

AIR WAR COLLEGE

AIR UNIVERSITY

THE PAST, PRESENT AND FUTURE OF OPERATIONAL AIR
COMMAND AND CONTROL
- SIMILAR BUT DIFFERENT?

by

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Biography

Group Captain John Shields is assigned to the Air War College, Air University, Maxwell AFB, AL. Shields joined the Royal Air Force in 1989. Following initial officer and navigator training, he flew in the Tornado F3, a two-seat interceptor aircraft responsible for the air defense of the UK, the Falkland Islands as well as global contingent operations. Spanning a flying career of 18 years, Shields has accumulated over 2500 hours on the Tornado F3 with tours as a squadron navigator, weapons instructor and commander in the UK and the Falkland Islands. He has flown in support of Operation Deny Flight and deployed to the AFCENT CAOC on three occasions spanning Operations Southern Watch, New Dawn, Enduring Freedom and, most recently, Inherent Resolve. His staff appointments encompass capability management and professional military education. He is a graduate of the UK's Advanced Command and Staff College and holds a Masters and a PhD in Defence Studies from King's College London.

Abstract

The introduction of the Joint, All-Domain Command and Control (JADC2) concept enables the US military, and its western allies, to transition from two decades of counter-insurgency operations to a focus on near-peer competition. However, what does this new concept mean for operational air command and control (Air C2)? This thesis will review a historical case study, the Battle of Britain, as well as contemporary operations to identify the enduring operational air command and control lessons that the introduction of JADC2 must embrace. While recognizing that the character of war continually evolves, future air component commanders must be cognisant of three enduring operational Air C2 challenges: equipment, manpower and training. These challenges will frame five persistent operational Air C2 factors that the JADC2 concept must address as it matures. The thesis introduces five persistent operational Air C2 factors: Context, Co-location, Configuration, Collaboration and Continuity or the 5Cs model. The window of opportunity is fleeting, but history shows that a timely change in operational air C2 processes can change the course of the battle, campaign and war. The US and its allies must exploit the opportunity now.

Introduction

“Never in the field of human conflict was so much been owed by so many to so few.”¹

Churchill’s infamous quote hailed the exemplary performance and bravery of Fighter Command’s pilots during the Battle of Britain. Consequently, the 1940 RAF fighter pilot cadre garnered an enduring global legacy that is still celebrated today. However, the adulation praised upon “The Few” masks an equally important role; the operational Air Command and Control (Air C2) role has subsequently suffered from a lack of understanding and investment.² Underpinning the success of the Battle of Britain was the fact that the RAF quickly exploited the advantages of radar in the immediate prelude to the Battle. The new technology provided the RAF with an asymmetric advantage that allowed it to detect threats early enough to launch its precious resources in sufficient scale to the right place at the right time. Consequently, the secret to Britain's success was neither its much-heralded pilots nor its innovative use of radar, but its ability to deliver efficient and effective operational Air C2. Following its success during the Battle of Britain, operational Air C2 has, surprisingly and demonstrably, had a diminished role within the UK and coalition airpower. For example, the author's previous academic work on the 1982 Anglo-Argentine Falklands Conflict highlighted several operational Air C2 discrepancies during the planning and prosecution of both the British and Argentine air campaigns.³ Additionally, following recent operational experience in the Combined Air Operations Centre (CAOC) at Al Udeid in Qatar, the author witnessed that deficits remain in the coalition’s ability to prosecute an effective and efficient air campaign.⁴

General David Goldfein, the USAF Chief of Staff, has determined that “advancing multi-domain, multi-functional command and control” is one of his three focus areas.⁵ As a result, the Joint, All-Domain Command and Control (JADC2) concept is pushing beyond the initial air, space and cyber domain boundaries of the USAF concept of Multi-Domain Operations (MDO).⁶ While this broad and innovative thinking is welcome, it would be foolish to discard the hard-won lessons of operational Air C2. Consequently, an understanding of operational Air C2 is fundamental to any JADC2 discussion. US conceptual thinking is coming at a time when UK airpower doctrine is once again starting to embrace Air C2 and recognizes that it “envelops all four [core] air power roles.”⁷

The utility of researching operational Air C2 is twofold. First, it may go some way to inform emerging UK and US air power doctrine. Second, the historic and enduring operational Air C2 lessons will remain prevalent and relevant as the JADC2 concept matures into a reality. Consequently, this paper argues that future operational Air C2 challenges are similar but subtly different from the challenges of the past and today. In particular future air component commanders must be cognisant of three enduring operational Air C2 challenges: equipment, manpower and training. These challenges will identify five persistent operational Air C2 factors that need to be considered as the multi-domain operational concept matures, the five factors, or 5Cs, are: Context, Co-location, Configuration, Collaboration and Continuity.

To show that the operational Air C2 challenges remain similar, this thesis will look at the operational Air C2 lessons from the Battle of Britain as well as 21st-century air campaigns. Following the review of the historical and contemporary campaigns, the thesis will look at the

implications for the future as the western powers embrace JADC2. The thesis starts with a look at what Churchill described as Great Britain's "finest hour."

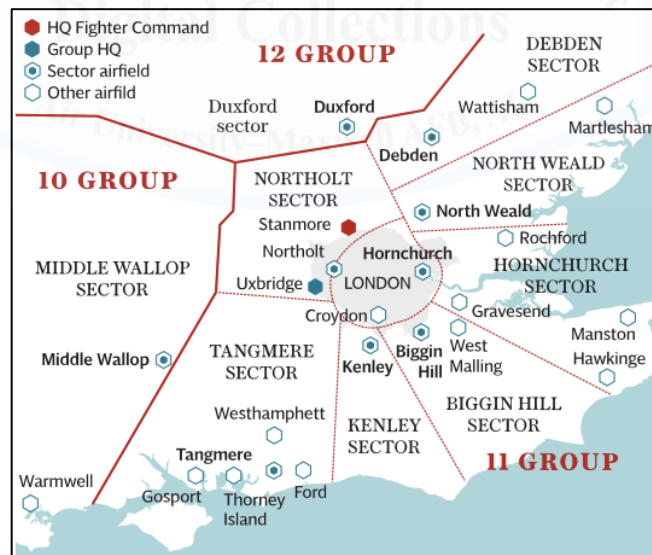
The Battle of Britain

In the summer of 1940, the outlook for Britain was bleak. The German military had made rapid progress across mainland Europe and had recently ejected the British Expeditionary Force from France. Hitler's gambit was to defeat Britain before assaulting the Soviet Union. A precursor to the proposed amphibious operation against Britain, Operation Sea Lion, was for the Germans to achieve control of the air over the English Channel and Southern England. Therefore, the *Luftwaffe* had to neutralize the threat from the RAF before the start of an amphibious assault. The Germans had momentum, experience and scale on their side.

In contrast, British-led force was still reeling from its recent retreat from Dunkirk and facing an imminent attack from a buoyant Germany. However, the RAF had a unique advantage; it understood the threat it faced, the context, and calibrated its air defenses accordingly by planning, equipping and training for just this eventuality over the preceding four years.⁸ The architect of the British operational Air C2 construct was Air Marshal Sir Hugh Dowding, who had created "a system which was greater than the sum of its parts."⁹ Moreover, Dowding would also lead Fighter Command during the Battle of Britain. Critical to the success of the battle was the available RAF equipment and organization.

In order to defeat the *Luftwaffe*, the RAF needed quality fighters in quantity. Although the RAF fielded competent fighters in the guise of the Hurricane and Spitfire, their numbers were finite and were initially outnumbered 1:2 by their opposition.¹⁰ Additionally, "standing patrols

were fatiguing for pilots, seriously affected aircraft serviceability and were wasteful of precious fuel."¹¹ Increasing the number of aircraft would alleviate some of the problems, but "all the fighters in the world were of little use if they could not find the enemy."¹² To offset the issue of scale as well as generating an effective and efficient use of his small force, Dowding incorporated radar into his operational Air C2 construct. Consequently, the British were the first country to field an operational Air C2 construct by using its coastal Chain Home radar network to vector their fighters to the right place, at the right time and in sufficient scale. Today, "such ideas are now commonplace, but in 1940 they represented outstanding co-ordination of design and organisation which was without parallel in the world."¹³ In terms of organizational structure, and as shown in the map below, Dowding's Fighter Command oversaw the various regionally-based Groups.



Fighter Command – Group and Sector Boundaries.¹⁴

As an example, Air Vice Marshal Keith Park's 11 Group was responsible for the defense of London and the south-eastern corner of England. In turn, the Groups were broken down

further into Sectors. Dowding recognized that it was "quite impossible to centralize tactical control at Command headquarters and even Group commanders would be too busy during heavy fighting to concern themselves with details of interception ... the system was that the command should be responsible for the identification of approaching formations and for the allotment of enemy raids to Groups where any doubt existed. Group Commanders decided which Sector should meet any specified raid and the strength of the fighter force, which should be employed. Sector Commanders detailed the fighter units to be employed, and operated the machinery of interception."¹⁵

The Battle of Britain exemplified the principle of centralized command and control, decentralized execution – an effective way of co-located decision-makers allocating their limited resources to empowered subordinates to make sensible and practical choices.¹⁶ As a result, this principle was seen by many as the exemplar way to conduct operations for future generations. Nevertheless, no matter the efficiency of the system, it is how people collaborate that will ultimately determine the success of the system.

As Cox appositely noted, "personalities inevitably intrude into every system, and can undermine the most careful planning."¹⁷ This situation was certainly true in the Battle of Britain and best highlighted by the strained relationship between two of Dowding's Group commanders – Park in 11 Group and Air Vice Marshal Trafford Leigh-Mallory in 12 Group. Bungay suggested that, "the argument about the Big Wing was an irrelevance. The issue was squadron tactics. The whole affair was sad and unnecessary, rooted more in a personality clash than in substance, and Dowding should have put a stop to it."¹⁸ A point Dowding readily accepted post-battle.¹⁹ However, the net result was that "bombers got through to their targets unmolested, valuable

resources were wasted, energy was expended on pseudo-issues and frustration was felt by all, including the pilots."²⁰

In warfare, personality cannot come before mission success. One issue that unified the RAF's senior commanders was not only the shortfall in equipment but the lack of personnel. Consequently, Park's and Dowding's approach "was conservation of their assets, both human and material."²¹ Unlike their German counterparts, RAF fighter units were regularly rotated out of the front line to recuperate at the quieter Groups in the north. Additionally, individuals were given respite tours in flying training appointments. However, these appointments were not without risk; the training losses were significant. By way of example, the Oakwood Cemetery in Montgomery, contains the graves of 100 Anglo-French airmen killed during their World War Two flying training in Alabama. Another role that the aircrew could take up was as a Controller at a Group or Sector headquarters. Individuals, such as the RAF's very first Air War College student, Al Deere, brought relevance and credibility to the critical Controller role.²² However, their tenure was usually fleeting, as their skills and experience were needed back in the cockpit. As a result, continuity in vital operational Air C2 appointments had to be offset by the individual's combat experience. Other operational Air C2 roles, such as plotters and radar operators, benefitted from greater continuity but lacked the detailed knowledge of fighter operations. As a result, training was vitally important to achieve and maintain their competence.

Although revolutionary, the Dowding system was not without its flaws. As Cox highlights, "there is a tendency to assume that the Chain Home radars and the associated Integrated Air Defence System provided a fully comprehensive air picture – they did not."²³ For example, Deere describes one such incident that became known as the "Battle of Barking

Creek."²⁴ The incident occurred a year before the Battle of Britain, when two RAF fighters were misidentified as enemy aircraft, intercepted and shot down, killing one of the pilots.²⁵ Deere correctly highlighted the need for extra training for the rapidly assembled group of controllers, plotters and radar operators.²⁶ However, Deere failed to mention the importance of aircraft recognition training for his fellow fighter pilots. The shortfalls in training were recognized. As Bungay suggested, "for it to work, everybody in the system had to practice."²⁷ Squadron Leader David Lloyd, the Tangmere Sector Controller, best described the utility of the training when he suggested that "the important thing was to make a right-enough decision, soon enough."²⁸

Enabling useful and timely decisions was the physical representation of the air picture. Bungay informed that "the plotting system was a masterpiece of graphic design. Using the simplest of methods, it showed at a glance the deployment of forces in three-dimensional space and colour to convey the dimension of time. This was critical, for in air fighting, information aged extremely rapidly."²⁹ Today, that concept remains unchanged. Nevertheless, and despite extensive training throughout the system, some individuals thought that they knew better and did not collaborate as much as they should have. As Cox noted, some squadron commanders, such as Douglas Bader, had a "tendency to operate as he saw fit and not as the 11 Group Controller had requested."³⁰

Despite its deficits, the Dowding system was victorious and enabled the RAF to ultimately vanquish the *Luftwaffe's* attempts to achieve control of the air over the UK and the English Channel, and gave the Germans their first defeat of World War Two. The fighter ace, Adolf Galland, spoke for his fellow *Luftwaffe* aviators when he informed, "it was for us a very bitter surprise. We had nothing like it. We could do no other than knock frontally against the

outstandingly well-organised and resolute direct defence of the British Isles."³¹ Nevertheless, would the operational Air C2 lessons of the Battle of Britain have utility beyond the south coast of Britain? Indeed, if Dowding found himself transported from his 1940 Fighter Command headquarters to the 2020 Battle Cab in a modern CAOC, would he be able to comprehend operational Air C2 in the contemporary environment?

Contemporary Campaigns

Many of today's operational Air C2 challenges echo those of the Battle of Britain. This thesis defines contemporary campaigns as the 21st Century conflicts in Iraq, Afghanistan, Libya and Syria.³² However, the term contemporary campaigns masks a diverse range of conflicts spanning four events over two decades with different actors, locations, durations, scale and intensity. Despite the apparent diversity, there remain several similarities between Operations Enduring Freedom, Iraqi Freedom, Unified Protector and Inherent Resolve. Before looking at the recurring Air C2 lessons, it is prudent to capture the essential elements of each of the four contemporary campaigns.

The first of the four contemporary campaigns to consider is Operation Enduring Freedom. The US-led operation in Afghanistan commenced in late 2001 as a response to the 9/11 attacks and the start of the Global War on Terrorism, specifically targeting the Al-Qaeda and Taliban organizations. Operation Enduring Freedom is the longest-running of the contemporary campaigns considered in the thesis; the operation culminated in late 2014. Today, a US-led coalition continues to operate in Afghanistan under the auspices of Operation Freedom's Sentinel. However, the thesis will focus on Operation Enduring Freedom rather than the most recent operation. Of note, Prince Sultan Air Base in Saudi Arabia hosted the initial campaign planning

and execution. However, as the AFCENT CAOC in Qatar became operational, the management of the air campaign transitioned to the new facility in 2003.

Operation Iraqi Freedom is the second of the contemporary operations. The US-led coalition commenced operations in March 2003 and would culminate until late 2011. A short and decisive major combat operation led to the overthrow of Saddam Hussein's government. However, the operation became protracted as it transitioned to a counter-insurgency footing. The newly established AFCENT CAOC in Qatar was responsible for campaign orchestration.³³

Next, Operation Unified Protector was, in many respects, an anomaly in contemporary campaigns. Unlike Operations Iraqi Freedom and Enduring Freedom where western conventional forces deployed their own ground forces, the NATO-led coalition in supported indigenous Libyan forces enabled by coalition special forces to overthrow Colonel Qaddafi's regime. The campaign was short in comparison with the concurrent operations in Afghanistan and Iraq, March to October 2011 and commanded from the NATO CAOC in Italy. Unlike air operations in Iraq and Afghanistan, the CAOC in Italy, not Qatar, managed Operation Unified Protector's air component.

Operation Inherent Resolve is the last of the contemporary campaigns. In 2014, the US formed a coalition to counter-Daesh operations across Iraq and Syria. Although the Daesh's physical caliphate has been neutered, the operation remains active. In a similar manner to the Libyan campaign, counter-Daesh air power supports indigenous forces under the principle of 'by, with and through.' The AFCENT CAOC in Qatar controls the air campaign. Throughout these campaigns, Clausewitz's notion that the nature of warfare is immutable remains valid.³⁴ Moreover, the character of war changes not only over the eight decades that have passed between

the Battle of Britain and the contemporary campaigns but also within the four contemporary campaigns themselves.

While two of the contemporary campaigns use coalition airpower to support indigenous forces enabled by coalition special forces, operational planning time was variable resulting in a less than ideal understanding of the operational context. Consequently, the character and lessons from each of the contemporary campaigns are eclectic. Nevertheless, the lenses of equipment, manpower and training remain prevalent as are the themes of the 5Cs model. The CAOC is central to the execution of the contemporary air campaign. Consequently, it is judicious to start the operational Air C2 investigation at the CAOC.

Standing in a CAOC, even a modern warfighter cannot fail to be impressed by the sight that surrounds them - a vast array of live, high-definition information presented on numerous large screens in the darkened room. This information, if presented to Dowding, would have immediately deluged him. However, once familiar with the contemporary character of war, Dowding would have been able to rapidly understand the enormity of what lies before him. So, what are the characteristic differences between the Battle of Britain and the contemporary battlespace?

In 1940, the RAF was the supported service, whereas, in contemporary warfare, the land component dominates with airpower supporting their needs. The outcome is also different; in 1940, the UK faced a war of national survival. In contrast, contemporary warfare is a war of choice. The Battle of Britain was geographically limited, whereas contemporary campaigns can cover vast regions or continents. The physical location of the operational Air C2 headquarters is also a significant difference. During the Battle of Britain, command bunkers were co-located with

the action. Today, the location of CAOCs can be several hundred miles away from the action and in a different country or continent. During the Battle of Britain, the RAF's priority was the control of the air role. In contrast, contemporary air warfare deals with the full gamut of airpower tasks simultaneously. Also, personnel from 16 different nations were involved in the Battle of Britain, but they were unified and integrated into RAF structures.³⁵ Consequently, the RAF benefitted from the unity of command and operated under a single set of rules.³⁶ Today, nations operate independently under a centralized coalition command construct. Therefore, the contemporary environment has to function with unity of effort rather than the nirvana of unity of command.³⁷ In addition to the changes in the character of warfare, operational Air C2 equipment has also transformed.

Today's equipment is vastly different from Dowding-era fighters, radar and Air C2 capabilities. However, the modern functions remain remarkably similar. At the heart of the system, linking the platforms and sensors is the command and control capability - the CAOC. According to the air component commander during Operation Enduring Freedom, the CAOC "actually represented the state of the art for command and control at the operational level of war."³⁸ Today, the CAOC is a weapons system in its own right. Indeed, the CAOC's relevance is underpinned by contemporary airpower leaders who suggest that "a nation's military air assets without an [C]AOC would amount to little more than an expensive flying club."³⁹ However, the CAOC configuration must be correct for its intended mission. For example, during the initial stages of Operation Enduring Freedom when "the CAOC was configured with a floor plan, equipment and operating procedures intended principally to support the conduct of Operation Southern Watch."⁴⁰ The CAOC can be a multi-role platform, just in the same way that a combat aircraft can change from a fighter to the bomber role, but both take time and a different mind-set

to reconfigure. Minimizing the transition period to the new operation is critical. The change not only impacts on the infrastructure, but it will also impinge on personnel as they adapt to the new character of war.

However, the introduction of new equipment was not without its issues. One of the fundamental changes has been the introduction of live, continuous, high-definition intelligence feeds directly into the CAOC. Consequently, the commander, located thousands of miles away, can have superior tactical situational awareness than the aviator in the vicinity of the target. Consequently, technology makes centralized C2 and execution a viable alternative to the Battle of Britain's ways of working. Contemporary airpower doctrine entertains the notion that specific high-value strategic targets and operating constraints, such as stringent rules of engagement, may require senior leadership oversight in target prosecution.⁴¹ However, centralized C2 and execution should be seen as the exception and not the norm. Indeed, the restrictive practice of centralized C2 and execution is an aberration in contemporary wars of choice where allied forces have air superiority and the luxury of time to finesse their products. Historically and, more prevalent, in future warfare, allies may face peer competitors where the centralization of C2 and execution will hinder, if not negate, operational freedom. As the Operation Desert Storm air component commander, General Chuck Horner, suggested, "the most dangerous thing we face is the 8000-mile screwdriver simply because it is possible."⁴² One mechanism to avoid this unnecessary strategic dabbling in tactical and operational affairs is to ensure that our operational Air C2 personnel are available, trained and empowered.

Not all of the contemporary campaigns were US-led. For example, during the 2011 Libyan crisis, operational Air C2 switched from a US to a NATO-led operation.⁴³ However, the

transfer of operational Air C2 was not without issues from a manpower perspective. Initially, the US led the air campaign but had to reconfigure and expand the remit of the lead CAOC to adapt to the battle it faced. Fortunately, the Africa Command and European Command (EUCOM) CAOCs benefitted from co-location and personnel from the latter were used to man the former.⁴⁴ Modifying the configuration of the receiving NATO CAOC in Italy was also necessary. "The United States and other NATO members were forced to surge hundreds of staff from EUCOM and elsewhere to fill gaps in the CAOC in Poggio Renatico."⁴⁵ Despite the transfer of authority, US support was vital for the continued success of operational Air C2. As NATO C2 structures were less than robust, "US personnel represented by far the largest contingent of strategists, targeteers, and other directors and managers of the campaign."⁴⁶ Consequently, the NATO air component commander recognized the need for significant US and NATO collaboration when he suggested that the transfer was a "planned played with some risk, but preparation."⁴⁷ However, the Turkey-based US General was also part of the problem as he was initially not located at the NATO CAOC in Italy.⁴⁸ The issue of co-location was not limited to the NATO air component commander; his UK counterpart arrived at the Italian CAOC a month after hostilities began.⁴⁹ Co-location of assets is vital if a shared understanding and timely decisions are to be exploited by commanders. In the Libyan case, the transfer of authority took two weeks to sort out all the initial issues.⁵⁰ The coalition was fortunate that it had the time to address the shortfalls; in the future, it may not be so fortunate. Nevertheless, the availability of trained personnel was an advantage that the coalition could exploit.

Training takes as long as the time available; it may or may not sufficient. Unlike Operations Enduring Freedom and Unified Protector, the coalition had sufficient time to develop, reflect and finesse their Iraq operational plans as well as train and select their people.⁵¹

Nevertheless, "only 43 percent of the personnel assigned to the CAOC during the major combat phase of [Operation] Iraqi Freedom had received formal [C]AOC training."⁵² Despite the advanced warning, this is only marginally bigger than the previous campaign in Afghanistan, where fewer than 40 percent of personnel were familiar with CAOC procedures.⁵³ Inexperience further exacerbates the continuity issue. For example, 45-60 days during Operation Unified Protector and a 90-day cycle in Afghanistan.⁵⁴ If the CAOC is indeed a weapons system, this would be akin to sending inexperienced pilots solo without the benefit of ground school or simulator training. However, the US relied upon experienced and educated personnel who could rapidly adapt to the new environment. The difference between training and education is critical. Ricks informs that "training tends to prepare one for known problems, while education prepares one for the unknown, the unpredictable, and the unexpected."⁵⁵

Last-minute changes to the plans plague contemporary campaigns. "In contrast to the beginning of Operation Desert Storm, which had been a triumph of orchestration, the opening of Operation Iraqi Freedom would be a triumph of improvisation."⁵⁶ Additionally, in Libya, "flexibility, agility and tailoring functions and organizations to meet mission requirements in an innovative manner were essential."⁵⁷ Educating takes investment, time, insight and reflection. In the case of Libya, augmentees from the NATO CAOC in Greece were trained for NATO response force activation and employed in the Italian CAOC.⁵⁸ In contrast, during Operation Iraqi Freedom, 25 percent of the CAOC's Strategy Division were either School of Advanced Air and Space Studies (SAASS) or School of Advanced Military Studies (SAMS) graduates.⁵⁹ As a result, when time or circumstances require novel solutions, educated personnel can make a decisive contribution both inside and outside of the CAOC.

During Operation Iraqi Freedom, a strengthened air component coordination element worked alongside the land force to bolster collaboration. This enriched presence was a direct consequence of the ineffective consideration of the air environment during the 2002 Operation Anaconda. "The failure of the land component to communicate its intentions clearly to the CAOC had left the latter almost completely unprepared to supply urgently needed air support ... after the mission unexpectedly turned sour."⁶⁰ Despite identifying lessons, practitioners are not learning the operational Air C2 lessons; the collaboration challenge still endures today. During Operation Inherent Resolve, the British Air Component Commander critiqued that the air component was rarely embedded early in CJTF [Combined Joint Task Force] planning and had to fight valiantly to be heard by their land counterparts.⁶¹ By focusing the coalition's asymmetric advantage merely on tactical support to special forces can deny access to targets of strategic and operational value. Exploiting air power's broad utility gives the joint force commander choice; it should not be squandered today or in tomorrow's operations.

The Future of Operational Air C2

Operational Air C2 has had a chequered past, with many problems recurring. During the Battle of Britain, the RAF did not have the luxury of scale to defeat its opponent. Consequently, the RAF had to be efficient and effective with its use of its force to defeat the *Luftwaffe*. A robust operational Air C2 construct was key to maximizing Fighter Command's potential. In contemporary warfare, the US-led coalitions have had a numerical advantage but can afford to be inefficient and still succeed. However, the emergence of near-peer competitors in the future could challenge western military dominance. Nevertheless, there is a fleeting opportunity to address many of the operational Air C2 issues and maintain US-led military superiority. The introduction

of the 2017 National Security Strategy was a catalyst for change.⁶² Subsequent western military conceptual thinking introduced the concept of JADC2.⁶³ While some believe it is not an entirely new concept, JADC2 does highlight the need for greater cohesion between the various military environments than have been the norm in recent campaigns.⁶⁴ As the US and its allies implement JADC2, those responsible for introducing JADC2 should also consider the enduring lessons of operational Air C2. Trained people with the right equipment will bring success across, as termed in this thesis, the 5Cs model, encompassing: Context, Co-location, Configuration, Collaboration and Continuity.

Context. Contemporary US doctrine suggests that the future character of war will expand in four different ways: time, domains, geography and actors.⁶⁵ The new US focus on near-peer competition is concurrent with the greater emphasis placed upon the space and cyber domains, a move that is likely to be welcomed by a US military that has historically thrived in major combat operations. However, the US must not discard the hard-won lessons from two decades of counter-insurgency operations. Moreover, the less-kinetic, lower-risk end of the military operations may well be the most likely operations that US forces are deployed to in the near term due to global strategic trends. The US has a historical bias towards high-end warfighting and a predilection for using this model as they encounter new military situations. This approach can have a detrimental impact on the duration and success of their operations. For future success, Air C2 operators must be aware of the context and mitigate their biases as they prepare for future operations.

Co-location. The concept of co-located operational Air C2 is not new. Indeed, at the Fighter Command headquarters during the Battle of Britain, Dowding was co-located with the Observer Corps as well as his army ground-based air defense commander, General Frederick

Pile.⁶⁶ As a result, Dowding was “able to make decisions about gunnery defence which could immediately be relayed to his fighters.”⁶⁷ However, the RAF failed to universally apply the hard-fought benefits of co-location during World War Two. For example, during the North African campaign, the RAF learned that the “reason for the break down of air-land cooperation was that the Army and RAF headquarters had been sited some 80 miles apart. The lack of information flow between the two components was a direct result of dislocated headquarters and poor quality communications.”⁶⁸ Additionally, and in order to generate the desired outcomes, “commanders at the operational level need to understand the capabilities of each component, and recognize how to harness these into synergistic air-land effect. Moreover, joint planning and decision making, achieved in North Africa by co-location of headquarters, must be sought in order to exponentially increase integration and co-operation.”⁶⁹ The historical lesson appears to be sacrosanct, but contemporary western air power has moved in a different direction. Why?

In the contemporary environment, there is a tendency to use technology and liaison teams to offset the lack of physical co-location of component headquarters. However, and as demonstrated, these mitigations are far from perfect and virtual co-location should be seen as a secondary, rather than a primary, mechanism for the execution of effective Operational Air C2. However, where should the headquarters be located?

Forward deployed CAOCs are vulnerable to attack and constrained by host nation demands. The AFCENT CAOC at Al Udeid is a case in point. Today, it has the luxury of operating in an uncontested environment with robust diplomatic freedoms. However, the current situation does not reflect historical or future environments.⁷⁰ A CAOC co-located in the US alongside its sister components could alleviate both issues. Additionally, greater use of air

attaches could mitigate concerns over deficits in regional influence. Consequently, the benefits of a CONUS-based CAOC are numerous: greater protection, access, continuity, cohesion and knowledge. Of note, the US is making progress in this area. Recently, the CAOC at Shaw AFB briefly took over the Air C2 functions from its Al Udeid counterpart.⁷¹ This increased focus on contemporary operational Air C2 is a step in the right direction, but the goal must be more prominent and inherently joint in outlook. Technology closes the cultural gap, but co-location regulates behavior as well as engendering trust and understanding.

Configuration. Main effort is not sole effort. While the increasing focus on near-peer competition will grab the most attention, as it is the most dangerous future military activity, the full spectrum of military operations must be addressed. Consequently, western air forces must man, train and educate the future cadre of operational Air C2 specialists to cater for the full gamut of military tasks. The statement would appear obvious, but experience has shown that insufficient individuals were trained or available at the correct locations to deal with emerging situations.⁷² Beyond manpower, the configuration must also address equipment interoperability. Modern CAOCs have a vast array of computer systems that need to be available, interoperable and accessible. Just like fighter Command in 1940, the capability must be fit for purpose ahead of the main event. Adapting in contact may not work in a time-critical future conflict.

Collaboration. The US rarely operates in isolation. Joint and combined is the preferred way of working and there is no intent to change this approach in the future.⁷³ Nevertheless, working cohesively with other services, environments, government departments, coalition partners and non-government agencies is difficult and requires constant attention. The need to collaborate with a broad range of stakeholders is neither new nor contentious; indeed,

collaboration could be considered part of the nature of war. External agencies must be integrated and understood at the earliest opportunity. Historically, effective collaboration has not always happened or it has occurred belatedly. Moreover, the complexity of the future operating environment may require new and more radical approaches.⁷⁴ External actors will have different perspectives, capabilities, restrictions and ways of working. Although integrating actors who think and act differently is complex, the benefits usually outweigh the risks. As a result, they must be inculcated into the plan at its outset and not as an afterthought, as is often the case.

Continuity. One of the critical challenges of forward located CAOCs is the deployed nature of the work. Consequently, deployed tours are significantly shorter than routine tours with an attendant restriction in corporate knowledge.⁷⁵ For the current deployed CAOC, the reality of battling to maintain the *status quo* compromises the business continuity nirvana of continuous improvement. Pre-deployment training mitigates the problem to a certain extent. Although CAOC-related training programs are available, most students train for a single, bespoke, short deployment before returning to their mainstream career. Therefore, and in addition to the benefits that a CONUS-based CAOC would bring to business continuity, western air forces should also consider generating a specific Air C2 career field with specialized post-graduate qualifications such as weapon school graduate training.

A cadre of trained and equipped Air C2 specialists that can advocate for operational air power across the full gamut of military tasks is within reach; the opportunity is too good to miss. However, the current quandary is that few people can articulate the vision for the future of operational Air C2; the debate appears to be active but lacking in focus. Any discussion on the

future of Air C2 should consider the 5Cs, as highlighted above. Failure to address these issues now could compromise the success of future JADC2.

Conclusion

In summary, this paper argues that future operational Air C2 challenges are similar but subtly different from the challenges of the past and today. In particular future air component commanders must be cognisant of three operational Air C2 challenges: equipment, manpower and training. Within that capability framework, the thesis identified five enduring elements that should be considered as the US and its allies inculcate the JADC2 concept. Known as the 5Cs model, the five key points to consider are: Context, Co-location, Configuration, Collaboration, and Continuity. This thesis has viewed operational Air C2 through the lenses of past, present and future. As a result, this paper reaffirms Clausewitz's dictum that although the nature of warfare is immutable, the character of war changes.

Before the Battle of Britain, Dowding promptly developed and introduced what many believe to be an effective system, but it was not without its flaws. The opportune introduction of the various elements of the system and its trained personnel was completed in time, just. Dowding understood the context and his adversary. Consequently, he led a well-trained, joint and combined coalition in a well-configured organization that was able to sustain its efforts throughout the Battle to achieve a decisive result.

Contemporary campaigns are similar but different from the Battle of Britain. The continually evolving character of war drives the key variances. Today, the environment is vastly more complicated than that faced by Dowding, the environment is geographically more

extensive, involving a vast array of actors and often across the full spectrum of military operations. Consequently, the battle is constantly changing and demands adaption. As a result, and complicated by the deployed nature of military operations today, operational Air C2 can struggle to collaborate effectively with allies, partners and the other environments. For example, short tour lengths in deployed CAOCs with limited personnel, both in terms of numbers, training and experience can compromise the desired outcomes. As a result, current operational Air C2 practitioners often fail to understand the complexities of the region, actors and the type of war they face. These issues are not insurmountable.

The introduction of JADC2 presents an opportunity to adapt the current operational Air C2 construct. While some may question the originality of the JADC2 concept, there is little doubt that to meet the full gamut of future threats, including near-peer competition, requires a collegiate pan-environment approach. Adapting people, training and equipment will be key to delivering future operational Air C2 success. Moreover, analysis from the 5Cs model suggests that the lessons of the past can rectify current shortfalls to deliver future operational Air C2 success. The window of opportunity is fleeting and must be exploited now, but by whom?

The thesis opened with a remark by Churchill, so it is apt that it culminates with another. Churchill described Dowding's performance during the Battle of Britain as "an example of genius in the art of war."⁷⁶ However, which airman is willing and able to take up the Dowding mantle as JADC2 transitions from theory to reality?

¹ Derek Wood and Derek Dempster, *The Narrow Margin*, (Barnsley: Pen and Sword, 2010), p269.

² Contemporary UK military doctrine describes Air C2 as a function that “envelopes all four air power roles ... Depending on the strategic, operational and tactical context, there are options to adapt between three levels of command and control to suit a specific operation or task.” United Kingdom. Ministry of Defence. Joint Doctrine Publication 0-30, UK Air and Space Power (Shrivenham: The Development, Concepts and Doctrine Centre, 2017), p41.

³ John Shields. “Air power during the 1982 Falklands Conflict.” Doctoral Thesis. Defence Studies Department, King’s College London (2019).

⁴ The author has served in CAOCs on three separate occasions. First, as the Tornado F3 Liaison Officer at Eskan, Saudi Arabia, in 2000 during Operation Southern Watch. Next, as the Deputy Chief of the Strategy Division at Al Udeid, Qatar, in 2011/2012 during Operations New Dawn and Enduring Freedom. Most recently, as the UK Red Card Holder/National Approvals Authority at Al Udeid, Qatar, in 2018, during Operation Inherent Resolve.

⁵ The other two focus areas are "revitalizing the squadron" and "strengthening joint leaders and teams." General David Goldfein. “CSAF Priorities.” Powerpoint, Air War College, 22 July 2019.

⁶ Multi-domain operations are defined as the conduct of operations, "to prevail in competition; when necessary, [military] forces penetrate and dis-integrate enemy anti-access and area denial systems and exploit the resultant freedom of maneuver to achieve strategic objectives (win) and force a return to competition on favorable terms." United States. US Army Training and Doctrine Command. TRADOC Pamphlet 525-3-1, The US Army in Multi-Domain Operations, 2028 (Fort Eustis: Training and Doctrine Command, 2018), pvii.

⁷ The UK defines four core air power roles: control of the air, attack, air mobility as well as intelligence, surveillance and reconnaissance. United Kingdom. Ministry of Defence. Joint Doctrine Publication 0-30, UK Air and Space Power (Shrivenham: The Development, Concepts and Doctrine Centre, 2017), p4.

⁸ Sebastian Cox, 'Battle of Britain Despatch' by Air Chief Marshal High Dowding GCB GCVO CMG ADC, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p92.

⁹ John Shields, The Battle of Britain: A Not So Narrow Margin, *Air Power Review*, ed. Paul Wilkins (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p186.

¹⁰ Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p107.

¹¹ Sebastian Cox, No 11 Group Instructions to Controllers and Analysis, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p51.

¹² Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p60.

¹³ Derek Wood and Derek Dempster, *The Narrow Margin*, (Barnsley: Pen and Sword, 2010), p84.

¹⁴ The Telegraph. The Battle of Britain, As it happened on September 15, 1940. <https://www.telegraph.co.uk/history/battle-of-britain/11865303/The-Battle-of-Britain-as-it-happened-on-September-15-1940-live.html> (accessed 23 January 2020.)

¹⁵ Sebastian Cox, 'Battle of Britain Despatch' by Air Chief Marshal High Dowding GCB GCVO CMG ADC, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p91.

¹⁶ United Kingdom. Ministry of Defence. Joint Doctrine Publication 0-30, UK Air and Space Power, Second Edition (Shrivenham: The Development, Concepts and Doctrine Centre, 2017), p42.

¹⁷ Sebastian Cox, No 11 Group Instructions to Controllers and Analysis, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p48.

¹⁸ Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p385.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Sebastian Cox, No 11 Group Instructions to Controllers and Analysis, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p41.

²² Alan Deere, *Nine Lives* (Manchester: Crechy Publishing, 2009), p142.

²³ Sebastian Cox, No 11 Group Instructions to Controllers and Analysis, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p42.

²⁴ Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p67.

²⁵ The incident occurred on 6 September 1939. Alan Deere, *Nine Lives* (Manchester: Crechy Publishing, 2009), p41.

²⁶ Ibid.

²⁷ Fortunately, there was time to hone the RAF's skills. Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p66.

²⁸ Ibid.

²⁹ Ibid., p64.

³⁰ Sebastian Cox, No 11 Group Instructions to Controllers and Analysis, ed. Paul Wilkins *Air Power Review* (Shrivenham: Royal Air Force Centre for Air Power Studies, Summer 2015), p51.

³¹ Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p69.

³² In the UK, Operation Enduring Freedom in Afghanistan is called Operation Veritas/Herrick. Whereas, Operation Iraqi Freedom is identified as Operation Telic. Moreover, the 2011 Libyan campaign, Operation Odyssey Dawn/Unified Protector, is recognized as Operation Ellamy. Lastly, the counter-Daesh campaign, Operation Inherent Resolve, in Iraq and Syria is known as Operation Shader.

³³ US Air Forces Central Command. Combined Air Operations Center (CAOC.) <https://www.afcent.af.mil/About/Fact-Sheets/Display/Article/217803/combined-air-operations-center-caoc/> (accessed 17 January 2020.)

³⁴ Carl von Clausewitz, *On War*, ed. Peter Paret and Michael Howard (Princeton: Princeton University Press), p89.

³⁵ In addition to the British aircrew, 15 other nations were involved encompassing pilots from Australia, New Zealand, Canada, Belgium, Poland, Czechoslovakia, Jamaica, Republic of Ireland, France, Bahamas, Palestine, US, Zambia, South Africa and South Rhodesia.

³⁶ Unity of command in the Armed Forces of the United States starts with national strategic direction. For US military operations, unity of command is accomplished by establishing a joint force, assigning a mission or objective(s) to the designated JFC [Joint Force Commander], establishing command relationships, assigning and/or attaching appropriate forces to the joint force, and empowering the JFC with sufficient authority over the forces to accomplish the assigned mission. United States. Department of Defense. Joint Publication 1, *Doctrine for the Armed Forces of the United States* (Washington DC: Joint Chiefs of Staff, 2013), pII-8.

³⁷ Team spirit and training ensure cooperation. Cooperation relies on three interrelated elements: mutual trust and goodwill, a common aim (or at least unity of purpose), and clearly divided responsibilities (including understanding the capabilities and limitations of others). Within alliances or coalitions, differences must be harmonized and political/military cohesion promoted and protected. United Kingdom. Ministry of Defence. Joint Doctrine Publication 0-01, UK Defence Doctrine, Fifth Edition (Shrivenham: The Development, Concepts and Doctrine Centre, 2014), p31.

³⁸ Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p283.

³⁹ Benjamin S. Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis: Naval Institute Press, 2013), p218.

⁴⁰ Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p281.

⁴¹ Ibid., pxxv and United Kingdom. Ministry of Defence. Joint Doctrine Publication 0-30, UK Air and Space Power, Second Edition (Shrivenham: The Development, Concepts and Doctrine Centre, 2017), p42.

⁴² Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p329.

⁴³ This transfer of authority was a deliberate US policy move after President "Obama declared early on that the American role would be limited, and after initial operations of roughly a week, the United States would pull back into an overwatch role and provide only those unique assets required to allow its allies to continue to operate." Christopher S. Chivvis, "Strategic and Political Overview of the Intervention," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p24.

⁴⁴ Robert C. Owen, "The US Experience: National Strategy and Campaign Support," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND), p94.

⁴⁵ Christopher S. Chivvis, "Strategic and Political Overview of the Intervention," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p29.

⁴⁶ Deborah C. Kidwell, "The US Experience: Operational," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p107.

⁴⁷ Ibid., p137.

⁴⁸ Christina Goulter, "The British Experience: Operation Ellamy," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p165.

⁴⁹ Ibid.

⁵⁰ Christopher S. Chivvis, "Strategic and Political Overview of the Intervention," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p29.

⁵¹ As an example, during the prelude to Operation Iraqi Freedom, a significant warfighter conference in August 2002 "included representatives from CENTCOM, its subordinate components, the four services, and the United Kingdom." At the conference, "key concepts of operations were either developed or refined, and relationships between and among the involved staffs were further strengthened." The conference outputs were then used at CENTAF's rear air operations center at Shaw Air Force Base to rehearse the campaign battle rhythm with the principal planners and operators. This working relationship was further enhanced as part of Exercise Internal Look in the new CAOC in Saudi Arabia immediately before the war. Benjamin

S. Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis: Naval Institute Press, 2013), p29 and 33.

⁵² Ibid., p214.

⁵³ Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p282.

⁵⁴ Deborah C. Kidwell, "The US Experience: Operational," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p137 and Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p282.

⁵⁵ Thomas E. Ricks, *The Generals* (New York: The Penguin Press, 2012), p420.

⁵⁶ Benjamin S. Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis: Naval Institute Press, 2013), p82.

⁵⁷ Deborah C. Kidwell, "The US Experience: Operational," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p137.

⁵⁸ Ibid.

⁵⁹ The mission of the USAF's School of Advanced Air and Space Studies (SAASS) is to produce strategists through advanced education in the art and science of air, space, and cyberspace power for the Air Force and the nation. Air University. "School of Advanced Air and Space Studies." Air University. Last modified October 11, 2019. <https://www.airuniversity.af.edu/SAASS/>. The US Army's School of Advanced Military Studies (SAMS) educates students at the graduate level to become agile and adaptive leaders who are critical and creative thinkers who produce viable options to solve operational and strategic problems. US Army Combined Arms Center. "School of Advanced Military Studies (SAMS)." US Army Combined Arms Center. Last Modified October 11, 2019. <https://usacac.army.mil/organizations/cace/cgsc/sams>. Both courses are referenced in Benjamin S. Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis: Naval Institute Press, 2013), p219.

⁶⁰ Ibid., p39.

⁶¹ Air Vice-Marshal Johnny Stringer. "Air Component Commander Lessons." Powerpoint, Permanent Joint Headquarters, April 2018.

⁶² United States Government. National Security Strategy of the United States of America, December 2017. <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf> (accessed 7 November 2019.)

⁶³ The emergence of the US multi-domain concept has also sparked UK interest in the subject matter. The RAF's gambit was to once again stand up Park's former command during the Battle of Britain, 11 Group, to champion the British roll out of MDO.

⁶⁴ Discussions with various 9th Air Force, AFCENT and ARCENT staffs during JWSS Field Trip to Shaw AFB in November 2019.

⁶⁵ United States. US Army Training and Doctrine Command. TRADOC Pamphlet 525-3-1, *The US Army in Multi-Domain Operations*, 2028 (Fort Eustis: Training and Doctrine Command, 2018), p8.

⁶⁶ Derek Wood and Derek Dempster, *The Narrow Margin*, (Barnsley: Pen and Sword, 2010), p30, 69 and 87 as well as Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p63.

⁶⁷ Ibid.

⁶⁸ Royal Air Force Air Power Review. From Coningham to Project Coningham-Keyes Did British Forces Relearn Historical Air-land Co-operation Lessons During Operation TELIC? Harvey Smyth. <https://www.raf.mod.uk/what-we-do/centre-for-air-and-space-power-studies/documents1/air-power-review-vol-10-no-1/> (Accessed 17 January 2020.)

⁶⁹ Ibid.

⁷⁰ For example, during previous campaigns, coalition basing, over-flight, personnel numbers and roles have been constrained by the host nation. Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p34.

⁷¹ In summer 2019 and during Operation Gamecock 2.0, AFCENT HQ took over Air C2 responsibility from AFCENT CAOC in Al Udeid for 8 hours. AFCENT Staff. "AFCENT Overview." Powerpoint, Shaw AFB, 15 November 2019.

⁷² For example, during the 2011 Libyan campaign, the AFRICOM CAOC was configured for air mobility and intelligence tasking rather than the full gamut of airpower roles. As a result, the co-located EUCOM CAOC took over responsibility for the operation. Likewise, the NATO CAOC at Poggio Renatico had to be supported by personnel from another NATO CAOC in Turkey. Robert C. Owen, "The US Experience: National Strategy and Campaign Support," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND), p94 and Christopher S. Chivvis, "Strategic and Political Overview of the Intervention," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p29.

⁷³ General David Goldfein. "CSAF Priorities." Powerpoint, Air War College, 22 July 2019.

⁷⁴ For example, during Operations Desert Storm, the USMC had the luxury of operating its organic airpower independently, this may not be the case in future operations as near-peer competitors may demand the need for both increased effectiveness and efficiency from coalition

airpower throughout the campaign. Tom Clancy and Charles Horner, *Every Man a Tiger* (London: Sidgwick and Jackson, 2000), p216.

⁷⁵ Although the author experienced US personnel on tour lengths of up to one year in the AFCENT CAOC in Al Udeid, other operations suffer from significantly shorter deployments. For example, 45-60 days during Operation Unified Protector and a 90-day cycle in Afghanistan. Deborah C. Kidwell, "The US Experience: Operational," in *Precision and Purpose: Airpower in the Libyan Civil War*, ed. Karl P. Mueller (Santa Monica: RAND, 2015), p137 and Benjamin S. Lambeth, *Air Power against Terror* (Santa Monica: RAND, 2005), p282.

⁷⁶ Stephen Bungay, *The Most Dangerous Enemy* (London: Aurum Press, 2009), p220.

