexpensive, and unattributable threat.



Figure 2 – March 2024 RAF Envoy GPS Jamming Near Ukraine.³²

Albeit this GNSS jamming is a capability that the MOD is trialling itself,³³ the technologies represent a threat to the way in which Air conducts business. Much like with the aforementioned PGMs, GPS jamming against aircraft would heighten risk profiles associated with operating in the domain. This could reduce the RAF's appetite to deploy High Value Air Assets (HVAAs), which typically perform the ISR role, to denied environments thus presenting a dilemma between potentially losing expensive HVAAs and their crews or depriving the commander from vital intelligence products.

This scenario is one of many reliance's the UK has on GNSS; it is not just GPS hardening on bombs which could be considered, but a full readjustment on the appetite for reliance.

Considerations

As technology develops, the UK's MOD should not discard basic, low-tech but mature and reliable methods for navigation and communications. Working in conjunction with the proposals laid out in the latest *Air Operating Concept* for the RAF to increase its resilience and employing more agile methodologies,³⁴ it could re-develop its TTPs for the hypothetical /

eventual denial of GPS & SATCOM. This could include further practice in switching over to paper-based communications and offline / paper map navigation. A resurgence of these cold war tactics would be relatively inexpensive and although the likelihood of broadscale denial of satellite signals occurring either through jamming or kinetic space warfare is low, the practice is likely to yield few negative implications and adjust the workforce to a war fighting mindset. Lean methodologies do not work well for defence and instead robust PACE plans which do not rely on heavy infrastructure, vulnerable links controlled by third parties, and Host Nations ought to be adopted across the whole force.

Potential challenges include resistance from a force whose only experience of the military has been in relative peacetime. These personnel may not see the aim of resilience training and practices and view it as an obstacle to their business-as-usual output. To overcome this, the vision of the idea and the reasons why defence is different must be understood and this would come from top-down direction and training. There must be a sense of urgency with implementing this recommendation as the TTPs and number of Suitably Qualified and Experienced Personnel (SQEP) in the profession is declining as time passes; service persons leave and are not replaced as a result of fewer and fewer Radio/Radar courses being offered by the RAF's No1 Radio School.³⁵

The UK could collaborate on launching its own GNSS & PNT satellite constellation. Following the country's exit from the EU, and subsequently the Galileo Project, a gap in capability which was previously decided to be of strategic importance was opened. Over 90% of military capabilities rely on space³⁶ and undertaking this recommendation would simultaneously help the UK to achieve one of the goals laid out in *Global Britain in a Competitive Age* by growing the country's Science and Technology power, as well as aiding in all four pillars of the *National Space Strategy 2021*. This recommendation could be conducted with partners such as the Five Eyes community of Anglo-spheric countries or parts of the Commonwealth of Nations. Working in partnership with Australia and New Zealand for example could provide a base of political will, which likely lacks in the UK due to its perceived lack of threat and low proximity to states which pose a systematic threat. Additionally, it could help reduce the financial burden of launching and maintaining the capability by sharing the funding and workforce at the same time as strengthening the country's international partnerships. Crucial to supporting this endeavour includes continuing to pursue the sovereign space launch capability, following Virgin Orbit's failed 2023 launch from Cornwall Spaceport.³⁷ This would give the UK an increased freedom of action in the Space domain as well as providing highly skilled jobs across remote areas of the country.

Amongst cost, potential challenges include the vast misunderstandings and unawareness of space and its integrity to modern life. This means that few people are aware of the roles that they can work in so that the potential 'best people' to enable the UK's space aspirations are working elsewhere across defence and industry. A potential solution to this is to increase an interest in science, technology, engineering and mathematics (STEM) in schools through

outreach programmes and for space organisations such as UK Space Command conducting more ‘road show’ style awareness pieces across stations and units. This recommendation would include a complex consortium of stakeholders working towards one goal for many years, making strong, bipartisan governmental leadership essential to its success.

Conclusion

IA is crucial to modern warfare as it enables instruments of Air and Space Power to operate effectively. All four lenses of IA contribute to Air and Space power in separate ways; the four Air Power roles are enabled by effective information flows, but they are vulnerable to Information Denial. Robust Information Resilience is the answer to overcome the risks and threats of this denial and can be implemented by feasible PACE plans and minimal single points of failure – such as a dependency on one type of technology.

Space services are only going to increase from its already integral position to modern life with respect to maintaining IA. Therefore, the UK could look to challenge its competitors by launching its own GNSS and thus providing Information Resilience as another source of PNT for its aircraft, munitions, and other strategic interests. Equally, this would demonstrate to its international partners that it is a strong collaborator and of high importance to the organisations which it is a member of, not a dependant of them. Finally, any useful technology should not be allowed to become an unmitigated dependency. Thus, the RAF could reinvest in historical and resilient means of transporting information, capable of withstanding Space Service Information Denial, such as HF Radio. Though this gets harder with financial and workforce constraint as RAF is asked to do more with less.

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Gordon Shephard Essay Prize 2024

A Framework for Protecting and Defending the UK's Space Interests

By Squadron Leader Mike Lambert

Gordon Shephard Memorial Essay Prize Winner 2024

Biography: Squadron Leader Mike Lambert is a Qualified Weapons Instructor serving in UK Space Command. He gained his MSc in Air and Space Operations and Tactics from Staffordshire University. He has attended professional Space Operations training in the UK and with the US Space Force, principally focussed on Space Domain Awareness and Orbital Operations.

Abstract: Strategic Theme 1 of the Defence Space Strategy is 'Protect and Defend'. Protect and Defend is described in this essay as Defensive Space Operations, of which there are three key operational functions that the UK must realise: Space Domain Awareness, Operational Command and Control and Space Control. This paper considers the UK's position in space power strategic theory and the context of threats in space. It then presents an analysis of the Defence Space Strategy's Protect and Defend theme, and each of these three operational functions, in order to provide the UK a route to operationalising its Strategy.

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Introduction

In space, a military satellite orbits the Earth at 35,786 km, holding position over the equator and providing secure communications to UK forces deployed in the Middle East. The satellite has a channel stood by to support personnel recovery operations for the Typhoon sorties conducting combat air patrols in Syria. Another satellite, owned by a competitive State, is approaching from the east, closing the range between them slowly. Intelligence suggests that the new satellite has an on-orbit servicing module including a cutting arm and a camera.

UK Space Command have noticed the closing distance and steered large, high-powered optical telescopes to watch the situation. The data, appearing as dots on a waterfall chart, shows the two satellites will be alongside each other in two days. The Space Component Commander directs the satellite operator to prepare evasive manoeuvring options, and disperse its services on to other commercial capabilities on contract nearby. At the same time, a bodyguard satellite hired from another commercial provider, a member of the Commercial Space Reserve, is directed to move in between the UK High Value Asset (HVA) and the approaching threat; the bodyguard moves at a high velocity by lowering its altitude from its patrol just above the Geostationary Equatorial Orbit (GEO) belt, and the bodyguard makes it to the defensive position in one day, beginning a forced motion circumnavigation of the UK HVA. A small velocity change by the aggressor is detected by the Earth-based telescopes. The potential threat arrives but has adjusted its drift and flies past the UK HVA and bodyguard, continuing on its path along the GEO belt.

This fictional scenario depicts a future where threats to UK spacecraft are presented and averted through good space domain awareness, deterrence through use of effectors and strong operational command and control. The conditions for this are set within the Defence Space Strategy but the UK currently lacks an operational model to realise it. This essay proposes a model to deliver Defensive Space Operations, appraising relevant space power strategy, threats and capabilities.

Space Power Theory

Academic discussion regarding the conduct of Defensive Space Operations, like Operations in any domain, must be grounded in theory. In Space Power Theory, there are four core schools.¹ These are *sanctuary*, focused on maintaining the stability of the space domain; *survivability*, similarly stability-focussed but with an added goal to enhance terrestrial force activities; *control*, essentially describing the function of fighting in space; and *high ground*, prioritising fighting in space to the point of winning decisive victory. Subsequent theorists tend to align to one of these schools of thought and their insight allows the domain to be contextualised.

This essay posits that all space warfare to date is asymmetric in nature.² The term irregular warfare is synonymous with asymmetric conflict, gunboat diplomacy, grey-zone conflict or a range of other in favour descriptors for what is essentially activity below the threshold of conventional warfare. In accordance with wider strategic theory regarding this type of warfare, irregular space warfare involves more than just military action, linking to the multi-

domain and strategic nature of space power. Space by its nature is dispersed and this dispersal, both physically and through dual-use of many space objects for both military and civil output, corroborates that it is unconventional by definition.³ However, it is important to acknowledge that irregular space activity might be conducted in support of conventional terrestrial activity.

Space power is inextricably linked to the commercial and civil sectors.⁴ This makes civil (scientific, civilian) and commercial (for profit) space strategies essential to the military practitioner. The private sector will shape the norms for the Space Domain more than any government element.⁵ National strategies might hope to provide oversight and policy for the private sector to align to, for example in shaping evolution of the domain from a mutually cooperative, explorative arena to one driven by Free Market Sovereignty.⁶ Private sector dominance has a further impact militarily, with commercial capabilities often contracted by governments for Defence activity, as the Space Domain matures from an enabler to a warfighting domain those capabilities and companies potentially become non-State actors, participants in hostilities or even privateers.⁷

Both Defence and Civil strategy in space will be linked to wider National Strategy.⁸ The space segment is firmly connected to Earth, linking to the analogy with gunboat diplomacy and implying the space domain is a littoral, defined by altitude rather than depth.⁹ The infrastructural link to Earth for operations including launch, control and payload services, all support the assertion that the Space domain is simply an extension of the Joint warfighting domains found terrestrially. Space warfighting will only take place in order to further a strategy already captured in terrestrial national grand strategy or defence strategies, not for Space's sake on its own.¹⁰ The centre of gravity will not be found in the Space Domain, though a critical vulnerability to deliver decisive victory against a terrestrial centre of gravity might be, demonstrating the theoretical need for Defensive Space Operations.

Key terrain in space exists as Celestial Lines of Communication (CLOCs).¹¹ Analogous to their terrestrial namesakes, CLOCs describe terrestrial, link or orbital segment areas that are critical to command of space. For example, Cape Canaveral, at 28.5° latitude, allows access to an orbital inclination of that or greater; denying the orbital inclination of 28.5° would have significant implications to the US' launch access. Similarly, 0° is the critical inclination to enable relative stationary flight at GEO; a debris event or persistent threat here would impact the advantage of persistence gained from this orbital regime by forcing spacecraft to incline. Tracking, Telemetry and Control frequencies might also be considered a CLoC in the link segment, interference with which could degrade the ability to control spacecraft and put safety of flight, or response options, at risk.

Subscribing to a *High Ground* perspective would push for national hegemonic control and space superiority. However, this is unrealistic. The domain's link to Earth means that it will always be contested, even by those competitors who are not space-faring themselves, for

example through terrestrial means.¹² The space-littoral argument is critical to understanding the extent to which control of space is possible; physics and capability will generally prevent absolute control being exerted from one position in an enduring capacity, though considering the littoral does bound the orbital area of responsibility. Control of Space, if not absolute, can then be considered as either persistent or temporary, and general or local.¹³ The asymmetric nature of space operations lends itself to being considered both temporary and locally bounded.

Appraising Space Threats

Following the assertion that military activity in space is generally irregular in nature, we can then extrapolate that a main threat in the space domain is from Great Power Competition. It may be argued that there is now a new, multi-polar Space Race for assured access to the domain for national interests.¹⁴ Accepting that activity in the space domain is not isolated, and an extension of states' terrestrial strategy, the competing powers and their broad intents are relatively easy to analyse and draw out. China and Russia are the key competitors for the West terrestrially and are so by extension in space. However, there is a further, more unique, element to consider at play in space: the commercial sector.

Russia

Russia's military space capabilities mirror their strategic terrestrial forces, adopting a deterrent posture¹⁵. Russia uses its military, civil and asymmetric space capabilities as a deterrent towards western or NATO aggression, being able to threaten offensive action against perceived western space supremacy. Russia's space strategy is largely asymmetric out of necessity, unable to compete with the US' (and by propagation NATO's) space capabilities directly.¹⁶ Russia instead chooses to field exquisite deterrent capabilities such as, potentially, on-orbit nuclear threats, electronic warfare jammers or ground based counter-space capabilities such as optical dazzlers.¹⁷ These capabilities are designed to prevent Russia's adversaries using space capabilities against them, or at least threaten a potentially costly and escalatory response to challenge space supremacy. For example, a nuclear detonation in low-earth orbit will impact all capabilities in that regime not hardened against it within weeks, impacting on a range of critical services including Intelligence, Surveillance and Reconnaissance (ISR) and communications.¹⁸ This is analogous to Russia's terrestrial strategy; since its invasion of Ukraine has cited NATO/western aggression and expansionism as a driving factor for its own military activities to defend its sovereignty.¹⁹ The invasion itself started with asymmetric action and rhetoric throughout the campaign has highlighted potentially escalatory deterrent capabilities as a threat to dissuade western intervention. Russia's terrestrial strategy may be interpreted as escalatory deterrent actions that threaten its perceived sovereignty, including beyond international normative standards, and doing so by employing offensive measures alongside a strategic narrative. Extrapolating to the space domain, understanding Russia's national interest and therefore with what it might choose to actively deter western interference is critical to understanding its military space behaviours.

China

Contrasting with Russia's deterrent approach to space strategy, China has said that space is the 'commanding height in international competition' and taken a development approach to match.²⁰ As well as its own Global Navigation Satellite System (GNSS) it also has a range of terrestrial and on-orbit intelligence and counter-space capabilities. Still demonstrating an alignment between grand strategy and strategy in the space domain, these developments align with China's broader military reform efforts to be prepared to fight a modern, information-dominant war; indeed its space capabilities are critical to an information-dominant warfare model similar to that of the West. However, China's development is less about asymmetry and more akin to direct capability competition. In orbit, China has a variety of space vehicles that have demonstrably proven the ability to threaten other spacecraft. China has been able to conduct Rendezvous and Proximity Operations (RPO) for decades, specifically seen through development of civil capabilities, though also implicitly to the benefit of its military programmes too. In 2021, SJ-21, an experimental satellite, demonstrated the ability to conduct an RPO against another object in geosynchronous orbit and then grab it, moving it into a higher-altitude 'graveyard' orbit.²¹ Another capability, SY-12, an 'inspector' capability, is a pair of satellites that demonstrate tactics such as seeking sunlit views of other objects on orbit. Finally, TJS-3 is a communications satellite that has reportedly conducted activity designed to elude inspection.²² Each of these examples demonstrate a significant amount of development in space capability with potential military effects. Furthermore, China is reported to be developing novel techniques for satellite operation to overcome its own competitors' tracking capabilities. For example, considering how to fly spacecraft with a reduced radar-cross-section through attitude control relative to known space surveillance sites demonstrates an intent to be able to obfuscate its satellite's positions as well as an implied awareness of western space surveillance capabilities; in the Air domain gaining this understanding is Intelligence Preparation of the Environment and exploiting it, Deception.²³

Commercial

The private sector has a unique strategic impact in the space domain compared to terrestrially, leading to national strategies seeking to influence and integrate the commercial sector. The UK National Space Operations Centre described four potential scenarios that demonstrate a scalar of commercial vs civil primacy in the development of the space sector.²⁴ The first is the *cosmic bazaar*, similar to Dolman's free market championing competition and innovation. The second is the *corporate cosmos*, with more integration between private and public sector. Third, touted as *nebular nations*, describes national primacy in development of the space domain more akin with Klein's proposal that terrestrial relations will reflect in space too. Finally, is the potential for a *global space directorate*, inspired by Moltz' proposal for enhanced international relations. Currently, major national strategies suggest that civil and military agencies are aiming for a collaborative approach to leverage private sector capabilities in support of their aims; the US Space Force and UK Space Command are both seeking commercial integration into operations.^{25,26}

However, the commercial sector is not only full of benign allies waiting to support national and defence strategic ends; their dominance of the sector means that they must be considered actors in competition. The private sector has been a competitor strategically throughout history, impacting on national power; for example the East India Company's role in the British Empire's hegemony of the sea and global trade, famously gave it influence beyond what might be expected of a commercial entity.²⁷ Demonstrating how private sector actors in space might affect Defence outcomes, during the Russian war in Ukraine, Starlink has been integral to enabling Ukrainian communications. However, changes to its availability to potentially limit its operational use have been a constraining factor in Ukraine's ability to conduct counter-attacks against Russian-held territory.²⁸ Competing motivations of a private sector actor, either national allegiance, political alignment or potential profitability, might all motivate a private entity to conduct an action that results in an effect normally only achievable by a government entity. It is therefore not surprising that national strategy seeks partnership and normalised behaviours between the private sector and national goals. That said, commercial competition in space power is nascent, with only a few large corporations beginning to demonstrate the ability to use levers of power akin to the established national space powers.²⁹ It is therefore possible that space superiority will still be able to be established by national space powers, though perhaps true supremacy will be challenged by quasi-state commercial entities.

Analysing UK Space Strategies

The UK has National and Defence strategies articulating the requirement to conduct space operations, but policy and doctrine do not offer feasible mechanisms to actually defend the UK's space assets. The Defence Space Strategy intends to provide overarching direction to operationalise Defence Space activity until 2030.³⁰ Across three Strategic Themes, it aims to support the National Space Strategy.³¹ The Strategy is short, summarising the strategic themes of 'Protect and Defend', 'enhance military operations' and 'upskill and cohere'. This article's focus on Strategic Theme 1 distils the course from strategy to operational means to protect and defend the UK's space interests.

The Defence Space Strategy does not explicitly identify Defence activity for Space, instead focusing on the need to protect and defend the economic advantages and scientific opportunities in the space sector. This highlights the cross-government strategic nature of the space domain and of the Defence and National Space Strategies, but ill-prepares the operational commander charged with protecting and defending space with the guidance to do so. However, it is not isolated in its lack of direction; the National Audit Office identified that the UK's National Space Strategy also lacked an implementation plan, direction or prioritisation of mission for the civil space industry.³² This is important; the Defence strategy is explicitly designed to support the National strategy, delivering strategic direction and operational art without adequate grand strategy risks failure.

The Defence Space Strategy cites the need to develop 'Space capabilities for effective operational outcomes...'; to 'identify and attribute threat systems' and 'to respond to hostile

activities in a proportionate and coordinated manner'.³³ This states the requirement to field space control capabilities, to provide Space Domain Awareness and to be able to exercise operational command and control of those capabilities in the space domain. Even at the strategic level, there is a focus on capabilities. In the technology-dominant space domain this is unsurprising but misses the opportunity to set conditions for properly framing the operational level of warfare, which must bridge from strategy to tactics.

Joint Doctrine Publication 0-40 is the UK's Space Power Doctrine.³⁴ This document does little to add additional context to the operational concepts with which a commander might conduct space operations, focussing instead on the integration of space outputs with Joint staffs. The roles of space power are, similarly to the Defence Space Strategy, particularly capabilities-focussed. There is discussion around developing the ability to identify adversary activity in space, in particular related to Rendezvous and Proximity Operations, and discussion regarding the space domain's role in multi-domain (including space itself) deterrence. Whilst this articulates some of the roles that a space operation might be used to support, it does not assist a commander cohere those roles into operational-level design, especially for the protection or defence of space interests.

The operational level of war must translate strategic guidance to a concept of operations that then enables a tactical action.³⁵ Operational art, therefore, is the identified missing element for the UK's space operations. Military doctrine offers the use of the ends, ways and means conceptual framework to identify the strategic ends needed and deduce the ways and means necessary to deliver them, essentially to conduct operational level thinking.³⁶ Directly analysing the Defence Space Strategy against this conceptual framework provides this article's handrail for operationalising the strategy.

Accepting the strategic ends are articulated in the Defence Space Strategy (DSS), linking to wider government strategy and national power, the strategic ways are therefore the strategic themes within the strategy; in the case of this thesis 'Protect and Defend'. The strategic level means are also available in the DSS, though they are initially ambiguous they can be translated to the operational ways with further analysis and contextualisation. In particular, *the ability to identify and attribute threat systems* points to a need for Space Domain Awareness; the need for *space capabilities for effective operational outcomes* might reference either sensors to support Space Domain Awareness or capabilities with which to conduct Space Control or operational Command and Control, *whilst the ability to respond to hostile activities in a proportionate and coordinated manner* also identifies the need to identify a hostile activity, coordinate a response and then conduct that responding action (ie Space Domain Awareness, operational Command and Control and then a Space Control activity).

There is a point of ambiguity when linking this analysis to space power theory. Whilst the ends of the Defence Space Strategy appear to point towards a survivability school of thought,

the requirement to be able to have Space Domain Awareness and the ability to respond to threats in a coordinated manner also demonstrate a theoretical intent towards control. Some honesty should be applied at this point; whilst the UK may be in a position to support a hegemonic alliance based on control, it is most likely that a sovereign strategy is intended to ensure survivability of space access rather than unilateral supremacy.

Defining and Bounding the Strategic Ways;

Strategic Theme 1: Protect and Defend

Protect and Defend (P&D) is not explicitly defined, but space power literature and doctrine frequently cite it as a key mission aim. Defining the terms is critical to be able to follow the golden thread from strategic intent to operationally useful concept. Starting simply with a dictionary definition, 'protect' is the use of something (proactively) to bar an attack or injury.³⁷ This implies a proactive, preventative but overall passive action. 'Defend' is then described as essentially synonymous with 'protect', but different in that it wards off an actual or threatened attack; in context this might mean responding to a perceived hostile intent or act and therefore being reactive, vice proactive.

The British Army Planning and Execution Handbook defines the mission verb 'protect' as 'prevent the enemy, environment or disease from having effect on an individual or groups'.³⁸ Whilst Land-specific, this definition highlights the preventative element of protect. Defend is not defined as a mission verb in the same source, but potentially synonymous descriptors include 'block' (to deny access to a given area); 'deter' (discourage a ... certain action) or 'guard' (protect the main body of a force through application of combat power whilst also observing and reporting). Each of these, but particularly deter and guard, align with the responsive nature of the term previously identified.

US Space Force doctrine also does not offer a specific definition of Protect or Defend.³⁹ However, it does discuss activities that are considered Protection measures that are indicative of meaning. Protection measures include Electromagnetic Support Operations, Movement and Maneuver (sic), Hardening and Cybersecurity. It is noteworthy that each of these actions present tactics to deny or bar adversary action, further supporting the trend that protection is a proactive, passively conducted action to deny the ability for an adversary to inflict harm. This publication also goes on to describe Defensive (Space) Operations as actions that 'preserve space combat power ... and neutralize or reduce the effectiveness of adversary actions'. It then goes further to describe reasonable or proportionate response to hostile act or demonstrated intent across any domain; notably similar to the point on response in the UK's Defence Space Strategy under Strategic Theme 1. Worth acknowledgement, Defensive Space Operations in US doctrine also defend against non-intentional threats including natural hazards, RF interference and space weather effects. Finally, the doctrine states Defensive Space Operations 'limit opportunities for an adversary to hide or mask actions', making an important point towards being able to attribute activity.

This article therefore will consider that, to protect is a proactive action, to minimise the risk or effect by hazard or threat to UK space interests. Defend is a reactive, military-led action to prevent or mitigate a hostile act being carried out, including pre-emptive defensive action.

Each segment in the space domain is host to an element of a UK space interest that might need protecting or defending through a Defensive Space Operation. Analysis of the strategic ends identify a range of capabilities that are required to be defended; those that support the Integrated Review goals or National Space Strategy, those that support the UK's space economy, support the scientific space sector and those that enhance military operations. This article will bound its conceptual discussion to only consider those elements that enhance military operations, though acknowledges that the concepts for defending military output are likely to be supportive of defending civil output too. The ability to defend a communications satellite, for example, will very likely be appropriate for a military satellite as for one used for civil purposes. Furthermore, the dual-use nature of a wide range of critical space capabilities makes those relevant for Defence also relevant to the civil and national sector.

In the space segment, physical satellites are the primary object that need to be protected and defended. There are three main missions of satellites in support of military operations; Global Navigation Satellite Systems (GNSS), Satellite Communications (SATCOM) and ISR. GNSS refers to systems such as Global Positioning System, these US-owned and operated satellites are in medium-Earth orbit in a highly volatile part of space. Owing to the environment, medium-Earth orbit has few satellites resident in it; threats to defend against are currently minimal and the primary concern is protection from the environment. This protective activity is a challenge for satellite designers and operators. SATCOM satellites are usually either in low-Earth Orbit or in Geosynchronous-Earth Orbit. SKYNET, the UK's own national satellite communications capability, is in the latter. This orbital regime is less dynamic than low-Earth orbit, but more costly to reach and therefore less congested, except at some longitudes that lend themselves to good communication beam coverage. However, it is also host to some of the potential threat vectors previously described. Therefore, there is a requirement to understand this orbital regime and be able to effect within it in support of these HVAs. ISR satellites are again found in multiple orbital regimes, though there are specific sun-synchronous low-Earth orbits that can be considered key terrain, or a CLoC, for these satellites to operate in; this CLoC is an example of another element that might need to be defended other than solely the satellite. Importantly for both communications and ISR, commercial satellite services exist across the domain and provide services to the public sector. A key challenge for the protect and defend debate is whether there is a mandate to defend dual-use or civilian capabilities in either orbital regime.

In the link segment, the key element to protect or defend for any space object is the Tracking, Telemetry and Control (TT&C) signal used to control satellites. Compromise of this signal would prevent control of the space capability or risk control being gained by an adversary through an

electronic attack.⁴⁰ Further, the payload frequencies of either GNSS, Satellite Communications or ISR are all critical to defend to maintain services provided. Attacks against GNSS signals may cause disruption to national or military capabilities reliant on those signals, ranging from financial institutions to weapons guidance.⁴¹

Defence of ground segment entities is also vital. Such locations include satellite control sites for UK HVAs in the space segment, which almost certainly offer a more accessible route to the space object than an on-orbit approach, illustrated by the attack on a Russian space operations site in Crimea.⁴² Control sites also tend to host the downlink receivers for critical link segment data, offering a further attack vector that must be protected. However, whilst the ground segment does have elements critical to space operations, this segment is most likely to be defended by terrestrial Joint Forces. Therefore, when considering the operationalisation of the Defence Space Strategy, drawn out functions will primarily focus on defending the space and link segments vice the ground segment.

Analysing the Strategic Ends, Ways and Means

Returning to the conceptual framework of ends, ways and means after considering the strategic landscape and the definition of protect and defend, it is possible to dissect the Defence Space Strategy to provide a start point for operational conceptualisation. Identifying the ends as the militarily strategic aims, the ways as Protect and Defend (umbrellaed under Defensive Space Operations), and then the means specifically to strategic functions identified through space power strategy.

In this analysis, the ends have been further classified to military strategic aims; enabling the Defence contribution to levers of national power; enabling information advantage (principally through communications) and enabling the critical [defence] capabilities identified in the previous section of GNSS, military SATCOM and ISR from space. These distinct strategic ends identify the critical capabilities the space domain offers the warfighter and align with earlier identified strategic space power theory that space is the supporting domain for a multi-domain, but terrestrially-centric conflict. This is critical to prevent operationalisation of the Defence Space Strategy becoming a space fight for space's sake. The means have been further analysed and mapped to the three identified functions: Space Domain Awareness, Space Control (Orbital Warfare) and Operational C2. These are the key operational functions that will endure through this article to further discuss Defensive Space Operations.

This analysis of strategic ends, ways and means is still an insufficient level of analysis to actually operationalise the Protect and Defend theme. It doesn't provide the practitioner a bridge from strategic ends to tactical means that can deliver operational outcomes, but only strategic ends to the operational level functions themselves. By moving the three functions to be considered ways, further analysis is possible to identify the means needed to operationalise Defensive Space Operations.

Means	Ways	Ends
Space Domain Awareness Space Control Operational C2	Defensive Space Operations - Protect - Defend	Enable the levers of national power (Diplomacy, Information, Military, Economic) Enable Information Advantage (communication) Enable Critical Capabilities - GNSS - Military SATCOM - ISR

Table 1. Identifying the Strategic Ends, Ways and Means for the Defence Space Strategy

Operationalising Defensive Space Operations

The strategic *means* discussed in the previous section can neatly become *ways* at the operational level. These *ways*, or functions, can then be analysed further to identify the actual operational *means* to deliver Defensive Space Operations.

Space Situational Awareness (SSA)

The first operational function is Space Domain Awareness (SDA). SDA is the start point for operations and critical for any further activity. Through earlier analysis of adversaries’ approach to competing strategically, it’s clear that sovereignty is a key motivator for their own space strategies, as it is for their terrestrial strategies. SDA offers the *way* to understand where competitors are conducting activity and how they might behave. Noting though that we have already identified that activity in space is generally considered irregular or in the grey-zone, a methodology is needed to improve understanding. One methodology that offers understanding and attribution of space activity is the Space Attribution Framework.⁴³ Figure 1 demonstrates the Space Attribution Framework and its component parts, that will be further examined as means to deliver SDA.

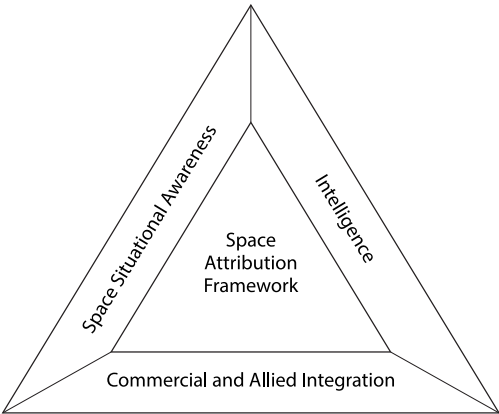


Figure 1. Klein’s Space Attribution Framework⁴⁴

SSA describes the activity of identifying, locating, tracking and characterising the function of objects of interest in space; usually friendly or potentially adversary satellites.⁴⁵ SSA is dependent on sensors to fulfil the search, track and characterise elements, of which a range of sensors are available for space operations, each offering a different operational advantage. A space surveillance network should include a series of sensors of multiple phenomenologies. For example, it might include ground based optical telescopes, which can refine an azimuth from the sensor position to the object with good accuracy, and radar, which is more suited to ranging objects from the sensor.⁴⁶ Used together, multiple sensor types will refine positional data of objects more effectively than on their own. Characterisation, which for the sake of clarity across terms really means identification (to varying degrees) is a further challenge; for example, a simple problem is that terrestrial sensors generally struggle to provide imagery with sufficient fidelity at the necessary ranges (42,000 km to geostationary-Earth orbit). Space-based SSA sensors provide an opportunity here and could allow potential threats to be identified from Earth and then further investigated, with greater fidelity and accuracy, in a layered approach to SSA.⁴⁷ SSA also enables the protective response to non-deliberate hazards such as space debris or natural phenomena of the space environment (eg solar weather).

Intelligence is the second component of the framework's triad. Intelligence is critical for SDA as it provides the hypotheses which must be corroborated through evidence obtained by SSA.⁴⁸ Furthermore, intelligence allows the appropriate tasking of SSA sensors and understanding of potential threats across the Space Domain.

Commercial and Allied integration complete the Space Attribution Framework. These are essential for UK Defensive Space Operations owing to the UK's lack of mass and primacy of larger alliances of which the UK is a part, or of the private sector. The possibility of misunderstanding or miscalculation in space is significant and the potential impact on operations a commercial element may have, owing to their priorities and dual-use nature of their capabilities, is significant. Commercial and Allied integration, whilst a component of SDA, is therefore also a key element for effective operational command and control (C2).

Command and Control

Operational C2 will for DSO should be considered in multiple forms; command relationships and operational identification for decision making. Command relationships are a critical challenge for implementation of decisive defensive action. Not all the UK's space assets, sensors or HVAs, are currently under the command of UK Space Command or indeed any single operational component.⁴⁹ SKYNET, the primary military HVA, is operated by Defence Digital, an element of UK Strategic Command. However, UK Space Command, which is responsible for delivering Protect and Defend as a mission, is part of Air Command. This essentially means that the operation of the spacecraft belongs to one headquarters, whilst responsibility for its defence belong to another. Analogous with the Air Domain, where Air and Missile Defence is the remit of an Air Component Commander, defence of Space must fall to a single Space Component Commander to deliver, which will place appropriate

command and control of joint assets on an operational commander for the domain. To achieve this, it is essential to consider military space assets as deployed forces. Considering space assets as deployed forces means acknowledging that they, as remote platforms, are actively participating in military operations; this will trigger certain legal and policy constraints, but also freedoms. It also ensures that the assets and the Command which operates them are treated as fielded forces, with appropriate operational command, operational control and tactical control delegations allocated.

A further element of operational C2 to consider is the function of combat identification.⁵⁰ This links the SDA and C2 functions, and then provides the connective tissue from SDA to Space Control. Combat Identification for space is immature; whilst sensors support characterisation during SDA, the observed object's characteristics and the operator's confidence in that information is what supports declaring an object as a Suspect, Hostile or, importantly, neither. The identification of an object as Hostile is the necessary step to move from observing a resident space object to potentially conducting an effect against it, therefore combat identification is a key element to delivering effective Defensive Space Operations. As indicated, key information derived from SDA such as location, identification, movement, behaviour and intelligence will all support combat identification, providing the essential C2 wrapper around any defensive effect.

C2 is also an appropriate point to consider the commercial sector and its integration. Commercial SDA, satellite operators and service providers all play, and will continue to play, a significant role in shaping the Space Domain. In the opening vignette, a commercial bodyguard was used to deter aggression. Later, we will discuss using commercial elements for dispersal of services, mitigating threats to sovereign satellites. Integration of the commercial sector is the best method to establish norms that are appropriate for the UK. The US Commercial Space Reserve concept goes some way to set conditions for a UK version; exchanging preferential contract terms, threat intelligence and cross-training in exchange for readiness and services in conditions of crisis would provide a unique route to temporary mass and possible tactical advantage.⁵¹

Space Control

Upon gaining both understanding of the situation and having the command relationships to take decisive action, it remains that there must be the ability to conduct effects in the Space Domain in order to Defend. Space Control describes any action that has an effect in the space domain. There are three avenues that should be explored to deliver space control operations; satellite operations, Combat Space Patrols and Ground-Based Space Defence.

The UK currently contracts the operation of its military satellites to the private sector, a change brought in when a Public-Private Partnership initiative was used to bring in the current SKYNET 5 military satellite communications capability.⁵² This creates a challenge during a defensive operation, as it potentially places the requirement for fundamentally military activity on a

civilian rather than combatant. It also erodes the perception of a space HVA as a deployed force element, and instead underlines it as a service-provider. If the UK choses to develop on-orbit effectors, having these operated by civilian contractors could raise potential legal issues regarding contractors engaged in a military role, reminiscent of challenges regarding contractor-operated remotely piloted air systems in recent conflicts.⁵³ To overcome these challenges, there must be military-trained satellite operators able to conduct military space operations, or sufficient policy in place to overcome the challenges of recent history in the air domain.

Developing the skills needed to conduct satellite operations sets conditions for the development of on-orbit space control, or defensive Combat Space Patrols. Other nations have documented intent to develop future forces with a range of weapons including on-orbit counterspace capabilities. Potential adversaries have already fielded capabilities that may fulfil a counterspace function and commercial entities are offering bodyguard satellites-as-a-service. Defensive patrolling is not a new tactic; defensive combat air patrols and escorts are common in the air domain and, noting space power strategic theory shows space strategy is an extrapolation of terrestrial strategy, then Combat Space Patrols might be a reasonable means to deliver defensive space operations. To add further weight, there is the possibility that a Combat Space Patrol satellite might also be able to fulfil the role of on-orbit space situational awareness, providing efficiencies in function. Combat Space Patrols must have the ability to conduct an effect; kinetic or non-kinetic options are both viable. Debris-clearing capabilities including grappling claws or nets are equally able to contest an adversary satellite as they would be at dealing with debris, whilst a less-permanent orbital electronic warfare capability might offer a more nuanced approach to threat mitigation.⁵⁴

Ground, or, more accurately terrestrially, based Space Defence capabilities must be considered as a means to deliver defensive space effects. Analogous with kinetic and non-kinetic weapons to defend the Air domain, Ground-based Space Defence would provide a means to effect adversary space capabilities without needing to be on orbit; potentially negating the risk of a mission kill or exhausting finite resources of an orbital capability. The US, Russia and China have all trialled kinetic anti-satellite weapons which, whilst delivering effective and permanent anti-satellite options, are contentious due to the risk of debris generation.⁵⁵ Non-kinetic options provide a potentially more morally and politically acceptable option owing to the lack of permanent damage to the target or its environment.

In contrast to the active defence effectors discussed so far, deterring any attack should be considered as a space control capability in its own right. Adversary action in space could be deterred by denial of the opportunity for action to take place at all.⁵⁶ Denying the opportunity for attack is the least provocative of defensive measures, and takes advantage of dispersing a small force size across a large operating area. Dispersing across multiple capabilities, essentially overwhelming an adversary's own space control capabilities, would also render many offensive

options futile. Dispersal and denial are valid tactics that should be developed but alone do not fulfil the strategic goal that the UK be able to take proportionate action itself. A denial operation could be conducted in concert with a more active strategy; making use of both government-owned and contracted private sector capabilities to make the targeting of on-orbit dependencies difficult, whilst also defending actively to fully frustrate an attack without having to match the combat mass of larger actors in space.

An Operating Model for Defensive Space Operations

The chart below shows the movement of the operational functions from where they were previously listed as *means* of strategy to *ways* at the operational level, and then demonstrates the discussed tactical *means* distilled from each operational function.

Means	Ways	Ends
Sensors Space Situational Awareness Intelligence Commercial Integration Command Relationships (Military) Satellite Operations Combat Space Patrols Ground-based Space Defence	Defensive Space Operations (Protect and Defend) - Space Domain Awareness - Space Control - Operational C2	Enable the levers of national power (Diplomacy, Information, Military, Economic) Enable Information Advantage (communication) Enable Critical Capabilities - GNSS - Military SATCOM - ISR

Table 2. Tactical, Operational and Strategic Analysis of Defence Space Strategy Strategic Theme 1

The next step for an operational practitioner is to be able to use the operational functions identified. To be of value, the functions should be proven theoretically against an accepted operational model. Boyd’s OODA Loop offers a decision cycle that a contemporary commander will recognise in order to be able to successfully conduct an operation.⁵⁷ The OODA Loop is a particularly useful model to use owing to its origin in Air Power theory and the familiarity this offers when the majority of space operators in the UK are part of the RAF. The OODA Loop is a model used to describe how to operate inside an adversary’s decision cycle; this is a useful perspective when overcoming an aggressor so that their attack may be mitigated. Mapping the operational functions (*ways*) against the OODA Loop demonstrates its applicability throughout the decision cycle. In this abstraction, Space Domain Awareness fulfils the *observe* element, Operational C2 provides the *orient* and *decide* elements and space control is the *act*.

Other operational models are also viable; the dynamic targeting cycle of Find, Fix, Track, Target, Exploit and Assess also maps to the *ways*. Find, Fix, Track and Assess fulfil the SDA function, Target and Engage refers to Space Control and Operational C2 provides a seam through the whole process. The benefit of this analogy though is demonstrated in the arrow through the

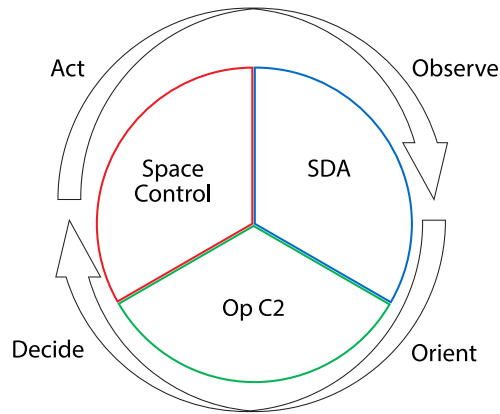


Figure 2. Application of the Defensive Space Operations Ways to the OODA Loop

centre of the diagram, showing that the left-hand side of the kill chain (Find, Fix and Track) can be consistently re-flowed through prior to any effect needing to take place.

Find	Fix	Track	Target	Engage	Assess
SDA			Space Control		SDA
Operational C2					

Table 3. Application of the Defensive Space Operations Ways to the F2T2EA Cycle

Conclusions

With interpretive analysis, Strategic Theme 1 of the Defence Space Strategy can provide the strategic direction necessary for Protect and Defend, but unilaterally lacks the guidance a strategy needs for unambiguous action. However, this article has demonstrated a way to operationalise that strategy into functions that can be used by an operational leader. There is a clear need to protect and defend critical enablers including GNSS, access to military SATCOM and the conduct of ISR operations from or through space. Key risks exist in each of the segments of the domain, the Space Component should focus on defending the orbital and link segments. The key operational functions for Defensive Space Operations are Space Domain Awareness, Space Control and Operational command and control. The need for appropriate and diverse sensing, the ability to conduct effects in the space domain and also disperse capabilities are all viable tactics that should be developed for the Space Component.

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¹⁰ Dolman, *Astropolitik, Classical Geopolitics in the Space Age*.

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¹³ Klein, *Fight for the Final Frontier: Irregular Warfare in Space*.

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CAS Keynote Speech

Keynote Speech by Air Chief Marshal Sir Harv Smyth, Chief of the Air Staff

Freeman Air and Space Institute Annual Lecture 2025

The following is the transcript of The Freeman Air and Space Institute's Annual Chief of the Air Staff Lecture, held at King's College London, Strand Campus, on the 25 November 2025. The event was introduced by Professor Linda McKie, Executive Dean, Faculty of Social Science and Public Policy, and hosted by Dr Sophy Antrobus and Dr David Jordan, the Co-Directors of the Freeman Air and Space Institute. The Chief of the Air Staff, Air Chief Marshal Sir Harv Smyth, after only 88 days into his tenure, here sets out his intent and priorities to a guest audience, including representatives from academia, industry and politics.

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Introduction

Ladies and Gentlemen, it is a true privilege to be here at King's College London tonight to deliver the annual Freeman Air and Space Institute Lecture.

Thank you to Dr Sophy Antrobus, the Co-Director here at FASI, for the very kind introduction, and for the invitation to be here today. Many of you will not know, that Sophy and I were actually on flying training together many moons ago, so it's an extra special treat to be here with her tonight.

It is also good to see so many familiar faces in the audience. We are a cohort bonded in a common cause. The talent I see in the room tonight is extremely impressive – heartening and daunting in equal measure; it is this team that will give our nation, and our allies, the ability to develop, deliver, and prosecute air and space power for both today and tomorrow, and provide the Royal Air Force with the competitive edge that is so critical to our continued success, particularly in a world which is currently characterised by unpredictability and volatility – what our PM has referred to as *an era of radical uncertainty*.



Dr David Jordan, Dr Sophy Antrobus, Air Chief Marshal Sir Harv Smyth and Prof Linda McKie

Reflecting on the first 88 days of my CAS (Chief of the Air Staff) tenure, I have been speaking a lot about my main effort - to put more AIR into the Air Force – to make the RAF more agile, more integrated, and more ready

....and our defence partners, especially in academia and industry, most definitely contribute to this quest, to enable us to fly, fight, and win, today, tomorrow and together - making the United Kingdom safe and secure, maintaining our values and our way of life, bolstering the protection and assurance of our allies, and keeping our potential adversaries deterred.

Developing and delivering Air and Space Power is a collective endeavour – this is not a new concept; indeed, it has been true since the dawn of air powered flight. We in the RAF are fundamentally reliant upon those that support us, and our defence partners – all of you here tonight – should be immensely proud of that enduring contribution – it is superb.

Simply put, our Air Force cannot be effective as our nation's global first responder, if we do not have **your** support. So thank you again for the invite to speak here tonight, and for your ongoing support and friendship.

Freeman

Despite the RAF being an accomplished and battle-proven fighting service - contrary to popular belief, our success is not always because we have the world's most brilliant pilots.

We equally pride ourselves on being a technically focussed service – we rely as much on those who develop and deliver game-changing capabilities, as those who fly and fight with them.

Our history is littered with stellar individuals who enabled the front-line forces, but often at times, despite their critical contribution, frustratingly go unnoticed - certainly when compared to the tales of derring-do associated with characters such as Douglas Bader, Sailor Malan, or Guy Gibson.

Even those further up the chain who directed the victorious battles and campaigns of our past, remain household names.

Meanwhile, those that stayed in the shadow of the backrooms often miss the limelight; and sadly, many are forgotten by history. However, we should be in no doubt that without their considerable efforts, victory would have eluded us.

An example of one such unsung hero, is the namesake of this Institute – Air Chief Marshal Sir Wilfrid Freeman – an absolutely critical cog in developing and delivering battle, campaign, and war-winning air power, both before, and during, the Second World War.

In 1936, as he took up his role as Air Member for Research and Development, he said, 'I am painting a background on which to paint the future'. With the threat of war growing on the continent, time was his enemy, and he struggled in finding sufficient time to allow his paint to dry! These words are equally apposite today.



Air Chief Marshal Sir Wilfrid Freeman

While others pushed for rapid provision of quantity from existing and less capable platforms, Freeman took a more holistic approach; his primary consideration was always the operational effectiveness of the Service, especially when compared to the anticipated threat.

For Freeman, quality and outcomes mattered more than just the output of sheer numbers. He had to manage the tricky balance of picking the future winners, tolerating what was available until the new technologies entered service, and, importantly, terminating the bad, mad and sad options at the most prudent opportunity – again, a lesson equally apt for our procurement specialists today.

Lord Tedder, when Chief of the Air Staff, said of Freeman - 'he was able to imbue the Ministry with a due sense of urgency, without panic'. Again, apposite words in the contemporary environment.

Freeman supported the near-term demand to defend UK skies, by signing the first Spitfire production contract that provided Dowding with the operational freedom to prosecute the Battle of Britain several years later. However, Freeman himself understood that:

'It was essential to resist a wholly defensive posture in war. It was simply not enough to avoid losing, it had to be won'.

So, with this in mind, and while the Battle of France and the Battle of Britain raged in the spring and summer of 1940, Freeman made three bold decisions that had a significant effect on the outcome of the rest of the war.

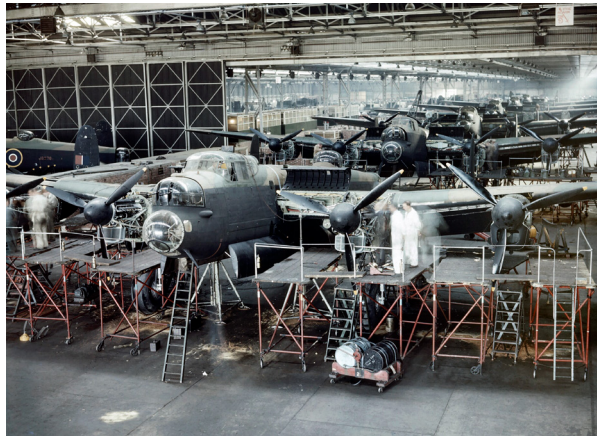
First, he ordered 320 new fighters from a small US firm. Second, the US company Packard were authorised to produce the Rolls-Royce Merlin engine. When these two decisions combined, it created a legend – the North American P-51 Mustang, so incredibly important in terms of the control of the air mission, and an aircraft that went from drawing board to first operational fighter in just 117 days.

And lastly, under Freeman's direction, the Avro Manchester, two-engined bomber, was to be re-engined with the Merlin, and ultimately add two further engines, to create the iconic, vitally important, battle winning Lancaster bomber.

Portal, who was Chief of the Air Staff for the last four years of the war, said of Freeman:

'...In his work, as in all he did, [he] was a tower of strength, brilliantly successful in foreseeing the needs of the Service. He showed real genius for distinguishing what was right, from what was merely clever – for finding the truth, and exposing the superficial and specious.

And he displayed steadfast courage in making and defending many crucial and difficult decisions'.



Lancaster Bomber Production

Freeman's efforts brought the necessary rewards. What Freeman did **really** mattered, and I would argue that such a level of commitment is needed once again today, more than at any other period in my career, not only for the United Kingdom, but for our allies and partners across the globe.

Let me explain why.

Strategic Context

As described earlier, much has changed in our world. When I joined the RAF in the early 90s, the Cold War had just been won, we basked in the decisive victory of Operation Desert Storm, and we gladly paid the resultant Peace Dividend.

The threat of state-on-state conflict subsided, and whilst we were now relatively secure in the homeland, unpredictable turmoil endured overseas, particularly in the Middle East. We fought

in wars of choice – from the Balkans, to

post 9/11 Afghanistan. Operating far from home, for two and a half decades, expeditionary, counterinsurgency, and counter-terrorism operations shaped our Armed Forces, especially in terms of experience, mindset, training, and force structure.



RAF Tornado GR1 – Operation Desert Storm

But those days have gone ...

As our Prime Minister states in the introduction to the new National Security Strategy, 'the world **has** changed' ...

and we are clearly witnessing the return of great power competition.

Our continent, and indeed our very way of life, is being probed and tested on a daily basis, sometimes conventionally, but more often than not, in the grey zone – in space, in cyber, in the information, or more accurately, the disinformation environment.

The pace of change and challenge is phenomenal, and it shows no signs of abating. And while some things remain constant, such as a belligerent and testing Russia, we must be in no doubt that the world has changed ... significantly so ... and we must change too, to meet the new challenges we face.

In his recent retirement speech, the former Chief of the Defence Staff, Admiral Sir Tony Radakin, said:

‘What we are seeing is an era shift from geo-economics to geo-politics. From counter insurgency, back to state-on-state. From wars of choice, to constant competition. The peace dividend is over. Finito. Ended.’

Against this backdrop, our lived experience of the last few years shows that when trouble arises, anywhere across the world, air power’s inherent attributes of speed, agility, and reach, mean that the RAF has secured a hard-won reputation of being UK’s. Providing leaders with rapid response, often at low risk, across the globe. It is a role we relish, and frankly, we excel at.

Our most recent operation is a case in point. Typhoons, supported by tanker aircraft, joined NATO allies to fly air defence missions over Poland as part of Operation Eastern Sentry – a NATO rapid response mission following Russia’s recent reckless, dangerous, and unprecedented violation of Polish and NATO airspace.



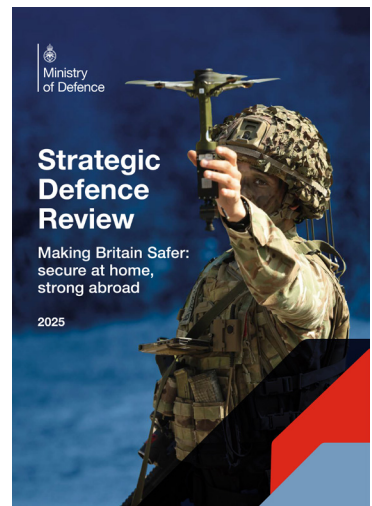
Operation Eastern Sentry

Just as our Polish allies helped protect our airspace from tyranny 85 years ago during the Battle of Britain, and throughout the Second World War, we are supporting them today – an overt demonstration of the strength and longevity of true partnerships, and a clear recognition that control of the air matters today, as much as it did in 1940.

Yet despite it being the ‘go to’ solution for our security challenges, air power’s enduring relevance sometimes hides in plain sight, unheralded, unrewarded, and unnoticed.

Many forget its value and take it for granted, but critically, not those who authored and endorsed the recent Strategic Defence Review (SDR).

By reviewing the lessons from the current Russia-Ukraine conflict, the SDR recognises what happens when neither side can gain control of the air – soon to be four years of grinding attritional stalemate, horribly reminiscent of trench warfare from 100 years ago, with well over a million



injured and killed – all happening a mere three and a half hour flight from where we sit today – a dreadful scenario, and one we must avoid at all costs.

Released in June this year, the Strategic Defence Review reflects the changing geo-political environment. It provides a clear direction of travel for the RAF, a good outcome for our Service, the nation, our allies, and our partners.

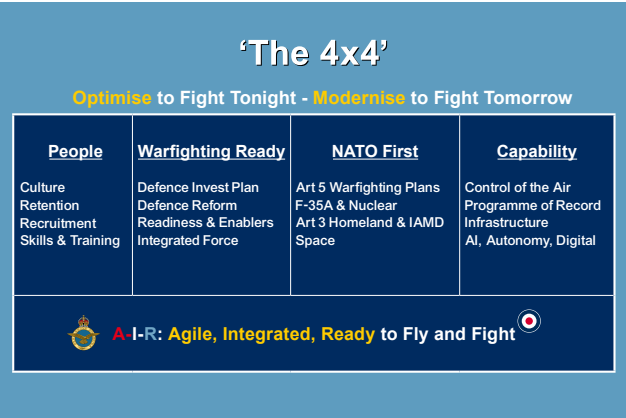
Just as Freeman did in the late 1930s, the SDR team wrestled with the age-old problem of balancing the need to optimise for the fight tonight, versus modernising for the fight tomorrow.

Same again in the 1950s, at the dawn of the first nuclear age, when then Chief of the Air Staff Sir ‘Jack’ Slessor, wrestled with similar problems:

‘Getting the balance right between being ready too soon with weapons that may be of little use when war comes and being ready too late in our attempt to achieve the perfect weapon’

and so, to reinforce the old adage that history repeats itself, I find myself starting my tenure as CAS faced with the same dilemma – balancing optimisation for the fight tonight, against the need to modernise, at pace, for the fight tomorrow. Given the clear direction laid out in the SDR, under this headline effort of optimise and modernise, there are four key pillars of activity I must focus on during my time in this role – to do what’s right for now, whilst setting the most solid foundation for my successors - I’m referring to this as the 4x4.

The 4x4 is built on four core pillars of effort – the first, and of upmost importance, is People – building and retaining the right workforce, with the right skills; the second, Warfighting Readiness, specifically by delivering the ambition laid out in the SDR, to include the new Integrated Force Model; third, shifting to a NATO First approach – a mindset and cultural change for the RAF, specifically in terms of a renewed High North focus; and fourth, modernising via our capability programmes, to include a deepened focus on gaining and maintaining control of the air – the RAF’s Unique Selling Point.



Within the 4x4, there are three notable areas that I would briefly highlight this evening – all of which present renewed focus and opportunity for the RAF: first, the reintroduction of an RAF nuclear capability; second, Integrated Air and Missile Defence; and third, our approach to Space.

Nuclear

On nuclear, of course the Royal Navy's Continuous at Sea Deterrent has provided the ultimate guarantee of our security since the late Sixties, and will continue to do so into the future with the ongoing Dreadnought programme.

But as Slessor himself deduced,

'There must be something between the hydrogen bomb, and the frontier policeman.'

And given the volatility of today's world, we need to recognise this space identified by Slessor, between CASD and our conventional capabilities.

Hence, the Government's recent announcement that the RAF will once again return to the sub-strategic nuclear game, by procuring F-35A (RAF Lightning) and joining NATO's Dual Capable Aircraft partnership, is much welcomed.

A nuclear-capable Lightning presents the UK with a mechanism to provide considerable support to our 'NATO First' approach, primarily because we're enhancing this rung of the escalation ladder.



F-35 (RAF Lightning)

Of course, there are some important steps ahead to deliver this capability, not least because it's been almost 30 years since the RAF had a nuclear role - but it's an exciting prospect to make the RAF a nuclear force again ... and I wholeheartedly embrace the opportunity.

Integrated Air and Missile Defence

The second area of note is Integrated Air and Missile Defence, or IAMD. Today, as it was in the skies above us in the summer of 1940, IAMD is critical to national security.

Control of the Air is our Air Force's core role, and importantly, it underpins our commitments to NATO's Article 3 and homeland defence.

Any IAMD solution will be multi-domain, and importantly, more than just ground-based air defence – ultimately, a multinational effort, especially in terms of integrating with NATO allies, with a layered capability, consisting of command and control, sense and warn, missile defence systems, defensive combat air and, often overlooked, a range of offensive capabilities, as critical components.



The announcement at the SDR of up to £1bn of new funding for homeland air and missile defence is most welcome and will allow us to begin the journey of delivering a modern and capable IAMD system. There is more to come, and much work to be done. As the nominated Lead Command for this work, we have just recently established a new 2* led Directorate, which will now get after this challenge at pace.

Space

And last, but by no means least, we must increase our focus on Space. As many of you know, I discovered my inner Space geek when acting as Defence's inaugural Director Space, and ever since, have been on a quest to raise awareness and support for this critical domain – a domain that matters more now than at any other time in our lives. Its relevance and importance have never been more evident, underpinning the foundation of 21st Century li

mind' approach, it has fast become vehemently contested, and incre



In the next decade, the global space economy is forecast to reach £1.8 trillion. Today, nearly 20 per cent of the UK's economy is underpinned by Space-based services, and the UK Space

sector alone generates about £17 billion in growth. It is clear that we are increasingly reliant on space ... and ever more so, across the span of Defence.

Against a backdrop where our opponents are investing heavily in space: and are outpacing us. The SDR recognises that we need to build a modern, agile, resilient space infrastructure ... one capable of meeting the threats, mitigating the risks, seizing the opportunities, and preparing for the challenges of today and tomorrow.

I am determined to lead a more ambitious approach to assuring access to space, and to protecting our equities within it, both on a sovereign basis, with NATO, and with other key allies.

We have an exciting opportunity to make a tangible and critical difference in the Space domain. It must happen this decade, and again, as Lead Command for Space, I will ensure the RAF champions this important endeavour.

While the trajectory of change I have described this evening portrays an ever more connected, integrated, multi-domain world ... one which we must respond to ... the magnitude and the rate of our response will be determined by several factors – the threat, our ambition, our collective ability to deliver in time, and our budget.

And as we take forward that work to deliver on the SDR, we know that to meet the pace required, and the scale of the requirement, we will need to work closer with Industry than ever before: where military and industry have a partnering relationship that goes much deeper than a customer-supplier contractual relationship – where we both recognise that we have key, interlocking, synergistic roles to play as part of the very fabric of the UK's approach to national security – just as we witnessed in terms of the industrial might that was harnessed to help win the Battle of Britain, and just as we are witnessing with our partners in Ukraine at this very difficult moment in their history.

All this is well understood and is at the heart of the recently launched and much-welcomed, Defence Industrial Strategy.

People Matter

However, none of this works without our People – *'People are our most important capability'* is not just a strap line – it is the vital foundation of all that we do – not just those in Regular Service, but across our whole force – the Full-Time Reserve Service, part-time Reserves, civil servants, academics,



contractors and the broader defence industrial team. They – you – are the ones that make the difference between defeat and victory – it's not only the front-line war-fighters that bring our advantage to bear, but also those that enable it, the Freemans of this world, that truly, properly, make the difference.

As a baseline to everything we do, we must continue to reinforce our foundations, by getting the basics right regards people. Hence, recruitment, retention, culture, and training remain core focus areas for our People effort, and are topics that flow through my In-box on a daily basis.

Our work in this area over the last two years has been exemplary – for the first time in a decade we are an Air Force in growth – and we are relentlessly on the hunt for talent.

In truth, we attract the best of what our nation offers, but after we have invested in it, and trained it to be the world's best, I know we must continue to fight to retain it.

Conclusion

And so, to conclude, the world has changed, and we find ourselves in an era of radical uncertainty.

We need a strong and resilient RAF to deter through strength, and to fly and fight when required. To continue to hold the baton of the UK's global first responder.

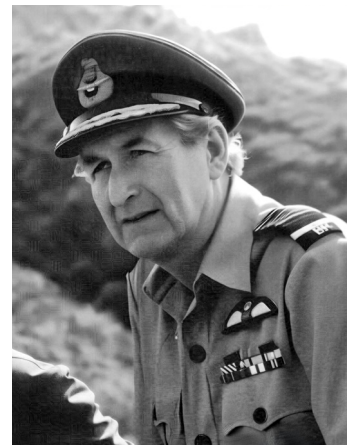
We must become more A-I-R – more Agile, more Integrated, more Ready.

We know that air and space power are based on a foundation of scientific and technological superiority, and that ...

We have a rich history of embracing cutting-edge technology to deliver innovation in the air, and latterly the space domains.

Wilfrid Freeman is an exemplar case study of this.

Contemporary military operations across the world have all acutely demonstrated that control of the air will remain the perennial requirement in all future military campaigns, just as it was when 'the Few', supported by 'the Many', defended the skies over southern England, some 85 years ago.

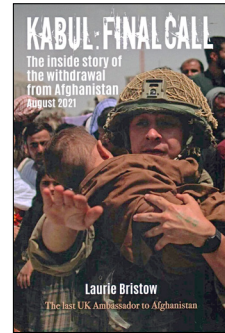


Marshal of the RAF
Sir Neil Cameron

And as I draw to a close, I am reminded of this gentleman ... Marshal of the RAF Sir Neil Cameron, a Chief of the Air Staff during the 1970s, and a fighter pilot, who as a younger man

Book Review

Kabul: Final Call; The inside story of the withdrawal from Afghanistan August 2021



Author: Sir Laurie Bristow

Publisher: Whittles Publishing (2024) ISBN: 978-1849955812, 256 pages

Reviewed by Flight Lieutenant James Langan

Introduction

The Kabul evacuation stands as a historical reference point to what would become, in the following short years, a turning point for the rules-based international order. The collapse of Afghanistan, an acute precipitating factor driving revisionist agendas in a multi-polar world, preceded the ongoing Russian invasion of Ukraine and the current Gaza/Israel crisis. Throughout August 2021, the US's rapprochement with the Taliban, the Doha Accords, reached its disastrous apotheosis with the feudal group's unforeseen restitution. After 20 years of NATO operations preventing the Taliban from gaining power, Bristow's book captures the tumultuous events of the UK's final chapter in Afghanistan: Operation Pitting, the harrowing evacuation mission initiated as a consequence of their return. What makes this book particularly compelling is the author's first-hand experience. Instead of offering theories from a distant, abstract perspective like many other analysts and practitioners, Bristow writes from the vantage point of his role as the UK's last Ambassador to Afghanistan. He was responsible for leading the evacuation on the ground before, during, and after the collapse of the Afghan Government.

Bristow's book is segmented into four parts. Parts One and Two consist of brief chapters that provide the context for most of the rest of the book. Parts Three and Four, the majority of the

work, delve into the lead up to Operation Pitting and the fall out of Kabul's rapid, unforeseen collapse. In Part One, Bristow, with the eye of a seasoned diplomat, concisely and cogently offers a critique of the Doha Accords, including the timebound nature of the US withdrawal, which served only to constrain the West's departure and provided no mechanism to enforce the agreed rapprochement between the Taliban and the Afghan state. Having eventually decided, after much deliberation, on the ambiguous US withdrawal to occur between 1 May – 11 September 2021 (the anniversary of 9/11), Part Two opens with President Biden's decision to proceed with the decision of his predecessor, President Trump, and end US involvement in Afghanistan. Like Part One, Part Two is concise, covering nine pages and providing an insight into the complexities of maintaining a diplomatic presence in Afghanistan, including the security and political considerations of ceasing or maintaining a British embassy presence altogether. Reading these chapters with the hindsight of Operation Pitting in mind, it is evident that as late as June 2021, Bristow's arrival in Kabul, the expectation of the Taliban returning to power was completely unforeseen. One discussed course of action was to construct a new embassy in the Green Zone, but this would take years to complete, and the cost would be huge. Additionally, the Joint Intelligence Committee (JIC) assessment was that Kabul was unlikely to fall in 2021.

The central focus of the book is found in chapters Three and Four, where the reader is presented with insights of Bristow's personal diary. It chronologically details the events of his departure for Kabul on 13th June and what was at the time his unanticipated return to RAF Brize Norton on 29th August. The book is much more than a recollection of quotidian events. It is a candid, reflective, discerning and most importantly, sincere narrative. Bristow provides forthright commentary not only on the Ghani Government, the Taliban and UK partners but on the political machinations and bureaucratic convolution within the British Government, Ministry of Defence and Foreign, Commonwealth and Development Office. At parts describing his political masters in the Foreign Office, Dominic Raab's Special Advisors, as displaying a pattern of micromanagement and controlling behaviour. Or scrutinising the UK Government's insouciant Afghan Relocation and Assistance Policy (ARAP), stressing the UK and other allies had had 20 years to come up with adequate plans to fulfil their obligations.

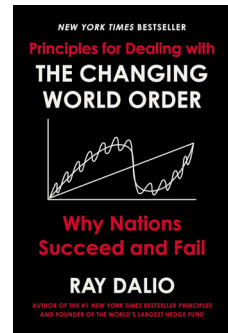
The book's strength is its portrayal of the challenges, moral dilemmas and the profound human toll civil servants and service personnel endured daily throughout Operation Pitting. The author delves into the intricate contest of reconciling UK immigration policy with the harsh reality on the ground. Afghan families, having survived the harrowing ordeal of queuing for days in extreme heat amongst desperate crowds where people were being crushed to death, were to have their fates determined by civil servants as young as 25 and young soldiers not long out of school. Agonising decisions over the elderly and infirm, unmarried daughters and unaccompanied children, often unable to speak English and with poor quality or inadequate documentation, faced the prospect of rejection and return to the unpredictable violence of the Taliban and the ferocious crowds. The pressure on these young civil servants and soldiers to establish the entitlement to evacuation was compounded by the disregard for

any safety measures at the height of COVID and the urgent weight of time. Deliberating any longer than seconds reduced the opportunity to process more people. As Bristow writes, for some, that could mean the difference between life and death.

Bristow's monograph is a gripping account of the UK's biggest humanitarian operation since the Berlin airlift. It can be read from many perspectives: as a testament to the resolve of the British military and the civil service, who, tasked with evacuating 1,500 people, saved over 15,000. A commentary on the human implications of failed UK foreign policy. Although he would be too humble to admit it, a case study of outstanding leadership during the crisis in what is the most pivotal moment of modern British military history. Bristow's first-person narrative may be written from the perspective of a diplomat, but for the Air Force reader, it is an account of the logistical agility of the Royal Air Force and the indispensability of air power. If one may be so bold as to paraphrase Britain's last Ambassador to Afghanistan, air power, like diplomacy, is not a spectator sport. It is about getting things done.

Book Review

Principles for Dealing with the Changing World Order: Why Nations Succeed and Fail



Author: Ray Dalio

Publisher: Avid Reader Press / Simon & Schuster (30 Nov 2021)

ISBN: 978-1982160272, 576 pages

Review by Air Vice-Marshal (Retd) Fin Monahan

Introduction

Ray Dalio has had a spectacularly successful career in the financial sector. He reputedly began trading shares at the age of 12 and, at the age of 26, founded Bridgewater Associates, a hedge fund company that Forbes Magazine assessed as the world's biggest hedge fund firm managing \$154 billion.¹ He wrote that in the course of his career, he needed to develop a deep understanding of the factors that made countries and their markets succeed and fail. This understanding allowed him to make informed decisions that have driven his investing strategies. In this book he has encapsulated his view of how the global system works. Dalio has examined centuries of data and historical cases and has written an interesting book that takes a novel and unconventional approach to explaining international relations informed by his expertise and experience in the world of finance. His deep engagement with history, politics, sociology, geology and conflict lends the book a breadth of perspective that makes this stand out as one well worth examination by members of the RAF Whole Force.

Part I, entitled *How the World Works*, sets out Dalio's stall. By looking back through history, his research has identified a fascinating series of 'Big Cycles' that have driven major changes in the global balance of power and he has drawn together patterns that are common to the rise

and decline of all empires and dynasties. Thus, he proposes a model in which there are three 'Big Cycles' that drive the world order: the debt/money/capital markets and economic cycle, the cycle of (a nation's) internal order and disorder and the cycle of (international) external order and disorder. Alongside these three 'Big Cycles', the model identifies eight key determinants that drive the upswings and downswings, which are: education, innovation and technology, military strength, trade, economic output, markets and financial sector and reserve currency status. He then identifies additional determinants such as acts of nature, geology, resources, rule of law and gaps in wealth. He proposes that, when considered together, the 'Big Cycles' and determinants allow a clear picture to be built about which part of a life cycle a country, empire or dynasty is in, where it is heading and that this is part of what he refers to as a 'perpetual motion machine'. Using data presented in graphs and tables he shows how these 'Big Cycles' result in swings from periods of national and global creativity and peaceful prosperity to periods of depression, revolution and warfare in which wealth is diminished and lives destroyed. He proposes that big boom and bust periods and other major shocks come along about once in a life time 'and so are surprising unless one has studied the patterns of history over many generations' and that 'the reason people typically miss the big moments of evolution coming at them in life is because they experience only tiny pieces of what's happening'.² He writes that: 'because the swings between great and terrible times tend to be far apart, the future we encounter is likely to be very different from what most people expect' and he provides some disconcerting data about the aspects of the current world cycle including debt, wealth and political gaps and rivalry between the US and China.

In Part II, entitled '*How the world has worked over the last 500 years*' Dalio examines the world since 1500 and explores the rise and fall of the Dutch, British, American and Chinese empires. He offers convincing evidence to support his 'Big Cycle' proposition whilst also providing engaging historical material that will appeal to military readers seeking to broaden their understanding of geo-politics. The chapters covering the rise of China and US-China relations are particularly insightful given the UK 'Pacific Tilt' signalled by the Integrated Review.

Part III is entitled 'The Future' and provides forecasts on key subjects such as the debt/money/capital market/economic cycle, technological developments, human inventiveness, climate change and potential causes for conflict. Perhaps most interesting is a brief section on how Dalio uses information to make decisions highlighting that 'whatever success I've had has been more due to my knowing how to deal with what I don't know than anything I know'.³ He then provides an insight into his own practical approaches to balancing probabilities and protecting against worst case scenarios that give him the 'safety, freedom and ability to go for great results'.⁴

In terms of style, the book is an easy-going read. Readers used to academic articles and books may be frustrated by the lack of footnotes and endnotes. However, in the early section 'How to Read this Book' he signposts his website that provides extensive references for the graphs and tables as well as a full and rich bibliography that formed the basis of his research. In Part III,

Dalio highlights that he will continue to update the website and his forecasts on this website. Thus, the book and website are mutually dependent. Switching between the two is a little frustrating but will ensure longevity of his material as he updates his forecasts.

Dalio has made this book accessible and flexible. He uses bold font highlighting for key statements to allow the reader to break out what he calls the 'concise version' of the book. He also signals what he proposes are 'timeless and universal truths for dealing with reality' by means of 'red dot' points.⁵ These highlighting and 'red dot' techniques will jar with academic purists, but are effective in allowing those with limited time to assimilate Dalio's key points at pace whilst providing the reader with options to delve into more detail in areas of particular interest. The overall writing style is thus engaging and Dalio provides persuasive arguments and points that will be of interest and value to the military audience.

Notes

¹ <https://www.forbes.com/profile/ray-dalio/?sh=18637d2b663a>.

² Ray Dalio, *The Changing World Order*, Simon & Schuster London 2021; p. 4 and p. 8.

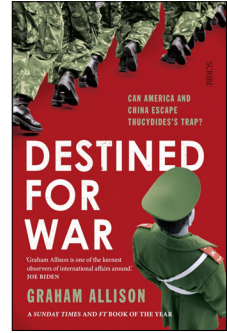
³ Ibid, p. 503.

⁴ Ibid, p. 504.

⁵ Ibid, Section entitled 'How Read this Book' np.

Book Review

Destined for War: Can America and China Escape Thucydides's Trap?



Author: Graham Allison

Publisher: Scribe Publications (2018) ISBN: 978-1911617303), 364 pages

Reviewed by Flight Lieutenant Tim Shortland

Introduction

Thucydides, the ancient Greek general and historian, wrote of the Peloponnesian War that 'It was the rise of Athens and the fear that this instilled in Sparta that made war inevitable'. In *Destined for War: Can America and China Escape Thucydides's Trap?*, Graham Allison, a Professor of Government at Harvard University and former director of the Belfer Center for Science and International Affairs, explores this concept in the context of contemporary US-China relations. By comparing historical analogies with current the geopolitical tensions, Allison argues that the situation reflects the concept of his term 'Thucydides's Trap': 'when a rising power threatens to displace a ruling one, the most likely outcome is war'.

Having directed the Harvard Thucydides's Trap Project, Allison's evidence for an impending collision course between the US and China is based on the structural stresses and outcomes of 16 major case studies of rise vs rule over the last 500 years. Of these, 12 resulted in war, while only four did not; a 3:1 ratio indicating war as the likely outcome between the two most powerful states in the 21st century. Allison proposes that 'intentions aside, when a rising power threatens to displace a ruling power, the resulting structural stress makes a violent clash the rule, not the exception'. The book does, however, offer hope of an avoidable

and peaceful future on the condition that the US and China can acknowledge two difficult truths. First, that war between the US and China in the years ahead is far more likely than is currently recognised, and that underestimating this outcome only heightens the risk of war. Second, as acknowledged in 2015 by Presidents Barack Obama and Xi Jinping, the two countries *are* capable of managing their disagreements and avoiding strategic miscalculations, in which case war is *not* inevitable.

The book is divided into four sections. In Part One, Allison summarises the magnitude and geopolitical consequences of the rise of China. Part Two compares US-China relations with the outcome to analogous historical examples, notably Germany's challenge to British hegemony prior to World War I. Next, Part Three examines how the geopolitical trajectory between the US and China is paving the road to war. Furthermore, it analyses the fine line between what is considered 'unlikely' and 'impossible', evidenced by how the assassination of Archduke Franz Ferdinand ignited World War I, and how easily history could have taken a different course during Khrushchev's nuclear brinkmanship in the Cold War. Finally, Part Four explains why war is *not* inevitable, emphasising that a peaceful future *can* be achieved if national leaders and the public embrace transformative changes in their actions and attitudes.

A strength of the book is Allison's empathetic examination of China's national objectives, drawing thoughtful parallels to US ambitions during their own rise to power. He evidences that both nations exhibit a profound sense of national greatness, viewing one another as the primary obstacle to it, alongside a firm belief in their historic missions. This perspective powerfully reinforces Allison's Thucydidean proposition of the structural tensions that arise when a rising power challenges a ruling one. Allison develops his argument through compelling historical references; for example, Theodore Roosevelt's assertion that 'preparation for war is the surest guaranty for peace.' By juxtaposing this US worldview at the turn of the 20th century with China's current aspirations, he underscores the nature of rising powers and the mirrored fears of ruling powers. This empathetic framing transcends cultural divides, presenting a nuanced understanding of the shared motivations driving both states, adding depth to his argument about the impending snare of Thucydides's Trap.

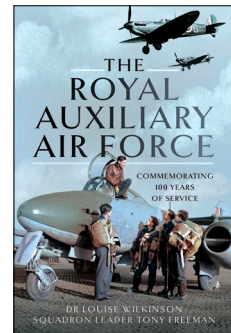
The author does, however, overlook the significance of smaller states in determining the outcome of war between major powers. Allison does not adequately consider how regional states and developed nations can coordinate - through converging national interests and formal alliances - to limit the influence of the US or China; for instance, within the strategically important First Island Chain. By disregarding the collective power of such nations, Allison misses a key dynamic that may shape the balance of power and complicate the assumption that only the two strongest powers determine the outcome of global conflicts; an oversight of fundamental importance to the theme of the book given his early reference to Corinth and Corcyra's influence during the Peloponnesian War.

Analytical and insightful, the book will resonate with readers interested in geopolitics and international relations. More than simply a diagnosis, Allison delivers an urgent wake-up call to avoid a statistically likely outcome, outlining political solutions and social mechanisms aimed at dismantling the Trap and averting future conflict.

By recognising and confronting the structural stresses of rising and ruling powers, we may hope to avoid future historians writing of our time: it was the rise of Beijing and the fear that this instilled in Washington that made war inevitable.

Book Review

The Royal Auxiliary Air Force Commemorating 100 Years of Service



Author: Dr Louise Wilkinson and Squadron Leader (Retd) Tony Freeman

Publisher: Pen and Sword Books Limited (2023) ISBN: 978 1399062183, 247 pages

Reviewed by Wing Commander Steve Minnikin

Introduction

The Auxiliary Air Force (AAF) was formed on the 24 October 1924, as a result of Lord Trenchard's desire to establish a reserve air force on a territorial basis, making this its 100th anniversary year. Over that time the Royal Auxiliary Air Force (RAuxAF), as it is now known, and its forerunners have played a significant role in many of the RAF's greatest achievements, including claiming over 30% of enemy kills during the Battle of Britain. Today, the RAuxAF is the RAF's Volunteer Reserve (VR) force delivering the full range of Air tasks in support of their regular counterparts. The people who do so have to balance their training and output with their primary civilian employment. This book was written to commemorate this 100th anniversary and to act as both a record and celebration of the RAuxAF's history and achievements.

The chapters of the book are laid out broadly in a chronological order, starting with the formation of six squadrons of the Auxiliary Air Force (AAF) in 1924. Officers who joined had to be licensed pilots while the airmen were taught their trades on the squadrons. This inevitably led to only those wealthy enough being officers, which in turn gave rise to the opinion that 'the auxiliaries were the snobbish preserve of the rich'. However, this is perhaps an unfair characterisation of a group of intrepid adventures, two of whom, Sir Douglas

Douglas-Hamilton and David Fowler McIntyre of 602 (City of Glasgow) Squadron, were the first to fly over Mount Everest. By the start of the Second World War (WW2) there were twenty squadrons that went on to serve with distinction. Their achievements included 602 and 603 (City of Edinburgh) shooting down the first enemy aircraft in combat over the British Isles, an accomplishment that the newspapers of the day reported with the headline 'FIRST BLOOD TO THE AUXILIARIES'. During the Battle of Britain, of the top fifteen squadrons by number of kills, eight of them were AAF. In recognition of its outstanding service over this period King George VI conferred the pre-fix 'Royal' upon the AAF leading to the creation of what we know today as the RAuxAF. Throughout, the book brings these activities and accomplishments to life through insightful personal stories including from three of the 217,000 women who served in the Women's Auxiliary Air Force (WAAF) during WW2.

Post-war, as a result of rapid disarmament and the ever-growing technical nature of the aircraft being flown, it became increasingly difficult to train and retain currency both flying and maintaining advanced jet aircraft. The outbreak of the Korean War saw the mobilisation of the RAuxAF fighter squadrons and the newly formed Air Observation Post Flying squadrons (AOPF), however the training requirements led to the perception that they could no longer be classified as front-line units and all the squadrons were disbanded in 1957.

By this time, the role of the RAuxAF was already expanding its post-war role to provide much of the workforce required to operate the nascent Control and Reporting system through the establishment of twenty-eight Fighter Control Units (FCUs) and two Radar Reporting Units (RRUs). Like the flying squadrons previously, these units were based on county affiliations and were allocated the 3000 series of squadron numbers. The FCUs and RRUs were disbanded by 1961 but the RAuxAF remained thanks to the three Maritime Headquarters Units that augmented operations, intelligence and communications staff at HQ Coastal Command during Transition to War and major NATO exercises.

Finally, the book covers the re-expansion of the RAuxAF back in the 1980s and summarises it as it is today, including the RAuxAF's involvement in recent conflicts, whether through mobilisation of entire squadrons such as 4624 Movements Squadron and 4626 Aeromedical Evacuation Squadron or the use of Individual Augmentees in support of operations. Hundreds of RAuxAF personnel have served in Iraq, Afghanistan and many other locations with two being killed in action.

The authors, Dr Wilkinson and Squadron Leader Freeman, combine their backgrounds in academic research and a specialist knowledge of the RAuxAF respectively, to produce a book that is factually rigorous but also full of personal stories and intricate detail. What the book does exceptionally well is demonstrate that today's RAuxAF was born out of many other reserve and auxiliary air forces, but rather than giving the impression of a tenuous link from those original organisations it draws a clear line of heritage from those squadrons of 100 years ago to today. This link to the past is most evident in the squadron numberplates; those first

squadrons in 1924 were a mix of 500 and 600 series numberplates, they served with honour in the Battle of Britain and still exist today. Speaking to a member of today's RAuxAF it quickly becomes apparent that they are immensely proud of not only the role they perform but of the history of their individual squadron and the wider force. They celebrate past achievements, honour those who have gone before them and carry the unique ethos of the Volunteer Reserves into the future.

The very first line of the book lays out its purpose, which is to 'record and celebrate [the RAuxAF's] many achievements'. The book absolutely achieves this through a well-balanced blend of a narrative timeline, engaging personal stories and tabulated record keeping. What was the most surprising element of this book was what I learned about the history of the RAF itself as, it is now apparent, Volunteers Reserves have been an integral part of its ability to deliver Air Power since 1924.

RAF Essay Prize Competitions

Your attention is brought to three essay prizes available to both serving RAF and non-serving individuals. The first two essay prizes are presented annually by Directorate of Defence Studies (RAF), on behalf of the RAF Centre for Air and Space Power Studies (RAF CASPS), which are the Gordon Shephard Memorial Prize and the Salmond Prize. The third prize, the Two Air Forces Award, is presented by the RAF Historical Society, on recommendation from the Director of Defence Studies (RAF). Further details are below:

The Gordon Shephard Memorial Prize was established in 1918, in memory of Brigadier G F Shephard DSO MC RAF, who was the highest-ranking officer of the flying services killed on active service during the First World War. The purpose of the competition is to encourage original thought and good writing, and is open to all serving RAF personnel. Essays may be on any theme directly relevant to the RAF or to the employment of air and space power more generally. There is a prize of £1,000 for the winning entry.

The Salmond Prize is awarded in memory of Air Chief Marshal Sir John Salmond, who served as Chief of the Air Staff from 1930 to 1933. The Prize is presented annually for the best essay submitted by a civilian or non-RAF service person of any nationality. The Salmond Prize does not attract a monetary prize, but the winner will receive an appropriate book of the winner's choice (subject to availability through our supplier Blackwells).

Further details for the 2026 competition will be promulgated in an Internal Brief Notice (IBN) early in the new year. Additional information, including our 'notes for authors' guidance on writing for publication, are published on our website: (<https://www.raf.mod.uk/what-we-do/centre-for-air-and-space-power-studies/publications/>) or email the Directorate of Defence Studies (CAS-ASDefencestudies@mod.gov.uk). Our MODNet website also contains a list of several winning essays: Directorate of Defence Studies - Gordon Shephard Memorial Prize - All Documents.¹

The Two Air Forces' Award is awarded annually. The winner is selected by the RAF Historical Society Committee following recommendations from the Director of Defence Studies (RAF). The Award was established in 1996 by the Royal Air Force Historical Society and its United States equivalent organisation, The Air Force Historical Foundation. The award will be given to a serviceperson who writes the most pertinent article of the year on an RAF / Defence historical related theme. The aim is to help shape the combined UK/US air power heritage by publishing rigorously researched articles.

Papers must be of publishable standard, with a view to including them in the Air and Space Power Review or the RAF Historical Society Journal. Essay guidance is the same as for the other prizes and available on the RAF CASPS webpage.

Note

¹ Articles previously published by RAF CASPS, such as in Air and Space Power Review, will be automatically considered for these prizes. The right to publication will rest with the MOD, and winners' names and photographs may be published. Any entries which are subsequently published in Air and Space Power Review will receive additional payment in accordance with the extant Air and Space Power Review editorial charter.

The Chief of the Air Staff's Fellowship Scheme provides a fantastic opportunity for RAF personnel, including Reserves and Civil Servants, of all ranks to undertake funded full and part-time postgraduate study at masters and doctorate level. There are a range of Fellowships available including a full-time MPhil in International Relations at Cambridge and Masters in Global Security Studies at Exeter. As well as more specialised Fellowships, there is a choice for the type of study including online distance learning to suit the applicant. Further details are available in the DIN (2025DIN07-066) but if you or a member of your team are interested in applying then please contact the Directorate of Defence Studies (RAF) team: CAS-ASDefenceStudies@mod.gov.uk

<https://www.raf.mod.uk/rafcasps>

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