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Effects-Based Operations and the Royal Australian Air Force

by WGCDR JW Waller

FOREWORD

The ADF capstone doctrine publication FORCE 2020 defines Effects-Based Operations (EBO) as the application of military and other capabilities to realise specific, desired operational and strategic outcomes in peace and war. EBO requires a much greater degree of integration and interaction with other services and more importantly with other national agencies. The initial planning process of an operation has to be changed towards becoming focused on effects rather than specific means and this in turn will need a sophisticated understanding of the people, structures and culture of other countries.

Knowledge therefore becomes the key to achieving effortless EBO. The more one knows about the adversary the better one will be able to carry out operations that have lasting effect with an appropriate reduction in the likelihood of unintended consequences. Adopting EBO is about achieving superior knowledge and innovation, and properly applied, it will provide better options to the commander and warfighter alike.

The RAAF needs to migrate from platform based operations to EBO in order to be more effective in the prosecution of its mission. This paper looks at the probable course of action that needs to be adopted for the RAAF to transform and implement the basic requirements for EBO to be successful.

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ABOUT THE AUTHOR

WGCDR Waller was born in Perth on 25 June 1969 and completed high school at Guildford Grammar School before joining the Air Force in 1987. He completed a Bachelor of Science at ADFA before starting No 158 Pilots Course. He graduated in May 1992 and was posted to fly P3-C Orions with 10 Squadron.

After three years at the squadron he began No 124 Flying Instructors Course and was then posted to No 2 Flying Training School at RAAF Pearce to instruct on PC-9 training aircraft. After one tour as a Qualified Flying Instructor (QFI) he became the C Flight Commander as an acting Squadron Leader in 1999. During this period he managed the disbandment of C Flight when 2FTS reduced it's capacity as a result of the creation

of ADF Basic Flying Training School (ADF BFTS). He was then substantially promoted to Squadron Leader in 2000 and became A Flight Commander and, towards the end of the year, acting Chief Flying Instructor (CFI).

In 2001 he was posted to Canberra and employed in the Aviation Capability Improvement Team (ACIT) under CDF. The team's role was to implement a wide range of recommendations aimed at improving ADF aviation capability and developing a new strategic management framework for ADF aviation. He graduated from Australian Command and Staff College in 2002, where he was awarded prizes for the Highest Overall Academic Achievement and best Aerospace Paper. He is currently serving as the Staff Officer 1, Air Operations, at Strategic Operations Division.

INTRODUCTION

Effects-Based Operations (EBO) is a concept developed in the United States (US) from parallel warfare methods used in the Gulf War.[1] Although definitions vary, the most complete is the United Sates Joint Forces Command (USJFCOM) definition:

> EBO is a process for obtaining a desired strategic outcome or effect (the physical, functional or psychological outcome, event or consequence that results from specific military or non-military actions) on the enemy through the synergistic and accumulative application of military and non-military capabilities at all levels of conflict.[2]

EBO officially entered the lexicon of the Australian Defence Force (ADF) with the publication of *Force 2020* (2002)—a future vision for the ADF. Force 2020 links EBO to aerospace power because strategic effects are enabled by the key aerospace characteristics of reach, speed and precision.[3] However, the concept has only just begun to permeate Royal Australian Air Force (RAAF) thinking. For the RAAF to maximise capability, and successfully operate in combined operations with the US, EBO must become more institutionalised.

The RAAF's migration from capability based operations to EBO requires change. Change is based on understanding differences between EBO and current warfare concepts. The nature of these differences determines a Course of Action (COA) for bridging the gap. Consequently, this paper examines the implications of EBO for RAAF aerospace power, and determines the way ahead for achieving Force 2020 goals.

Scope. The paper first describes current ADF warfighting concepts from both a joint and aerospace perspective. It then provides a detailed description of EBO. From these baselines, it analyses the difference between the two concepts, primarily focussing upon aspects of doctrine, organisation and planning. Finally, it determines a COA for implementing EBO in the RAAF.

EBO has depth, ranging from national strategic to military tactical applications. Also, it has breadth across land, maritime and aerospace environments. This paper focuses on RAAF aerospace at the strategic and operational levels; however, it also considers implications beyond this realm when relevant. It does not argue specific EBO benefits and limitations, except where they impact EBO implementation.

CURRENT WARFARE CONCEPTS

Overall Concepts

Before analysing EBO, current warfare concepts require explanation in order to provide a baseline for comparison with EBO. ADF warfighting concepts develop from cascading principles, as follows:

a. **Policy**. Defence 2000—Our Future Defence Force (D2000) is current government defence policy. D2000 maintains Australia's national defence policy as a layered sea-air gap defence.

b. **Strategic and operational concepts**. Principles for applying military power to achieve national objectives are contained in ADDP Doctrine: Foundations of Australian Military Doctrine (2002). It details promoting national interests in a liberal democracy, through application of the principles of war.

Operational warfighting concepts to achieve this are explained in Australian Warfighting Concepts to Guide Campaign Planning: Decisive Manoeuvre (1998).

c. **Aerospace concepts**. In parallel, AAP1000 Fundamentals of Australian Aerospace Power (2002) encapsulates strategic aerospace doctrine, and AAP1002 The Operational Air Doctrine Manual (1999) defines operational doctrine.

Fundamentally, these documents have a linear heritage in western military theory. They evolved from a continental school of thought, and exist in a paradigm of destroying the enemy's military capabilities to neutralise a threat.

Current Doctrine

D2000 and subordinate strategic documents reflect the government's constitutional responsibility to determine the foundations for applying military force. Government coordinates the elements of national power in pursuit of national objectives, which, at the political–military interface, are distilled into military objectives. Military command guidance provides military goals calculated to serve the national interest. Decisive manoeuvre doctrine is the basis for achieving military goals, and is defined as follows:

> Decisive manoeuvre is the conduct of synchronised operations using assets from and within any or all environments to defeat the adversary by positioning in time and space the most appropriate force to threaten or attack critical vulnerabilities, thereby unhinging the centre of gravity and obtaining maximum leverage.[4]

Decisive manoeuvre brings together Navy, Army and Air Force capabilities in a coherent and synergistic fashion against the enemy's weakest defences. Current aerospace operational doctrine describes aerospace power's contribution in the joint battle. The roles are capability based, and include:

a. counter air,

b. strategic strike,

c. precision and close air support,

d. maritime strike,

e. battlefield air interdiction,

f. vital air defence, and

g. air logistic support.[5]

This spectrum of operations has an attrition flavour—similar to decisive manoeuvre—but considers the enemy as a system, rather than discrete targets. Aerospace doctrine fuses with decisive manoeuvre by emphasising technologically advanced aerospace elements, integrated with other ADF capabilities, to provide focussed, effective power.

ADF doctrine recognises that military power is not applied in isolation, but acts in concert with other elements of national power. However, a capability-based approach centres on destroying similar military capabilities, once diplomatic efforts fail. When the enemy's capabilities are destroyed to a level where the ADF is dominant, Australia's national interests prevail.

Current Organisation

National Strategic. Doctrine guides the organisational hierarchy at strategic, operational and tactical levels. The scope of this paper covers the strategic and operational levels, as in Figure 1. At the national strategic level, government defines national interests requiring a military response through the following structure:

a. **National Security Committee of Cabinet (NSCC)**. Chaired by the Prime Minister, the NSCC is the primary committee on all national security matters.

b. **Secretaries' Committee on National Security (SCNS)**. SCNS, as the senior inter-departmental security committee, coordinates whole of government advice and policy.

c. **Strategic Policy Coordination Group (SPCG)**. This group provides day to day coordination of security policy objectives and constraints.

These groups determine which combinations of national power elements are utilised in any situation. In combination, they are the political–military interface producing government guidance to enable military strategic planning.

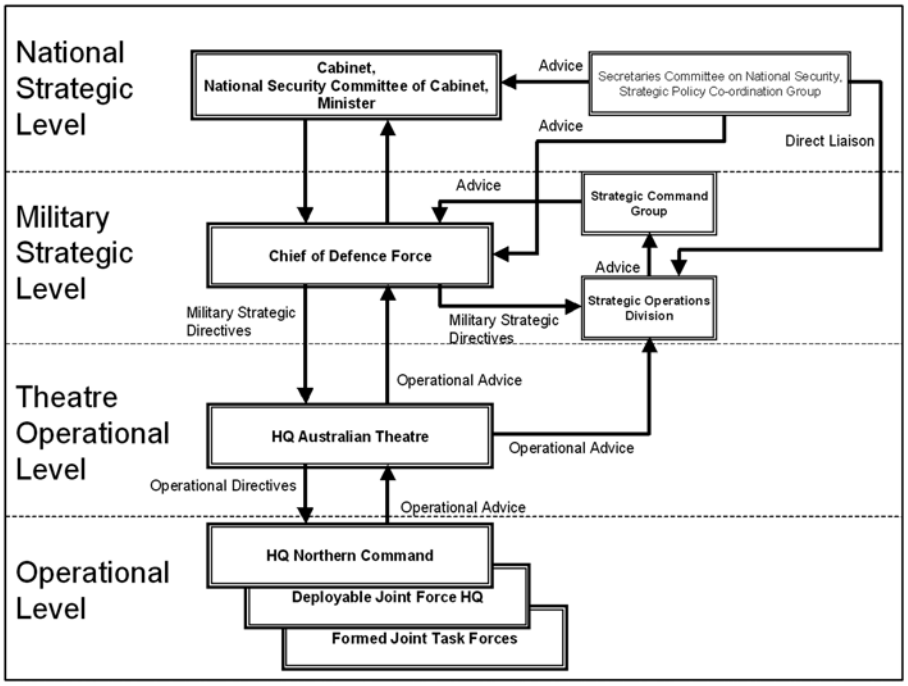

Figure 1: Strategic and Operational Organisation Structure[6]

Military strategic. At the military strategic level, the Chief of the Defence Force (CDF) is responsible for providing advice on military responses, and initiating planning. Advice to and from CDF is developed in the Strategic Command Group (SCG). SCG considerations include government requirements, military aspects of defence strategy, and concepts for operations and campaigns.[7] This process also develops guidance for military strategic and operational planners, and includes:

a. political constraints;

b. the national end state;

c. military end state, objectives and tasks; and

d. future intentions.[8]

From this starting point, operational organisations provide ways for achieving strategic ends.

Operational. Headquarters Australian Theatre (HQAST) is the premier operational headquarters interfacing with military strategic processes. HQAST's role is fulfilling strategic imperatives by constructing campaign

and theatre plans, and then directing ensuing operations. From an aerospace perspective, Air Commander Australia (ACAUST) is the Air Component Commander (ACC) and provides aerospace assets to meet HQAST requirements. These HQs specify military tasks and allocate military resources. Operational objectives, the centre of gravity and critical vulnerabilities are defined, and aerospace strengths synchronised with other ADF elements. Consequently, decisive manoeuvre and aerospace doctrines are first applied at the operational planning stage. If the strategic–operational interface collapses, planning can become nugatory as evidenced by aspects of the air war in Vietnam.[9]

Current Planning

Planning modes. Although planning responsibilities differ at each level, the process remains consistent. Planning takes two forms:

a. **Deliberate Planning**. This process is conducted free of time constraints, and produces generic plans based on current capabilities. At the strategic level, the process follows these iterative steps:

   (i) strategic assessment,

   (ii) strategy guidance and development,

   (iii) analysis, and

   (iv) review.[10]

   At the operational level, strategic deliberate planning products—such as Australian Illustrative Planning Scenarios (AIPS)—are used to develop future campaign scenarios and possible responses.

b. **Immediate Planning**. Unlike deliberate planning, immediate planning is time dependent and responds to an existing situation. By necessity, it is highly sensitive to national strategic and military strategic organisation structures. Therefore, parity is required between immediate military responses and government direction. The strategic process consists of:

   (i) situation development,

   (ii) planning development,

   (iii) execution, and

   (iv) evaluation.11At the operational level, planning follows a similar pattern, formalised in the Joint Military Appreciation Process (JMAP).

JMAP. The JMAP is a tool for planning staff, designed to facilitate dynamic immediate planning for operations. It is a cyclical process, beginning with preliminary scoping then proceeding through:

a. mission analysis,

b. COA development,

c. COA analysis, and

d. decision and execution.[12]

The JMAP is informed by the Joint Intelligence Preparation of the Battlefield (JIPB). The JIPB increases the joint commander's and planning staff's situational awareness. Primarily an intelligence function, the process consists of:

a. defining the battlespace environment,

b. describing the battlespace effects,

c. evaluating the threat, and

d. determining threat COAs.[13]

The JMAP and JIPB are flexible and adaptive processes, and thus potentially complement future warfare concepts. Importantly, they integrate with the current aerospace targeting process, as illustrated in Figure 2.

Aerospace Targeting. Targeting is fundamental to aerospace doctrine, operational planning, and contemporary debate on future warfare concepts. It represents the deliberate, practical application of aerospace power, and is defined as:

> …selecting and analysing targets and matching the appropriate response to them, taking into account national strategy, operational requirements and capabilities. Targeting responses may include lethal and non-lethal force and direct and indirect manipulation, including those measures taken to alter perceptions within the battlespace.[14]

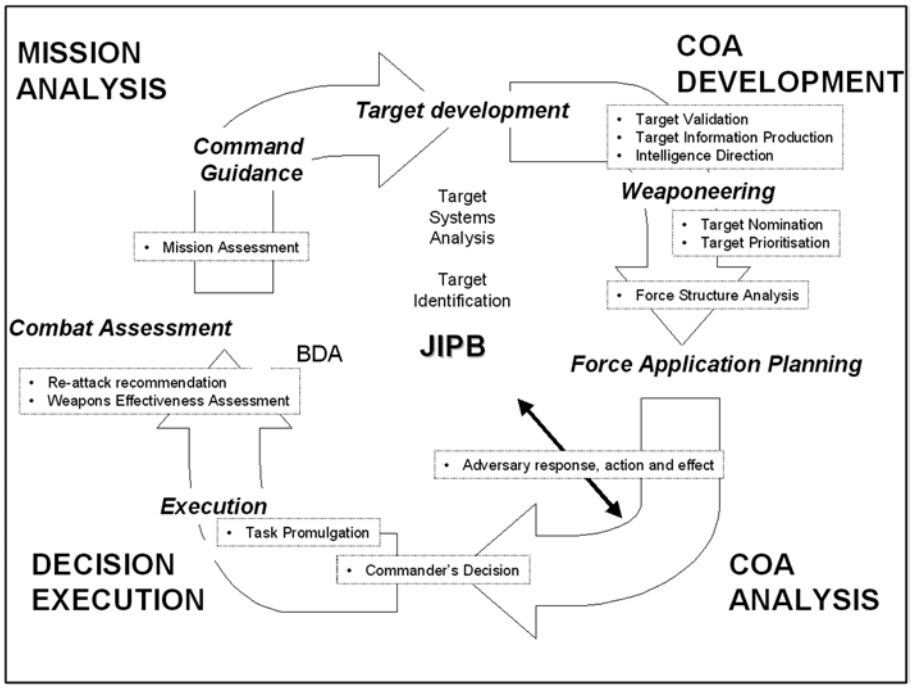

Figure 2: JMAP and targeting processes[15]

Targeting rhetoric has evolved from the historical attrition concepts; however, legacy doctrine, capabilities and weapons do not necessarily support 'non-lethal force' and 'indirect manipulation'. This requires robust application of the integrated JMAP–targeting steps, described as follows:

a. **Command guidance**. These are military goals distilled from the national security structure.

b. **Target development**. Enemy systems analysis produces a Joint Integrated Prioritised Target List (JIPTL). In peacetime, intelligence supports target development by maintaining a joint integrated database.

c. **Weaponeering**. This process determines the requisite level of damage, exploitation or degradation of identified targets, to achieve desired outcomes.

d. **Force application planning**. At this stage, planning staff prioritise, synchronise and de-conflict targets and assign forces.

e. **Execution**. Air Task Orders (ATOs) are issued to match requirements in the force application phase to individual units.

f. **Combat assessment**. This step determines whether preceding steps achieved their objectives.

The cyclical process can achieve the defined targeting aim. However, it is highly dependent upon correctly identifying critical vulnerabilities, and then precise target selection to effectively achieve military goals. Otherwise, the process degenerates into serial attrition down the JIPTL.16

The discussion illustrates cascading means for applying military power to enforce national will. Aerospace power is fundamental because of its role in defending the sea-air gap, and targeting critical enemy systems. Overall, current warfare concepts are adaptive and progress beyond a force–on–force concept. However, legacy characteristics of attrition based warfare remain. EBO represents the next development in the lineage of warfighting concepts.

EFFECTS-BASED WARFARE CONCEPTS

Overall Concepts

In the past, problems developed with EBO discussions because of cognitive disconnects.[17] Advocates and critics often debated the same side of the coin, due to misunderstandings over EBO concepts. Even the name can be misleading, because EBO is not just about operations: it has applications at all levels—particularly the national strategic. Understanding EBO biology is critical for juxtaposition against current warfare concepts.

EBO's ascent is a response to poorly employed wartime strategic planning emphasising firepower and attrition—such as Vietnam and, more recently, Kosovo.[18] Aerospace power emerged as the proxy figurehead for EBO, due to the precision available, and the casualty aversion of political decision-makers. Moreover, this is reinforced by contemporary theorists, such as Warden, claiming that aerospace power is able to change the mind of an adversary's decision-making elite, without resorting to force–on–force conflict.

A threat is defined as comprising capability and intent. EBO emphasises operations targeting the 'intent' component to bring about early resolution, based on the following hypothesis:

> If we can anticipate, with any degree of certainty, how an intelligent adversary should, can, or could act and react to compensate for our actions; and if we can plan, execute, assess and adapt our actions in terms of the effects we desire, then we can identify and execute the most effective COA to bring about the desired change in the adversary's behaviour.[19]

Critics argue that this hypothesis represents nothing new—war planners always attempt to forecast the enemy's reaction and then adapt. However, current ADF doctrine is weighted towards an end state where the enemy cannot achieve its objective. This leads to attacks on physical capabilities. EBO focuses on an end state where the enemy will not perform activities to achieve its objective.[20] This cognitive approach exploits developments in experimentation and wargaming to precisely model the enemy's decision-making processes, and considers effects beyond the immediate.

EBO Doctrine

EBO is about overcoming massed force limitations by efficiently applying all national power elements to mitigate the material and human consequences of serial destruction. The aim is to understand complexities within the enemy system, and target critical nodes—not necessarily via military force—without triggering effects counter productive to achieving national objectives. The concept is depicted schematically in Figure 3. Historical battlespace views are limited to an Area of Operations (AO) containing physical military targets. Current doctrine extends this view by assembling physical targets into target systems, enabling system neutralisation by attacking critical nodes. EBO iterates the systems approach by considering not just direct effects of the attack, but indirect effects in multiple effect domains. Understanding mechanisms that link effects between domains, systems and targets is fundamental to EBO.

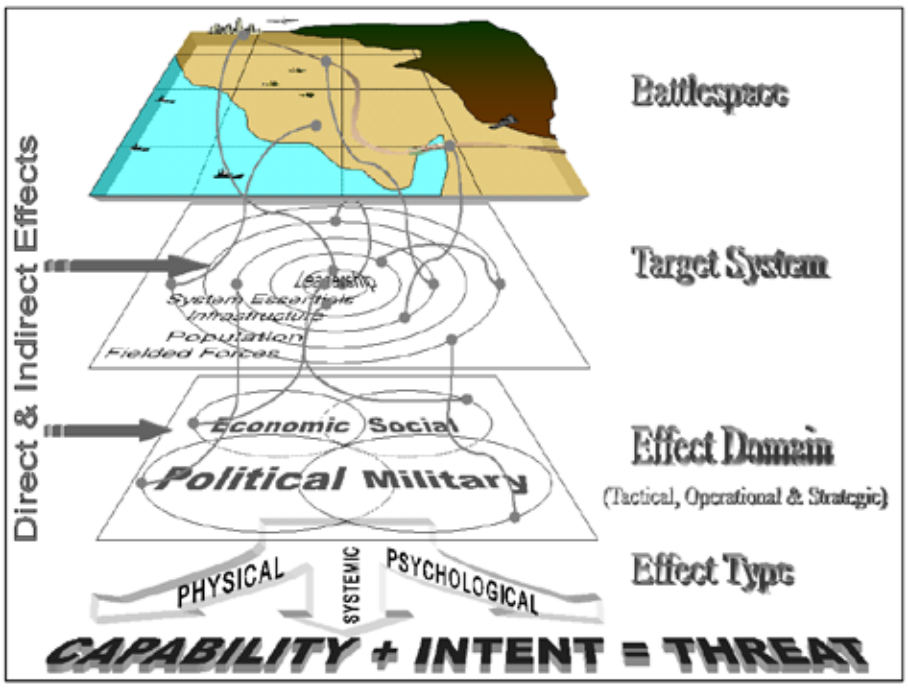

Figure 3: EBO Schematic

EBO emphasises massing effects through the synergy of military and non-military actions. Effects are caused by mechanisms with a taxonomy as follows:

a. **Direct Effects**. These are also known as first order or immediate effects. They occur when no intermediary mechanism resides between the action and outcome. For example, bombing a bridge has the immediate effect of degraded enemy mobilisation. Direct effects can be:

   (i) physical,

   (ii) functional,

   (iii) collateral, and

   (iv) psychological.

b. **Indirect Effects**. Effects rarely occur in isolation from each other. Indirect effects are the final result of multiple mechanisms triggered from a direct effect. They tend to be delayed and are less recognisable than direct effects. For example, a second order effect of bombing the bridge may be that engineers build a temporary bridge. A third order effect may be rising discontent in the local population, now unable to travel freely. Indirect effects can be of the same type as direct effects, but also include:

   (i) **Cascading Effects**. Effects rippling through the enemy system, and potentially effecting other systems are termed cascading. Usually, but not always, they cascade downwards—such as popular discontent in the bridge example.

   (ii) **Cumulative Effects**. Direct and indirect effects accumulate over time, usually building to a higher level effect. Attrition of armour to help force Iraq's withdrawal in the Gulf War is an example of a cumulative effect.

Operational planners are familiar with these phenomena, but EBO represents an increase in scale and complexity. Also, improvements in Precision Guided Munitions (PGM) and Command, Control, Communication, Computers, Information, Surveillance, and Reconnaissance (C4ISR) capabilities limit adverse, indirect effects, and weight EBO towards aerospace operations.

Effects impact different domains—such as economic, political, military and social—and also migrate across domains and target systems, via physical or psychological linkages. EBO requires intimate knowledge of system linkages to avoid unintended effects. In the past, this was very difficult, as illustrated by the Gulf War scorecard in Table 1. This is partially because legacy modelling and planning tools use attrition formats. Predominantly, the reason is that adversaries are Complex Adaptive Systems (CAS) with unpredictable, human elements, and effects are only visible after significant delays.[21] Nevertheless, recent analysis indicates that improvements in modelling soft factors potentially solve CAS dilemmas, and make effective EBO a reality.[22] These tools partner tailored organisational and planning processes dealing with uncertainty.

Target Set	*Planned Effects*	*Results*
Integrated air defences (IADS) and airfields	Early air supremacy; suppress medium-high air defences; contain or destroy air force.	IADS taken apart, but low-altitude anti-aircraft batteries and surface-to-air missiles (SAMs) remained; Iraqi air force did not engage and eventually fled to Iran.
Naval	Attain sea control.	All Iraqi combatants neutralised, but Silkworm missiles remained active.
Leadership and C 3	Disrupt government functioning; isolate Saddam from people and troops in the Kuwait Theatre of Operations (KTO).	Unknown disruption; no decapitation; telecommunications substantially reduced, but not cut.
Electricity and oil	Shut down national grid with minimal long-term damage; cut flow of fuels and lubricants to forces, with no long-term damage.	Rapid shutdown of grid; some unintended damage; degraded refining by 94%; destroyed 20% of fuels and lubricants
WMD and SCUDs	Destroy nuclear, biological, and chemical weapons and production capability; destroy nuclear program for the long term; prevent/suppress use.	Only some chemical weapons destroyed, though use was deterred; nuclear program merely "inconvenienced"; firings of missiles somewhat suppressed.
Railroads and bridges	Cut supply lines to KTO.	All bridges destroyed, but workarounds were made; short-term effects.
Republican Guard and other ground forces in KTO	Destroy Republican Guard; reduce effectiveness by 50% before the counteroffensive (kill half the armoured vehicles?).	Much less than intended effect on Republican Guard, although it was arguably immobilised; front-line units were either attrited to 50% or had morale severely reduced: they waited to surrender or be destroyed.

Table1: Gulf War Operational Scorecard[23]

EBO Organisation

National Strategic. EBO concepts are relevant to all levels of a conflict.

However, at the national strategic level they have the greatest utility. This is because whole of government resources accumulate to greater effect on the behaviour of belligerents than military force applied in isolation.[24] Also, important knowledge of an adversary may not reside exclusively within the military or government. National coordination of knowledge, resources and activity promotes system understanding, and avoids harmful indirect effects. EBO diverges from Clausewitzian concepts, and combines policy and warfare seamlessly.

Military Strategic. The proper translation of national objectives into military objectives is critical to EBO. Otherwise, military strategy could be in conflict with the political endstate or other government initiatives. For example, in East Timor, military objectives required the rapid stabilisation of Komoro airfield. However, VIP aircraft were used for initial sorties to avoid detrimental diplomatic effects. Strong and cooperative relationships are required between the military and other government departments to ensure all effects are synchronised.

Operational. Coordination across all government agencies is equally important at the operational level. This produces operational objectives expressed in terms of effects required, derived from a strategic effects campaign. Operational effects focus on changing the behaviour of adversary decision-makers. Operational commanders applying EBO use decision tools to predict cascading indirect effects, and deconflict indirect military effects from diplomatic and political campaigns.[25] This requires an adaptive approach to resource application, since different capabilities can achieve similar direct military effects, but have different indirect effects. For example, using Special Forces to conduct strategic strike has a different impact on an enemy decision-maker compared with using stand-off weapons. Therefore, effective planning is critical for effective EBO.

EBO Planning

Planning for EBO must be iterative and continuous. A generic process contains these steps:

a. **Environment Research**. Planning must begin at the strategic level before a concept for operations is developed. This is because EBO decision tools must be developed and enemy systems modelled prior to conflict. Therefore, EBO becomes highly context dependent because more generic enemy models contain more assumptions, and consequently greater error probability. Planners must continually scan the external environment to progressively understand potential belligerents and the nature of potential conflicts, and thus refine their models.

b. **Determining Goals and Strategy**. Once a situation develops, policy and military goals are framed in terms of intended effects. From here, a whole of nation strategy can be developed.

c. **Mission Allocation**. Elements of national power best producing desired effects are selected, and ways for working together determined.

d. **Effects Assessment**. Whole of nation resources are required to determine policy goal achievement. The military participates in this process but does not exert control. Non-government resources are also utilised.

In EBO planning, it is critical that intelligence does not just deliver a finished product, but becomes fully integrated into each stage.

From the military operational perspective, planning hinges on correct targeting processes. The focus is not on, 'Did we do the action correctly?' but 'Did we do the correct action?'[26] Therefore, measurement systems need to be in place prior to military action. In the application of aerospace power, accurate Battle Damage Assessment (BDA) is essential. Historically, BDA is highly damage oriented—that is, it focuses on physical effects, not functional, systemic or psychological effects.[27] Assessment loops based on desired effects prevent this problem. In Operation *Desert Storm*, planners reduced sorties against electric system targets once intelligence revealed power plant operators were turning plants off to avoid attack.[28] The required effect had been achieved.

Planning requires accurately understanding the enemy's cognitive and behaviour domains. Therefore, operational planners may come from fields outside the military. This represents a fundamental difference between EBO and previous concepts.

These examples demonstrate that operational commanders require timely assessments, based upon quantitative data, to avoid subjective decisions. Timeliness is difficult since indirect effects are often delayed. Hence, the planning process must anticipate lag by pre-empting operations with multiple intelligence sources, linked to effects-based measurements. An amalgam of the strategic and operational processes is shown at Figure 4.

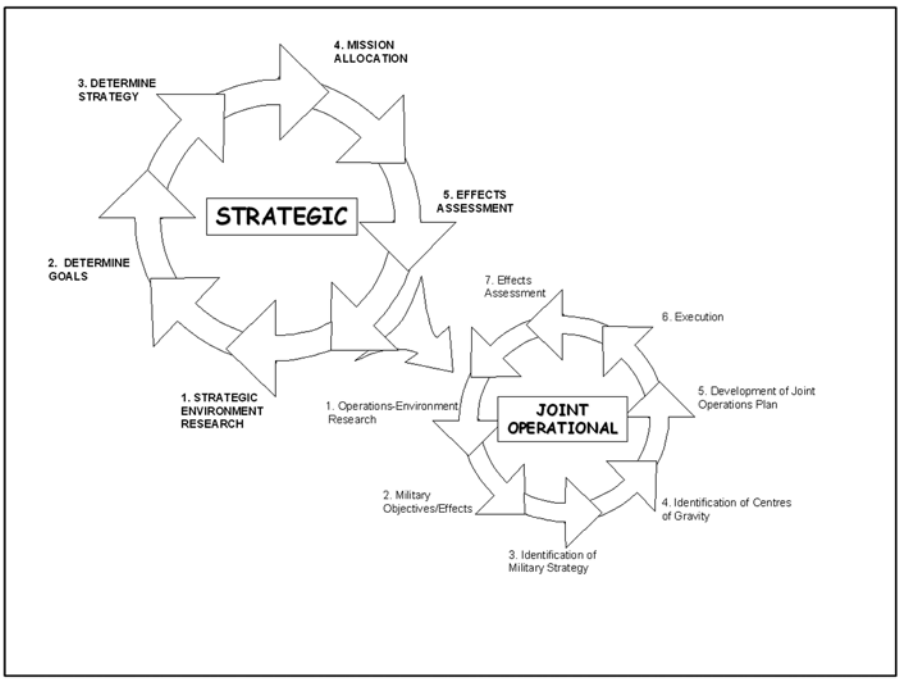

Figure 4: Effects-Based Planning

DIFFERENCES BETWEEN CONCEPTS

General Differences

Separating EBO from decisive manoeuvre is a false dichotomy. EBO does not substitute for current ADF and aerospace doctrine, rather it expands upon existing principles. Decisive manoeuvre emphasises a joint approach and recognises the military's role as a partner in whole of government initiatives to enforce national will. EBO is not just strategy, but a formal process coordinating desired effects. It is also a cognitive framework, looking beyond defeating the enemy's military force by denying it its capabilities. Attriting capabilities successfully negates part of the threat, but altering intent prevents recurrence. Despite the difficulty of achieving this goal, it is fundamental to success.[29]

Doctrine Differences

Aerospace doctrine and EBO are closely linked. The difference is that current operational doctrine evolved from supporting ground forces. Aerospace doctrine, in an EBO environment, emphasises achieving strategic effects, rather than just military goals. This changes the JIPTL focus to include things that the enemy values. Decisive manoeuvre targets—such as interdiction points for ground forces—remain valid, but new value-based systems emerge. These might include the enemy decision-makers' finance, popular support, and lifestyle systems. Aerospace reach brings these systems into range.

Organisation Differences

EBO concepts are based upon a strategic–operational–tactical nation-state. Consequently, structures at strategic and operational levels that are designed to support current doctrine also support EBO. At the national strategic level, NSCC and SCNS coordinate whole of government responses. Distilling political will down to military strategic and operational levels is a normal part of ADF operations. The difference is the degree of horizontal coordination. Potential exists to create conflictions between economic, political, diplomatic and military campaigns—particularly at the operational level.

Within the military, the ADF is organised along environmental lines. This is a legacy warfare concept from separate sea, land and air campaigns. It also reflects a platform-based view of capability development.

Progression to joint operations attempts to integrate these arenas, while maintaining professional mastery in each operational environment. However, pure EBO is beyond joint. It blends organisational structures, enabling the commander to control military resources according to the effects required, instead of the operational environment.

Planning Differences

EBO planning cycles and strategic–operational planning cycles are not fundamentally different. Each is based upon a rational decision-making process. Again, differences lie in planning depth and scale. Planning must consider all effects, not just direct and second order effects. Existing planning tools, such as the JIPB, do not dissect enemy cognitive behaviour enough to fully enable EBO. Modelling and prediction analysis requires front loaded intelligence on an adversary's behaviour processes, prior to the start of conflict. Similarly, assessment procedures—particularly BDA—are not effects-based. The planning loop must close effects-based objectives and assessment fast enough to mitigate or avoid adverse cascading effects.

TRANSITION TO EBO

General Requirements

Transitioning from current warfare concepts to EBO requires an ADF wide approach.[30] Although it is possible for the RAAF to evolve and adopt many EBO precepts in isolation, this is neither desirable nor consistent with Force 2020 visions. Transition to EBO should be an iterative process, taking into account that US strategies may not suit Australia's smaller military or strategic environment. Doctrine underpins aerospace education, and must thus drive EBO cultural and procedural change, while considering Australia's security context.

Future Warfare. EBO is heavily dependent upon the context in which war is fought. Therefore, the ADF must identify the type of conflicts likely to involve Australia—especially as the lead nation.[31] From an EBO perspective, low intensity warfare would involve targets not always historically accepted, including:

a. leaders and the leadership system,

b. religious and cultural icons as part of belief systems, and

c. civilians as part of the war-making system.

This requires examining Australia's interpretation of the Law of Armed Conflict (LOAC) and extant Rules of Engagement (ROE). More importantly, Strategic Policy Group (SPG) must understand motivations of potential belligerents, and systems affecting their motivation. The RAAF must address these scenarios to determine whether future aerospace capabilities could achieve necessary effects.

Change Management. The history of EBO transition in the US indicates a formal change management strategy is necessary.[32] Currently, the RAAF views EBO as a future concept to be adopted once transition from platform-based to capability-based management is complete. A better strategy would adopt EBO principles in a modular format by developing current policy and procedures. This should be embedded in the Air Force Plan, and become part of the Air Force 2015 transformation strategy. While change management does not need to incorporate every facet of EBO immediately, institutional change will not occur without formal planning.

Training. EBO will not become institutionalised without training and experimentation to modify warfighting culture. Training should occur at strategic levels involving real decision-makers.[33] Current exercises remain force–on–force and attrition based. Consequently, only direct effects are considered and measured. For EBO to be successful, tactical level understanding of effects-based tasking is required, and planners need training in compensating for an adaptive enemy. This should be driven from the bottom up by restructuring ATOs.

Doctrine Considerations

Lexicon. Change management implemented through EBO training requires a common lexicon embedded in doctrine. Debate regarding EBO often becomes muddled because terms are misunderstood or used beyond their context. ADF definitions of EBO and the effects taxonomy should be developed by the ADF Warfare Centre

(ADFWC) to precipitate informed debate. From this baseline, individual Service doctrine centres can develop discussion papers. Debate is already well under way in the US. The focus of the Aerospace Centre should be determining whether US conclusions are valid for the RAAF without organic stealth and significant mass.[34]

Experimentation, Analysis and Modelling. The ability to predict effects, combine national power mechanisms, and target behaviour is highly dependent on effective experimentation. EBO concept validation is through small scale modelling, up to large-scale wargaming. This also forms part of the training and planning processes. Currently, these processes are based on mission systems and capability, leading to quantifying attrition.[35] EBO experimentation hinges on quantifying behaviour, and so must deal with uncertainty and the human element. US developments—in particular, Agent Based Distillations (ABD) coupled with increased processing power—enable EBO-like wargaming.[36] Transition in the ADF to a family of EBO models should form part of Military Strategy Branch's (MSB) Defence Experimentation Framework (DEF). Overseas experimentation capabilities—accessed through DEF—coupled with Air Force's HEADWAY experimentation program would test EBO using RAAF capabilities.

Organisation Considerations

National. The national security committee structure is adequate for EBO transition. NSCC guidance includes political restraints. These are effects government departments should avoid precipitating. SCNS is the appropriate forum for deconflicting whole of government effects strategies. The SPCG should then translate strategic effects into department campaigns. Realistically, however, transition to this pure effects environment is realistically a long term objective. The ADF should be prepared to operate in 'pull-down' mode, extracting effects and limitations, without relying on a national EBO policy.

Military Headquarters. Without a national EBO process, Headquarters' responsibilities increase for deconflicting military operations with other national power elements. Joint warfighting is about managing the seams between maritime, land and aerospace. EBO is about managing direct and indirect effects on two levels:

a. **National Strategic**. Better inter-department liaison is required. Relationships need building at all levels, particularly with the Department of Foreign Affairs and Trade (DFAT).

b. **Military Operational**. The Force Element Group (FEG) and environmental component command structures may not be efficient. A more effective structure may be joint FEGs of combat capability, combat support, and C4ISR. However, extant command arrangements, with increased liaison, should remain as an iterative step.

Intelligence. Transition to EBO will not be possible without enhanced intelligence capabilities. Behavioural intelligence needs to be a part of every stage in every process. Assessing behaviour effects requires increased Human Intelligence (HUMINT) and interoperable C4ISR. Intelligence feeds the experimentation process before conflict, and continues feeding to enable modification. Importantly, EBO intelligence sources come from outside the military and include industry, interest groups, and humanitarian organisations. These must inform both deliberate and immediate planning.

Planning Considerations

Deliberate. Introducing EBO into deliberate planning will not prevent strategic misjudgments. However, it is an iterative improvement on the present condition. At the national strategic level, planning for denial of the sea-air gap is destruction based. Deliberate planning along EBO lines orients thinking towards an enemy's motivation for attacking Australia, and how that could be changed. This could lead to fundamentally different capability development over the long term. AIPS should remain a strategic planning product, but with cause and effect relationships incorporated. Information is sourced from day to day policy outcomes with regional neighbours. However, the bulk of the deliberate planning process should develop effects measurement systems, because once conflict begins it may be too late to set these in place.

Immediate. ADF immediate planning processes are suitable for EBO. However, steps within JMAP, JIPB and targeting require development. The flavour of each process is similar to decisive manoeuvre, so only second order military effects are considered. Although the rhetoric speaks to linking action with national will, the

BDA process and assessment mechanisms may not be timely enough to create effects-based planning. Current aerospace capabilities for conducting BDA fall short of systems analysis. Also, planning tools designed to predict indirect effects are not available. However, experience and instinct are potential substitutes.[37] Planning and target selection is possible without elaborate EBO tools. Initially, HQAST and Headquarters Air Command (HQAC) should implement EBO by changing the immediate planning focus and ATO format, rather than reinventing procedures.

CONCLUSION

Current ADF warfare concepts are not overwhelmingly different from EBO concepts. ADF doctrine is based on defending the sea-air gap through operational application of decisive manoeuvre. Concepts for operations develop from strategic guidance formulated through the national security committee structure. This system enables a whole of government approach to enforcing national will. Decisive manoeuvre is joint doctrine exploiting aerospace capabilities in tandem with land and maritime capabilities. It underpins ADF methods for achieving political objectives using military force. Although based on destroying enemy capability, current warfare concepts extrapolate linearly to an EBO concept.

EBO retains capability based warfare principles and includes a focus on changing an adversary's behaviour through careful application of national power. Military and non-military force is applied, cognisant of both direct and indirect effects. Even without EBO, second and third order effects still occur—but are unaccounted for during planning. EBO gains leverage from developments in experimentation tools to predict consequences so commanders can take steps to mitigate those consequences or, if necessary, alter their strategy. EBO is aerospace centred since behavioural change is best achieved through strategically targeting the enemy's value systems and aerospace power offers the required reach and penetration. However, this is highly dependent upon the strategic context, and land or maritime forces may provide the weight of effort in some scenarios.

Regarding doctrine, organisation and planning, the RAAF must adopt a formal change management policy to incorporate EBO into extant procedures, processes and structures. Change is possible through an iterative process in parallel with transformation from a platform based to a capability based air force. Change must be driven by doctrine, built upon a common lexicon, and implemented through EBO training at all levels. The heart of change is modified targeting concepts. The targeting process must be developed to incorporate a systems view that extends to the behavioural and cognitive domains, and the linkages between domains. Force 2020 grasps the beginnings of these concepts. However, if the RAAF waits until 2020, and hopes to slowly migrate to EBO, cultural change will not occur. The RAAF will become irrelevant in combined operations, and find hardware inter-operability is negated by an attrition versus effects doctrine disconnect.

Recommendations

A recommended COA for the RAAF to transition to EBO is as follows:

a. Develop an EBO lexicon. The ADFWC should develop an EBO lexicon. From this basis, the Aerospace Centre should issue a discussion paper on EBO applicability in the RAAF.

b. Implement EBO change management. Air Force Headquarters (AFHQ) should implement an EBO change management strategy through the Air Force Plan and Air Force 2015 strategies.

c. Scan the strategic environment. AFHQ should scan the strategic environment, based upon SPG futures, to determine contexts for EBO application, which can then drive EBO capability development.

d. Modify exercises. HQAC should modify exercises to incorporate EBO doctrine at each level. Also, exercises should involve liaison with other government departments.

e. Develop EBO experimentation. Air Force should develop indigenous EBO experimentation using HEADWAY to leverage overseas EBO experimentation projects through MSB.

f. Modify planning and targeting processes. HQAC should modify its planning and targeting processes, and establish EBO assessment measures and intelligence systems.

ENDNOTES

[1] Deptula, Brigadier General D.A. *Effects-Based Operations: Change in the Nature of Warfare*, Aerospace Education Foundation, Arlington, 2001, pp. 1–6.

[2] United States Department of Defence, *A Concept Framework for Joint Experimentation: Effects-based Operations (Draft)*, USJFCOM J9 Concepts Department, Washington, 2001, p. ii.

[3] Deptula, *Effects-Based Operations*, p 25.

[4] Department of Defence (Commander Headquarters Australian Theatre), *Australian Warfighting Concepts to Guide Campaign Planning: Decisive Manoeuvre*, Defence Publishing Service, Canberra, 1998, p. 1.

[5] Royal Australian Air Force (Headquarters Air Command), *AAP1002 The Operational Air Doctrine Manual (1st ed)*, Defence Publishing Service, Canberra, 1999, pp. 15–16.

[6] Department of Defence (Australian Defence Headquarters),

Australian Defence Doctrine Publication: Foundations of Australian Military Doctrine, Defence Publishing Service, Canberra, 2002, chap 7.

[7] Department of Defence (Head Strategic Command Australian Defence Headquarters), *Australian Defence Force Publication 9: Joint Planning*, Defence Publishing Service, Canberra, 1999, p. 3-3.

[8] *Ibid*.

[9] During the Vietnam War the command and control structure elevated target approval to the Executive Level of government. This undermined operational planning since strategic and operational levels became bypassed; Beagle, Major T.W. *Effects-Based Targeting: Another Empty Promise?* Air University Press, Maxwell Air Force Base, 2001, pp. 46–7.

[10] Department of Defence (Head Strategic Command Australian Defence Headquarters), *Australian Defence Force Publication 9*, p. 3-7.

[11] *Ibid*.

[12] *Ibid*., p. 8-3.

[13] *Ibid*., p. 8-4.

[14] *Ibid*., p. 1-1.

[15] Department of Defence (Commander Headquarters Australian Theatre), *Australian Defence Force Publication 23: Targeting*, Defence Publishing Service, Canberra, 2000, p. 3-3.

[16] This is a Gulf War criticism, since Iraq's military capabilities were destroyed, but the strategic objective of regime change was not achieved; Davis, P.K. *Effects-Based Operations (EBO): A Grand Challenge for the Analytical Community*, RAND, Santa Monica, 2001, p. 21.

[17] *Ibid.*, p. 7.

[18] *Ibid.*, p. 2; Beagle, *Effects-Based Targeting*, pp. 46, 47, and 78.

[19] United States Department of Defence, *A Concept Framework*, p. ii.

[20] Lee, D.B. and Kupersmith, D. *Effects-Based Operations: Objectives to Metrics Methodology—an Example*, paper presented to Military Operations Research Society Analysing Effects-Based Operations Workshop, January 2002, Vienna, 2002, p. 4.

[21] Davis, *Effects-Based Operations (EBO)*, p. 24.

[22] Alberts, D.S. Garstka, J.J. and Stein, F.P. *Network Centric Warfare: Developing and Leveraging Information Superiority (2nd ed)*, Department of Defense C4ISR Co-operative Research Program, Washington, 2000, p. 174; Bullock, R. *Using Influence Nets to Model a Nation-State*, Air Force Studies and Analysis Agency, Pentagon, 2002, sects 4-5; Davis, *Effects-Based Operations (EBO)*, pp. 29-30.

[23] Davis, *Effects-Based Operations (EBO)*, p. 23.

[24] For example, Operation *Allied Force* combined aerospace power with Russian diplomacy, economic sanctions, and NATO solidarity to finally force Milosevic to capitulate.

[25] Normally these decision-tools would be computer-based applications derived from models and experiments. However, they also take simpler forms—for example, group brain-storming sessions.

[26] Beagle, *Effects-Based Targeting*, p. 11.

[27] For example, in Operation *Desert Storm* assessors categorised an intelligence HQ 25 per cent degraded, because 25 per cent of the building was destroyed. Yet, functionally it was completely destroyed because it was abandoned; Beagle, *Effects-Based Targeting*, p. 89.

[28] Deptula, *Effects-Dased Operations*, p. 12.

[29] For example, in Vietnam significant attrition of North Vietnamese forces failed to achieve victory. The Gulf War represents an example where Iraq's military capability was severely depleted, but Saddam Hussein's intent remains, and, consequently, so does the threat.

[30] Although EBO works best in a whole of nation environment, transitioning to this end-state is beyond the scope of this paper.

[31] Van Creveld theorises future war will undergo metamorphosis from nation-state conflicts over policy and interests, to non-political conflict based on justice, religion and maintaining existence (the current War on Terrorism is an example); Van Creveld, M. *The Transformation of War*, The Free Press, Sydney, 1991, pp. 124–56.

[32] Mann et al argue EBO implementation in the US has been piecemeal and remains uninstitutionalised; Mann, E. Endersby, G. and Searle, T. 'Dominant Effects: Effects-Based Joint Operations', *Aerospace Journal*, vol XV, no. 3, p. 94.

[33] For example, Exercise *Kingfisher* and Exercise *Crocodile* stop short of considering adversary decision-making behaviour at the national-strategic level. Their primary focus is on neutralising capability, rather than changing intent; discussions with HQAC staff 16 Sep 02.

[34] US literature often links EBO to parallel warfare, and parallel warfare is heavily dependent on stealth and (especially in the Gulf War) mass.

[35] Davis, *Effects-Based Operations (EBO)*, pp. 29–30.

[36] McCrabb, M. 2002, *Behavioral Modelling and Wargaming for Effects-Based Operations*, Military Operations Research Society, Alexandria, pp. 12-15; Military Strategic Experimentation Branch, Defence Experimentation Framework Baseline Document (draft), Directorate Military Strategy, Australian Defence Headquarters, Canberra, 2002, p. 89.

[37] Operation *El Dorado Canyon* (1986) against Libya is an example of an effects-based operation without elaborate effects-planning tools. The aim was not to destroy capability, but change the leader's mind, and the chosen targets arguably achieved this goal; Clarke, S. *Strategy, Air Strike and Small Nations*, Air Power Studies Centre, Fairbairn, 1999, pp. 52–4.

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