

BATTLE MANAGEMENT AS A BASIC AIR FORCE DOCTRINE  
OPERATIONAL FUNCTION

A THESIS PRESENTED TO THE FACULTY OF THE U.S. ARMY  
COMMAND AND GENERAL STAFF COLLEGE IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE  
DEGREE

MASTER OF MILITARY ART AND SCIENCE  
JOINT PLANNER

BY

JON M. RHONE, MAJ, USAF  
M.A., AMERICAN MILITARY UNIVERSITY  
MANASSAS, VA, 2005

FORT LEAVENWORTH, KANSAS  
2008

Approved for public release; distribution is unlimited.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. <b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>					
1. REPORT DATE (DD-MM-YYYY) 13-06-2008		2. REPORT TYPE Master's Thesis		3. DATES COVERED (From - To) AUG 2007 – JUN 2008	
4. TITLE AND SUBTITLE Battle Management as a Basic Air Force Doctrine Operational Function				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Jon M. Rhone, Maj USAF				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College ATTN: ATZL-SWD-GD Fort Leavenworth, KS 66027-2301				8. PERFORMING ORG REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT According to JP 1-02, Department of Defense Dictionary of Military and Associated Terms, battle management is "The management of activities within the operational environment, based on the commands direction, and guidance given by appropriate authority." The crews that execute the battle management function are awarded the 13B AFSC and are called Air Battle Managers. This thesis explores the validity or feasibility of adopting battle management as an operational function in United States Air Force Basic Doctrine. Specifically, the study focuses on whether or not the duties associated with battle management meet the criteria listed in basic doctrine to be formally considered an operational function. Air Force Basic Doctrine contains seventeen key operational functions, but does not list battle management as one of them. The impact battle management has on mission accomplishment is significant enough to warrant clearly written doctrinal guidance. The lessons learned from multiple, recent operations show the importance of integrating battle management into all aspects of every Aerospace operational function. Due, in part, to a lack of doctrinal guidance that covers battle management, many military operational leaders do not understand how to properly integrate battle management functions into mission planning, execution, and debriefing. This study will use historical combat operations, personal interviews, and doctrinal analysis to show why battle management is indeed a vital operational function of Aerospace power.					
15. SUBJECT TERMS Battle Management, ABM, USAF C2 Doctrine, Rhone					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT (U)	b. ABSTRACT (U)	c. THIS PAGE (U)			19b. PHONE NUMBER (include area code)
			(U)	82	

Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std. Z39.18

MASTER OF MILITARY ART AND SCIENCE  
THESIS APPROVAL PAGE

Name of Candidate: Major Jon M. Rhone, USAF

Thesis Title: The Case for Adding Battle Management to Basic Air Force Doctrine

Approved by:

\_\_\_\_\_, Thesis Committee Chair  
LTC John Esch, MMAS.

\_\_\_\_\_, Member  
Arthur T. Frame, Ph.D.

\_\_\_\_\_, Member  
Lt Col Richard Telles, M.S.

Accepted this 13th day of June 2008 by:

\_\_\_\_\_, Director, Graduate Degree Programs  
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

### BATTLE MANAGEMENT AS A BASIC AIR FORCE DOCTRINE OPERATIONAL FUNCTION, by Major Jon M. Rhone, 82 pages.

According to JP 1-02, Department of Defense Dictionary of Military and Associated Terms, battle management is “The management of activities within the operational environment, based on the commands direction, and guidance given by appropriate authority.” The crews that execute the battle management function are awarded the 13B AFSC and are called Air Battle Managers. This thesis explores the validity or feasibility of adopting battle management as an operational function in United States Air Force Basic Doctrine. Specifically, the study focuses on whether or not the duties associated with battle management meet the criteria listed in basic doctrine to be formally considered an operational function. Air Force Basic Doctrine contains seventeen key operational functions, but does not list battle management as one of them. The impact battle management has on mission accomplishment is significant enough to warrant clearly written doctrinal guidance. The lessons learned from multiple, recent operations show the importance of integrating battle management into all aspects of every Aerospace operational function. Due, in part, to a lack of doctrinal guidance that covers battle management, many military operational leaders do not understand how to properly integrate battle management functions into mission planning, execution, and debriefing. This study will use historical combat operations, personal interviews, and doctrinal analysis to show why battle management is indeed a vital operational function of Aerospace power.

## ACKNOWLEDGMENTS

This thesis is dedicated to the Happy Few--those Air Battle Managers and leaders who continually fight to educate the Armed Forces about the battle management profession. Through your effortless dedication to the instruction of the application of aerospace power, the Armed Forces of the United States are the best in the world. To the leaders of the Air Battle Manager community: Without your years of mentorship and candid input to both my career and this study, battle management as an aerospace operational function would not be where it is today.

I would also like to thank the members of my committee for their assistance and guidance in the development of this thesis. Lieutenant Colonel John Esch of the Department of Joint Interagency Multinational Operations provided a great deal of direction and kept me on course. Dr. Frame of the Department of Joint Interagency Multinational Operations offered his academic and analytical skills, aided in research techniques and helped me conceptualize. Lieutenant Colonel Richard Telles of the Air Force Element provided timely, continuous, and constructive feedback, as well as helping me understand and formulate the problem in order to frame my conclusions and recommendations. All three instructors dedicated their personal time and energies to my research efforts. Their personal attention to developing this thesis made it a very pleasant and valuable learning experience.

I especially want to thank my loving and considerate family for supporting me in this endeavor. To my role models: my parents, Jim and Judy Rhone, thank you for your prayers of encouragement, for taking your time to help me raise the girls, and for the

home-cooked meals each month. I could not have completed this endeavor without your help. To my amazing children, Ryleigh and Riana, who had to grow up faster than they should have. Thank you for helping me to keep everything in perspective through your persistent humor and reminders of what is really important in life. I am so proud to be your father. And to my hero, my brave and loving wife, Tisha: Thank you for your steadfast support over the past ten years, and for the motivation across the miles this past year. Thank you for doing more than most people will ever know in the defense of our freedom.

Freedom is not free!

## CONTENTS

	Page
MASTER OF MILITARY ART AND SCIENCE THESIS APPROVAL PAGE .....	iii
ABSTRACT .....	iv
ACKNOWLEDGMENTS .....	v
ACRONYMS .....	viii
ILLUSTRATIONS .....	x
CHAPTER 1 INTRODUCTION .....	1
Thesis Intent and Primary Research Question .....	7
Assumptions .....	10
Limitations and Delimitations .....	11
CHAPTER 2 LITERATURE REVIEW .....	13
The Vision for Battle Management .....	17
The Role of Battle Management Systems .....	19
CHAPTER 3 METHODOLOGY .....	26
CHAPTER 4 CONCLUSIONS AND ANALYSIS .....	32
Conclusions .....	32
Secondary Questions .....	36
Distinguishing between Command and Control and Battle Management .....	36
Operational Function Criteria .....	46
Warfighting Task .....	47
Operational Level Effects .....	50
Delivers Air and Space Power to the Joint Force Commander .....	57
Planned and Executed at the Operational Level by a Component Commander ....	60
Primary Question .....	62
CHAPTER 5 RECOMMENDATIONS .....	64
The Way Ahead .....	64
Final Thought .....	67
REFERENCE LIST .....	69
INITIAL DISTRIBUTION LIST .....	72

## ACRONYMS

AADC	Area Air Defense Commander
ABCCC	Airborne Battlefield Command and Control Center
ABM	Air Battle Manager
AFDD	Air Force Doctrine Document
AEF	Aerospace Expeditionary Force
AETACS	Airborne Element of Theater Air Control System
AFOTTP	Air Force Operational Tactics, Techniques, and Procedures
AFTTP	Air Force Tactics, Techniques, and Procedures
AMC	Airborne Mission Coordinator
ANG	Air National Guard
AOC	Air Operations Center
AOR	Area of Responsibility
ATO	Air Tasking Order
AWACS	Airborne Warning and Control System
AWC	Air War College
BLOS	Beyond Line of Sight
BM	Battle Management
BMC2	Battle Management Command and Control
C2	Command and Control
C2ISR	Command Control, Intelligence, Surveillance, and Reconnaissance
CAF	Combat Air Forces
CAS	Close Air Support
C/JFACC	Combined/Joint Forces Air Component Commander



COP	Consolidated Operational Picture
CRC	Control and Reporting Center
CSAR	Combat Search and Rescue
DCA	Defensive Counter Air
DT	Dynamic Targeting
EBO	Effects Based Operations
FTU	Flying Training Unit
HVAA	High Value Airborne Asset
IFF	Interrogator Friend or Foe
JP	Joint Publication
JSTARS	Joint Surveillance, Targeting, and Attack RADAR System
MAAP	Master Air Attack Plan
MDS	Major Design Series
NEO	Non-combatant Evacuation Operation
OTS	Officer Training School
PDS	Passive Detection System
PR	Personnel Recovery
ROTC	Reserve Officer Training Corps
SATCOM	Satellite Communications
TACS	Theater Air Control System
TFC	Tactical Fluid Control
TTP	Tactics, Techniques, and Procedures
UABMT	Undergraduate Air Battle Management Training
UJTL	Universal Joint Task List
WSO	Weapons System Officer

## ILLUSTRATIONS

	Page
Figure 1. Battle Management Core Competencies.....	3
Figure 2. Operational Functions.....	8
Figure 3. USAF and USA members participate in a joint exercise at the 613 <sup>th</sup> Air and Space Operations Center.....	20
Figure 4. CRC RADAR and IFF interrogator.....	21
Figure 5. CRC equipment under camouflage.....	22
Figure 6. E-3 Sentry AWACS.....	23
Figure 7. E-8 JSTARS.....	24
Figure 8. ABM Career Core Competencies .....	42
Figure 9. TACS Architecture .....	44
Figure 10. Operational Functions.....	46
Figure 11. Col John Boyd’s OODA Loop.....	51

## CHAPTER 1

### INTRODUCTION

Battle Management (BM) has been around since the inception of combat. Although it may not have been a formal specialty code in the armed forces, there was someone responsible for understanding the operational environment and managing the changes required to meet the commander's desired end state. This someone was one who understands the capabilities of both the adversary and friendly forces, who also has the situational awareness and situational understanding to determine if the game is being executed in accordance with the plan, or if there are events occurring that require changes to the game plan. The difference between situational awareness and situational understanding is subtle. According to the Army's Situational Awareness Knowledge Center Website "Situational Awareness is the ability to generate actionable knowledge through the use of timely and accurate information about the Army enterprise, its processes, and external factors" (<http://www.army.mil/armybtkc/focus/sa/index.htm>). Simply put, situational awareness is knowing what is going on around you. According to Global Security's website ([globalsecurity.org](http://globalsecurity.org)), "Situational awareness is defined as 'the ability to maintain a constant, clear mental picture of relevant information and the tactical situation including friendly and threat situations as well as terrain.'" Situational understanding is "the product of applying analysis and judgment to the unit's situational awareness to determine the relationships of the factors present and from logical conclusions concerning threats to the force or mission accomplishment, opportunities for mission accomplishment, and gaps in information (FM 17-96, 2001, 1-13).

In addition to situational awareness, those responsible for BM must be intimately familiar with the Joint/Combined Forces Air Component Commander (J/CFACC) and mission commander's intent. Regardless of the type of mission, from combat operations to personnel recovery, to non-combatant evacuation operations (NEO), a successful mission requires effective BM. BM skills are even required in today's current irregular wars in Afghanistan and Iraq; the Close Air Support (CAS) and dynamic targeting (DT) missions are heavily dependent on coordination with ground commanders and Combined/Joint Air Operations Center (J/CAOC), a job BM crews are trained to do.

Early BM did not reach the operational level of war, but was focused on aiding the tactical fight. The contemporary BM mission set has evolved from its initial concept of operations. Early BM was born out of a need to provide fighters with early warning of adversary aircraft. Due to the relatively short RADAR detection ranges of fighter aircraft in the late 1960s and early 1970s, pilots and Weapons System Officers (WSOs) relied on information from off-board sources for adversary positional updates. Fighter aircraft used this information to put themselves in a tactically advantageous position. At the 30<sup>th</sup> anniversary celebration of the USAF E-3 Airborne Warning and Control System (AWACS), General Ronald E. Keys had this to say about the E-3s – and hence every battle management platform's emerging role.

When the E-3 started, it was purely an additive to our ability to conduct air defense. It would go out and point the fighters in the right direction. Now it can do so much more. The E-3 is becoming a gateway. It's not only a command and control aircraft but also a gateway to process information and send it to the larger force.

In Operation DESERT STORM, BM contributed to 39 of 41 air-to-air kills (Operation Desert Storm Lessons Learned, 1992). While BM will always have a role in

the air-to-air fight, known as tactical fluid control (TFC), over the past thirty-five years, the BM mission set has evolved. It is now more than simply providing early detection of adversaries and voicing vectors to friendly aerospace forces in order for them to secure an air-to-air kill. The current Air Battle Manager (ABM) – the Air Force Specialty Code (AFSC) that BM officers belong to – core competencies are shown below in Figure 1.

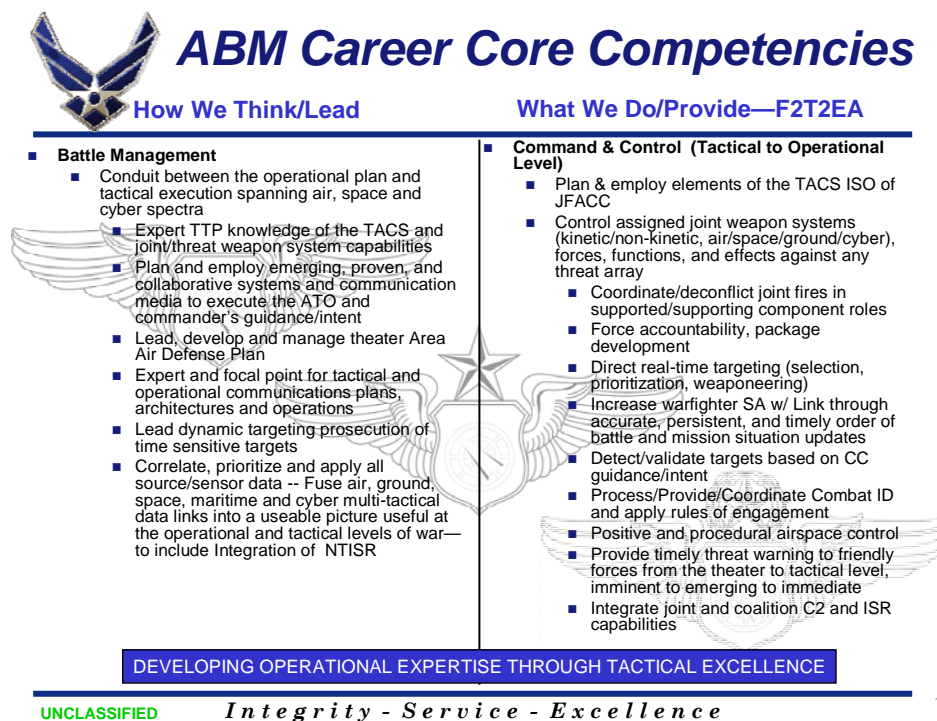


Figure 1. Battle Management Core Competencies  
Source: HQ USAF, AF/30Y briefing

Since BM has taken a larger role in the operational fight, one of the drawbacks is that BM is often thought of as being synonymous with Command and Control (C2)--a distinction that will be made later in the paper--due to the coordination between BM assets and the tactical missions. BM assets, many times, are the mouth piece of the AOC,

and in some instances relay messages from the C/JFACC to the tactical forces. The BM assets also have the capability and organic equipment to populate the Common Operational Picture (COP) which provides the AOC staff much of the situational awareness used to make operational and sometimes tactical decisions.

BM coordination with the operational level leadership was born out of necessity. Due to the fact that many tactical level decisions may have strategic level impact, operational and strategic leaders felt the need to have near real time situational awareness in order to make any required adjustments. Although beyond the scope of this study, those decisions many times were counter to the decentralized execution tenet that is at the heart of effective Aerospace Power employment. When integrated effectively into the overall mission, effective BM prevents the need for the operational level leadership to control the execution of the mission, which is centralized execution.

Proper integration is vital to ensuring that negative effects are minimized and that each mission has the greatest chance of success. Simply because BM crews and assets are integrated does not guarantee excellence of execution, but it exponentially increases the chances of mission success. The lack of proper integration usually results in significant lessons learned and re-learned regarding the inclusion of BM. From my experiences, there are a number of reasons the BM mission is often misapplied in the operational environment.

The most common include:

1. A misunderstanding of what BM is and does.

2. Mission commanders developing game plans without the aid of BM operators, or using the BM operators' skills too late in the mission planning for the recommended changes to be integrated.
3. BM operators not asserting themselves into the mission planning.

Many experienced pilots are now operational leaders and their experiences with BM was in using the BM assets in the early warning role described earlier--TFC. They were used to getting the number, location, altitude, speed, and heading of the adversaries that could be a factor to their flight. After the initial point out, a pilot and/or WSO would want threat updates in order to help defeat an adversary or the adversary RADAR.

The support BM crews give to the air-to-air fight, TFC, is still, and will most likely remain, a BM core competency. Another weapon BM brings to the fight is the ability to integrate all assets into the fight, optimize the force structure, and provide new solutions to the changing operational environment once deviations occur. It is often taught at most introductory combat training schools that no good plan withstands the first engagement. Although the author may not have intended this quote to specifically apply to Aerospace Power, it holds true. A well integrated BM plan and team will use all of the mission planning information and their training to adapt the plan based on the Air Tasking Order (ATO) assets available, the theater commander's intent, the apparent risk, and the enemy situation to make sure the mission is accomplished in accordance with the mission commander's intent.

In order for this to happen, the BM lead for the mission should be tied at the hip with the mission commander during mission planning. Although the mission commander

and the BM mission planning lead may be geographically separated, they need to figure a way for the BM mission planning lead to become intimately familiar with the mission commander's intent in order to include his or her contingency plans. This is important because once the mission commander experiences his or her first contact with the enemy, the priority of effort and focus shifts from executing the game plan to survival and flight execution. Effective BM allows the mission commander to reprioritize his or her focus while the lead BM operator implements the briefed contingencies, or develops his own contingencies based on knowledge of the plan and the commander's intent. There are times when the BM element consults with the mission commander prior to implementing unilateral plans, but that consultation is usually brief and includes the reason a deviation is necessary (time permitting) and, most importantly, a succinct synopsis of the new recommended game plan. The BM operator is trained to not waste the mission commander's time with a consultation. The plan is usually briefed in such a way that allows the mission commander to digest it and provide his or her answer quickly and concisely. Ultimately, plan approval is up to the mission commander unless that authority is delegated to the deputy mission commander or the BM element.

If the mission commander and the BM planner are not able to plan with such detail, the chances of BM guidance negatively affecting the plan increase. In combat, it is certain the BM team is going to have to make decisions without having the luxury of time to consult the mission commander prior to disseminating a new game plan. The best way for all players to ensure the tactical level decisions are made appropriately is to effectively integrate the BM plan from the beginning of mission planning.



When the BM plan is not effectively integrated, the fault does not lie solely with the mission commander. BM planners must assert themselves and inject themselves into the planning as early as possible. The BM community has a responsibility to make sure their expertise is given to the mission commander, as well as the individual package commanders, from the beginning of mission planning through the conclusion of the debrief. The BM community has made, and is continuing to make, great strides in making certain Air Battle Managers (ABM) understand their trade, but more importantly how to communicate and integrate their expertise to the mission leaders and operators.

### Thesis Intent and Primary Research Question

Consciously or not, the missions most operational commanders and leaders understand are those doctrinal missions that get the most “air time”. Ask any of them to explain Strategic Attack, and you will probably get a paraphrased version of “an offensive action conducted by command authorities aimed at generating effects that most directly achieve our national security objectives by affecting the adversary’s leadership, conflict-sustaining resources, and strategy.” (AFDD 1, 2003, 40) If you ask them to give you an explanation of the Counter Air mission, most operational leaders would be able to explain that it “consists of operations to attain and maintain a desired degree of air superiority by the destruction, degradation, or disruption of enemy air forces.” (AFDD 1, 2003, 41) They would also be able to tell you that it can further be broken down into either offensive or defensive counter air--OCA or DCA, respectively. While those examples are common and have been in the databases of most Air Force leaders since their Academy, Reserve Officer Training Corps (ROTC), or Officer Training School (OTS) training,

many of the operational level leaders will also be able to explain some of the newer operational functions such as information operations.

The point is that most tactical and operational leaders have a working knowledge, and perhaps some expertise, in most of the USAF operational functions. The operational functions are “the actual operational constructs airmen use to apply air and space power to achieve objectives.” (AFDD 1, 2003, 39) AFDD 1 also describes operational functions as, “the broad fundamental and continuing activities of air and space power.” (AFDD 1, 2003, 39) There are currently seventeen mission sets the Air Force believes meet the criteria to be labeled operational functions (Figure 2).

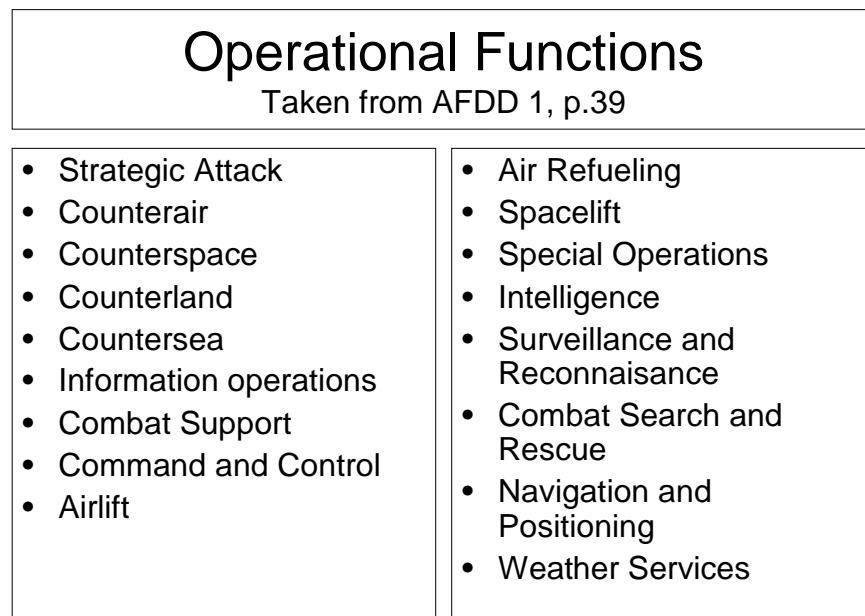


Figure 2. Operational Functions  
*Source:* (AFDD 1, 2003, 39)

The operational function criteria, as listed in AFDD 1 *Air Force Basic Doctrine*, are:

1. It must be planned and executed at the operational level by a component commander.
2. Must be a warfighting (operational) task, not an organizational (administrative) task.
3. It should create an effect at the operational level.
4. It should describe a finite operation that delivers air and space power to the JFC. (AFDD 1, 2003, 39).

The research will attempt to answer the following question: Does BM meet the criteria dictated in AFDD 1, *Air Force Basic Doctrine*, to be considered an operational function? Answering this question is important to joint and combined leaders and operators because every application of Aerospace power will have some level of BM. In order to properly understand both its impact and how to best integrate BM into theater Aerospace operations, combat leaders at the operational level and below should have a working knowledge of BM. One way to ensure BM gets the consideration required to positively affect the operational environment may be to make it a part of USAF basic doctrine.

The impact BM has on mission accomplishment may be significant enough to warrant clearly written doctrinal guidance. The fact that there is no doctrinal description of BM that accurately reflects its role in the contemporary operational environment may be a contributing factor to why many leaders do not understand how to properly integrate BM functions into mission planning, execution, or debriefing. Through researching case studies, personal interviews, and analysis of current doctrine, I will attempt to answer my

primary research question.

Ultimately, the method used to answer the primary research question is to first answer a number of secondary questions. The secondary research questions will aid in answering the primary research question, “Does BM meet the criteria dictated in AFDD 1, *Air Force Basic Doctrine*, to be considered an operational function?” The secondary research questions are:

1. Since C2 is already an operational function, is BM distinguishable enough to be a separate operational function?
2. What are the criteria used to determine operational criteria?
3. How should the BM operational function be organized in AFDD 1?

The secondary questions serve as the foundation the conclusions, and ultimately the recommendation, to the primary question will be based.

### Assumptions

Several significant assumptions are made through the entirety of this thesis. In order to fully understand the impact BM has on the planning and execution of Aerospace operations, the reader must have a working knowledge of the other key operational functions listed in *Air Force Basic Doctrine*. If not, I recommend reviewing them prior to reading this thesis in order to fully appreciate BM in the context of joint warfighting in relation to the other operational functions listed in Figure 2.

Another assumption made in this work is that all future Aerospace employment will require some level of BM. Without BM, successful application of Airpower is exponentially more difficult than it is in the current operational environment and more difficult than it was in the historical examples I will cite. This research will assume that

BM assets, planners, and operators will execute the missions listed in the following pages and that no other systems are developed to accomplish those same missions from outside of the operational theater. Additionally, this research assumes the BM crews are appropriately trained and proficient at executing BM duties and integrating with other combat assets, regardless of the mission set.

### Limitations and Delimitations

This thesis is entirely unclassified. Although some of the sources are classified, and discussing classified information may add to the fidelity of some of the case studies and historical references, the primary and secondary research questions do not require insertion of classified information. For those interested in the information and cleared to the appropriate level, I will annotate classified documents for review. There are multiple open source venues for information review and keeping this work unclassified will make it more reachable and able to be dispensed more easily and through more channels. One of the limitations I foresee in this research is defining and convincingly relating the differences between C2 and BM.

In order to effectively keep the paper focused, there are a number of delimitations this research paper will have. I will organize the paper in such a manner that each of my examples of BM core competencies and BM impacts in past operations relate to one of the operational function criteria. By doing this, I will ensure only relevant events and competencies are discussed. Delimitation is that this paper will concentrate on Air Force doctrine and BM and not discuss or research joint operations. Although the BM of Aerospace operations is a joint, and sometimes combined, endeavor, discussing the other services and allied roles in BM would cause the scope of this paper to be too broad. For

that same reason I will not include any discussion of the current initiatives to change the “traditional” air and battlespace deconfliction procedures. The personal interviews conducted for this paper were only conducted with leaders in the ABM community. I intentionally did interview leaders from other AFSCs because I wanted to determine how the ABM community felt about the current state of BM in joint and combined operations. Finally, I want to provide sufficient background to prove or disprove BM’s worthiness as an operational function without turning the thesis into a historical account of BM actions in combat or making it an ABM career field briefing. While it is instructive for the reader to understand what an ABM is and the BM core competencies, it is not necessary to be an expert in what it takes to make or become an ABM. It is sufficient for the reader to know that an ABM is the primary career field responsible for executing battle management duties in the operational environment.

## CHAPTER 2

### LITERATURE REVIEW

To conquer command of the air means victory; to be beaten in the air means defeat and acceptance of whatever terms the enemy may be pleased to impose.

Gen Giulio Douhet, 1921

While this statement most likely reflects the views of most every combatant, JTF, and Air Component commander, the reality is many operators who have been delegated the responsibility to execute and apply aerospace power do not have a working understanding of the role BM plays in achieving command of the air. Without that basic understanding it is not possible for them to optimally integrate the BM function into the mission package. Contributing to the lack of understanding is a lack of recent published research works on BM and its impact on the application of aerospace power. If a mission commander did not effectively integrate the Combat Search and Rescue (CSAR) or intelligence operational functions, the chances of an unsuccessful mission increase exponentially. Mission commanders are expected to know how to integrate those functions, largely due to the fact that these functions are basic doctrinal operational functions. Just as important is the contribution of BM elements, but partly because it is not a doctrinal operational function, many commanders are not expected to, nor do they, understand how to best integrate it into the mission. As the BM function became more important to tactical mission commanders, who are responsible for planning and leading the missions, and operational leaders in the AOC, the importance of having this mission accurately defined in doctrine increased. Chapter 1 demonstrated some of the ambiguities

between doctrine in defining BM, and the thin line between C2 and BM. Chapter 4 will discuss the differences in greater detail.

The misapplication of the BM mission has been a trend in near vertical learning curves at the beginning of new operations or when units rotate IAW the Aerospace Expeditionary Forces (AEF) cycle. Although I will not dismiss the fact that BM asset rotation will contribute to mistakes at AEF transition times, a doctrinal understanding of BM and how it should and could be integrated would help make the learning curve a little more horizontal. If proven true, I believe this thesis will persuade Air Force tactical and operational leaders that BM meets the established doctrinal criteria required and should be added to the list of operational functions in USAF basic doctrine.

I know of no other contemporary research arguing that the state of BM is such that the USAF is at a point where it may need to change basic doctrine. Although there has been discussion among tactical and operational leaders about the impact of BM on operations, specifically focusing on ideas that will ensure the BM mission set is understood by decision makers, I have not seen any professional journal articles, theses, or government documents conveying the need to add one more operational function to AFDD 1.

AFDD 1 is the foundation doctrine document for the employment of Aerospace Power and the focus of this research. Without a solid and accurate description of the elements of air and space power, those that AFDD 1 is intended to influence –all airmen– cannot fully appreciate how to best employ the assets that are the building blocks of Aerospace Power. The latest AFDD 1 is dated November 2003. Although BM operations



have changed significantly since Operation DESERT STORM, there is still little doctrinal guidance on how the BM fits into Aerospace Power employment.

Chapter 4 of AFDD 1, Roles Missions and Functions of Air and Space Power, describes “what air and space power in general, and the Air Force in particular, bring to the Nation.” (AFDD 1, 2003, 35). This chapter in AFDD 1 serves as a consolidated collection of the specific combat missions the Air Force performs. Like most doctrine, the descriptions of how to employ these elements are vague enough to allow operators and planners latitude in how to best apply these assets in combat situations. Missing from this chapter is how the different roles, missions, and functions fit together in combat. There is not a single operational function mentioned in Chapter 4 that should be applied unilaterally; they work best when integrated and were designed to be complementary and symbiotic in their relationships. However, there is no function identified to integrate the functions listed.

The other AFDDs—2-1, *Air Warfare*; and 2-1.7 *Airspace in the Combat Zone*—as well as the joint doctrine publications—JP 1, *Joint Warfare of the Armed Forces of the United States*; JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*; JP 3-0, *Doctrine for Operations*; JP 3-30, *Command and Control for Joint Air Operations*; JP 3-52 *Doctrine for Joint Airspace Control in the Combat Zone*; JP 3-56.1 *C2 Doctrine for Joint Operations*—are used to form my understanding of any joint doctrine guidance on BM. Researching these documents will also allow me to determine if the AFDD guidance on BM / C2 is adequately nested with the joint doctrine.

Additionally, researching Air Force and joint doctrine will establish the baseline that will determine how much weight other case studies and lessons learned will receive.

This is not to say that if other authors' research or opinions do not match doctrine, that they are invalid. In those cases that an opinion differs significantly from doctrine, I will look for other sources to corroborate that opinion before I give it weight in answering either the primary or secondary research questions.

While changes to doctrine are subject to a revision schedule, there are numerous professional journals that BM professionals are able to use to recommend changes in regards to how BM is used by the combat air forces (CAF) and joint community. While some BM professionals have taken advantage of these media to present their case to those that employ and are supported by Aerospace Power, their views on BM's impact are diverse. Evident in these different articles, many of which will be referenced throughout this thesis, is the ever-changing roles and differences in definitions of what BM truly is. What is consistent throughout the different literature used in this research project is the fact that BM has a significant impact on each and every mission set and operational function used to employ Aerospace Power.

Whenever someone considers adding to, deleting, or otherwise amending service doctrine, it is important to first reference joint doctrine. The dominance of joint doctrine is imperative to this research, especially as it relates to defining command and control. Although joint doctrine is authoritative, it is not directive or regulatory, and does not take away any services' right to employ and develop service doctrine as they see fit. This fact is often used as justification when service doctrine does not nest with joint doctrine. David Johnson of the Rand Corporation observed, "Absent significant reform, the joint system will continue to produce concepts that are an amalgamation of service doctrines...rather than demanding that the services specifically...support joint doctrine."

Additionally, Johnson's final recommendation in his work *Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era* is that "joint doctrine...must be overhauled. As it stands now, joint doctrine...reflects a consensus view rather than a truly integrated joint perspective." (Johnson, 2006, xvii) While this paper will not focus on how well joint and service doctrine complement each other, understanding that there are cultural biases that affect service doctrine is important to objectively conducting this research, specifically when considering how each service interprets joint definitions and concepts.

When researching BM, I found it is often confused with C2. Although Chapter 4 will discuss the differences in depth, this fact impacts the research of this thesis and the differences in C2 and BM must be established and understood in order to effectively answer the primary research question. If the two are not unique, it can be argued that BM is effectively enveloped in *Air Force Basic Doctrine* under the C2 operational function.

### The Vision for Battle Management

The ABM career field leaders have developed a vision for BM. This vision includes revamped core competencies as well as a career field pyramid for ABMs. Beyond the BM core competencies and the experiences of BM operators, there is little written about BM that has a common concise statement of what BM is and does from an operational impact perspective. This may be due to the fact that BM is involved with most operational functions and contributes to each of them in a different way. Many of the documents or lessons learned get into specifics of what BM provides to each individual task or operational function, but only a few of the works approach BM from a level that could be considered doctrinal in scope. In order to overcome this challenge, I

will collect the works available and conclude, based on the personal interviews, case studies, and available doctrine, if, and how, BM fits into Air Force Basic Doctrine as an operational function.

The current version of Air Force Basic Doctrine describes each operational function in paragraphs that describe what the function is, what it aims to accomplish when employed, and how it accomplishes those goals. It does not, however, discuss how these functions are integrated to apply aerospace power against the enemy. This concept is crucial to the understanding of BM's role in the application of Aerospace Power because BM effects span the rest of the seventeen operational functions.

If the answer to the primary research question--Does BM meet the criteria dictated in AFDD 1, *Air Force Basic Doctrine*, to be considered an operational function? --is an affirmative, then the idea of describing how the operational functions are integrated may have to be considered if the doctrine writers decide the points made in this research are valid. Effective and timely integration of assets is one of the main tasks assigned to BM platforms. In researching BM operations, I will investigate a number of BM platforms--weapons systems that are operated by aviators and/or trained BM crews. Each of the platforms researched has participated in operations and contingencies since Operation DESERT SHIELD in 1990. Although their primary missions are to manage the employment and execution of Aerospace Power, due to the sensor suites employed on these BM platforms, they are capable of being used in tailored roles that do not always include BM. Some of these missions include early warning and surveillance and intelligence preparation of the operational environment. The lessons learned from each of these assets, and their BM effects as a whole, will be the basis of the case studies.

### The Role of Battle Management Systems

The theater BM systems are consolidated under the umbrella of the Theater Air Control System (TACS). The TACS reference documents contain operational and tactical TTPs and concepts of employment. The TACS includes both ground based and airborne elements of the TACS (AETACS). The ground based elements of the TACS pertinent to the research of this thesis are the AOC and the control and reporting center (CRC). The E-3 AWACS and the E-8 Joint STARS are the relevant AETACS systems. The AOC is the lead element of the TACS; it houses the C2 nodes that the other three elements report to in the execution of their BM duties.

The AOC operational level TTPs are consolidated in Air Force Operational Tactics Techniques and Procedures (AFOTTP) 2-3.2. The focus of that document is establishing standards for the FALCONER AOC weapons system; there are five operational FALCONER AOC (figure 3) weapons systems deployed throughout the world. The FALCONER is the system “through which a...joint force air component commander exercises command and control of air, space, and information forces.” (AOC fact sheet)



Figure 3. USAF and USA members participate in a joint exercise at the 613<sup>th</sup> Air and Space Operations Center

Source: (AOC fact sheet).

CRC employment and TTPs are outlined in tactical doctrine 3-1.26, *Tactical Employment-Theater Air Control System*. The CRC is a mobile battle management platform that uses a RADAR and interrogator Friend or Foe (IFF) system to maintain control of and identify friendly and enemy aircraft (shown in Figure 4). It also boasts a robust communications systems consisting of line of sight and beyond line of sight (BLOS) communications. The BLOS communications capabilities includes satellite communications (SATCOM), as well as a web based collaborative communication set

used to communicate with other TACS elements. There are five active duty and ten Air National Guard (ANG) CRCs. (These numbers do not include the one active duty CRC training squadron, one ANG training squadron, and one ANG test squadron.) (Carpenter, 2007). CRCs are currently deployed to Afghanistan and Iraq.



Figure 4. CRC RADAR and IFF interrogator  
*Source:* CRC Fact Sheet



Figure 5. CRC equipment under camouflage  
*Source:* CRC Fact Sheet

The E-3 Sentry Airborne Warning and Control System (AWACS) (shown in Figure 6), “provides all-weather, surveillance, [battle management], and communications needed by commanders of U.S., NATO and other allied air defense forces” (E-3 Fact Sheet). It is a modified Boeing 707/300 airframe that is modified with a RADAR / IFF system. In addition to the active RADAR and IFF systems, the AWACS has a passive detection system (PDS) to supplement the active sensors and aid in identification of emitters.





Figure 6. E-3 Sentry AWACS

*Source:* E-3 Fact Sheet

#### The E-8C Joint Surveillance Target Attack RADAR System (JSTARS)

Is an airborne battle management, command and control, intelligence, surveillance and reconnaissance platform. Its primary mission is to provide theater ground and air commanders with ground surveillance to support attack operations and targeting that contributes to the delay, disruption and destruction of enemy forces. (E-8 fact sheet).

Like the E-3, the E-8 (Figure 7) is a modified Boeing 707/300 series airframe. Its modifications include a radome under the forward fuselage of the aircraft. The Radome houses a phased antenna array optimized to locate track and identify moving ground targets. The E-8 also has a robust LOS and BLOS voice and data communications suite that allows the flight, BM, and Army crews to communicate their picture and BM decisions to joint and coalition forces.



Figure 7. E-8 JSTARS

*Source:* E-8 Fact Sheet

The contemporary operating environment in which OAF, OEF, and OIF were fought required a change in the training of the ABM community and a resultant change in the BM community core competencies. These discussions that established the baseline for the change in BM core competencies began to take place at lessons learned conferences. The lessons published from OAF, OEF, and OIF focus on the integration of all of the Aerospace Power operational functions. These lessons are developed by experienced operators, many who are instructors and evaluators on their specific platforms. The CRC, E-3 AWACS, E-8 Joint STARS, and the ABMs who served in the AOCs during recent conflicts acknowledge and recognize the changing role of the BM. In addition to their expertise, each of the lessons learned conferences or meetings included expertise from assets that were responsible for other operational functions. For example, the defensive counter air (DCA) assets were represented by pilots with counter air experience; EW expertise was given by the EA-6B, RC-135 RIVET JOINT, EC-130H COMPASS CALL and F-16 community; CSAR experts lent personnel recovery expertise to the conference. Chapter 4 will cover the contributions of each of the platforms in detail. The salient point to the lessons learned case studies that will be discussed throughout this research is that most operational functions were represented at the BM

lessons learned portion of the conference. This is due, in part, to the fact that the Aerospace Power leadership understood the force multiplying effect effective BM had on the mission and that it was imperative to make sure the lessons learned documents reflected the need for BM to integrate those operational functions in order to meet the desired operational level effects established by the C/JFACC.

## CHAPTER 3

### METHODOLOGY

The research method used to successfully complete this research centered on a review of current joint and Air Force doctrine, an analysis of past and ongoing operations, via a study of available lessons learned, and personal interviews from BM career field leaders. The career field leaders all have operational BM and/or C2 combat experience. The combination of doctrinal literature review and comparing, or when required, contrasting doctrinal thought to the actual application of BM as it applies to planning for and executing aerospace power employment will form the basis for differentiating BM from C2. That distinction is essential to establishing a valid conclusion to the primary research question. The study of doctrine also serves as a baseline for determining if, and/or how, BM fits into Aerospace Power application. The doctrine review may also show how a lack of a coherent BM definition contributes to the confusion between C2 and BM. That confusion manifests itself as the lack of understanding of how to effectively integrate BM into Aerospace missions. Chapters 1 and 2 hinted at the confusion that sometimes arises in distinguishing C2 from BM. Chapter 4 will attempt to remedy much of the confusion while still describing the close relationship between C2 and BM, one necessary to effectively bridge the operational and tactical level of Aerospace operations.

Doctrine forms the foundation upon which we employ as a military force. Doctrine is developed, dictated by, and expresses a service's operational requirements and culture. Using that thought process, BM needs to be accurately described and defined

in USAF doctrine before officers can be expected to effectively apply BM in combat or humanitarian endeavors. Once the doctrine is concrete, it is up to the experienced leaders, operators and instructors to ensure the doctrine is correctly applied at all levels of warfare--strategic, operational, and tactical. One critical point about service doctrine is that it does not always nest with the guidance provided by joint doctrine. The first step in correcting that doctrine may lie in adding BM as an operational function. Through researching and comparing BM's role in recent conflicts and other operations to the designated criteria for labeling mission sets as operational functions prescribed in AFDD 1 *Basic Air Force Doctrine*, I intend to determine whether or not BM meets these criteria.

The main publications I will use to answer the primary and secondary research questions are AFDD 1, Basic Air Force Doctrine, "which documents the fundamentals of Aerospace Power," and the AFDD 2 series doctrinal documents. (AFDD 2, 2000, i) The AFDD 2 series illustrate "how our Air Force organizes and employs Aerospace Power throughout the spectrum of conflict at the operational level." (AFDD 2, 2000, i) Together these documents will be used to determine the depth of BM integration into doctrine. To show evidence of the need for sound and explicit BM doctrine as well as the importance operators and leaders place on BM integration, I will reference the lessons learned from Operations IRAQI FREEDOM, ENDURING FREEDOM, ALLIED FORCE, and DESERT STORM. These operations will serve to determine the extent that BM effects are felt at the theater operational level as well as demonstrate what affect poorly integrated BM had on theater operations. By comparing and contrasting these operations, I will determine if the BM lessons were re-learned in successive operations and if the lessons learned documented any recommendations with respect to BM

integration or the operational level effects BM created.

These references may also document the make-up of the mission planning cells, as well as make observations whether or not BM was adequately represented and integrated into the planning process. These case studies will be helpful in demonstrating how effective BM execution can increase the probability of mission success. This is especially true since most mission commanders become focused on other tasks once their flight or element pushes into the area of responsibility (AOR). The ABM and BM crews should be left to execute, and fix, the ATO in accordance with the mission commander's intent and briefed game plan. In addition to lessons from combat operations, I will research MOOTW events that required BM to determine if a conclusion can be drawn as to whether or not those examples answer either the primary or secondary research questions. For both the combat and MOOTW missions, I will use the operational function criteria as evaluation criteria to ensure the focus of the thesis document remains on target.

The sources for research were bounded by their direct correlation to BM. In many cases these sources labeled the BM missions as C2, a distinction that was made in Chapter 2 and will be discussed in more detail in Chapter 4. The sources' relevance to the thesis lie in their applicability to forming a working definition of BM or their use in demonstrating how BM relates to the criteria used to determine an operational function.

Initially, the doctrinal research focused on joint definitions and guidance found in a number of doctrine documents. Specifically, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*; AFDD 1, *Basic Air Force Doctrine*, AFDD 2-1, *Air Warfare*; and Joint Publication 3-01, *Joint Doctrine for Air and Missile Threats* were used to determine if there was a consensus between joint and Air

Force doctrine with respect to a working definition of BM. These same documents were also used to see if doctrine clearly distinguishes between BM and C2 or their effects. The research focused on determining if there were different doctrinal definitions for C2 and BM, and to determine if Air Force definitions were nested in joint doctrine, consistent with joint doctrine, or contradicted joint doctrine.

Since BM is a relatively young mission set and because there is a limited amount of nested doctrine or unclassified literature on BM's role in recent conflicts, personal interviews from recognized experts will fill the void in printed materials. All of the interviewees are recognized leaders in the BM career field. Those interviewed have combat experience, were instructors at the USAFWS, and/or commanded and led BM units (CRC, E-8, and/or E-3) in combat or combat support missions. Some of the interviewees also have experience in the Master Air Attack Plans (MAAP) Cell in OAF, OEF, and/or OIF. Each of the interviewees was initially given a common list of questions. Frequently, the answers to the initial questions led to branches or sequels of follow-on questions. The focus of the questions was to gain senior leader perspectives on the distinguishing characteristics of BM, especially as it relates to C2. Additionally, the questions focused on their opinion of BM effectiveness and any challenges or obstacles to optimizing the effectiveness of BM and integrating BM with the other doctrinal operational functions. The interviewees also lent their viewpoints on the best way(s) to overcome the challenges to integrating BM into all phases of Aerospace Power application. As mentioned earlier, those chosen for interviews have vastly different experiences in combat, combat support, and humanitarian operations. Their experiences in recent joint and combined operations are invaluable to showing how BM was

integrated into these operations, and more importantly what lessons resulted from those missions or campaigns. Finally, those interviewed were asked to provide their opinion on how BM lessons learned were being implemented into BM basic and continuation training in order to ensure BM professionals are prepared to integrate into Aerospace application missions.

The final research method used to reinforce joint doctrine and the BM career field leaders' testimonies were the actual lessons learned documents from Operations DESERT STORM, ALLIED FORCE, ENDURING FREEDOM, and IRAQI FREEDOM, as well as mission reports from multiple relief efforts and non-combatant evacuation operations. The challenge of using these lessons as a source is ensuring only UNCLASSIFIED information is documented and used in the thesis. Where I am not able to fully complete a point, due to classification, or if there is pertinent data that cannot be included in this UNCLASSIFIED thesis, I will point out how the information supports or does not support my thesis and list the source document where the information can be found. This data can be used by those who are interested and are able to access the information.

The purpose of all of the research is to develop empirical data to determine, in Chapter 4, whether the BM mission set is:

1. Planned and executed at the operational level.
2. Is a warfighting task and not an organizational task.
3. It creates an effect at the operational level.
4. It describes a finite operation that delivers air and space power to the JFC.

(AFDD 1, 2003, 39).



In other words, the data is used to determine if BM should be an Air Force operational function listed, defined, and described in AFDD 1, *Air Force Basic Doctrine*. Chapter 4 concludes with the answers to the secondary and primary research questions. In order to thoroughly answer the primary research question, the secondary research questions must be answered first. Once this has been completed, the answer to the primary research question will be obvious to me and to the reader. The answers to the secondary and primary research questions will lead to the final chapter of this paper. Chapter 5 includes the recommendations based on the researched data. Although the proposal specifically relates to Air Force Basic Doctrine, it may be applied to joint and combined operations that deal with the planning, application, and integration of BM into Aerospace Power operations.

## CHAPTER 4

### CONCLUSIONS AND ANALYSIS

The value of information exists in time since information most often describes fleeting conditions. Most information grows stale with time, valuable one moment but irrelevant or even misleading the next.

Marine Corps Doctrine Publication

#### Conclusions

Based on the review of doctrine, personal interviews, and lessons learned from recent operations, the following conclusions should be made with respect to adding BM as an operational function in Air Force Basic Doctrine. Prior to reviewing and measuring the empirical data against the criteria, it is instructive to revisit what an operational function is and why it is important in Air Force doctrine.

Using the baseline Air Force doctrine document, there are four descriptors of an operational function. The first thing an operational function does is describe “the actual operational constructs airmen use to apply air and space power to achieve objectives.” (AFDD 1, 2003, 39). When building a mission package from the beginning of planning through the mission debrief, these “constructs” form the baseline of the operators’ thoughts and focuses their efforts. These baselines are ingrained in young aviators from the time they begin undergraduate training and continue through their respective major design series (MDS) training in their flying training units (FTU). After training is complete, an understanding of the doctrinal constructs is required for an aviator to successfully complete required upgrades leading to mission command. Without an understanding of the various operational functions, it is likely that an aviator, planner, or

tactician will miss a vital element that may either result in mission failure, and/or make mission accomplishment more risky, difficult, and costly.

These constructs are nested into the next descriptor of operational functions. According to AFDD 1, operational functions are “the broad fundamental and continuing activities of air and space power.” (AFDD 1, 2003, 39) While a mission commander or planner does not need to have an in-depth knowledge of all of the systems being employed in the specific operation, he or she needs to have a breadth of working knowledge of the operational functions in order to put together a plan and mission package that has a significant chance of success based on the anticipated threat. As mentioned in the previous paragraph, the fundamentals of air power employment are ingrained into the minds of aviators from the time their training begins. Along with the master tenets of airpower—centralized control and decentralized execution—the operational functions are mission sets that airmen and professional aviators should be familiar with. If a mission set as vital to Aerospace Power employment as BM is not included as an operational function, there is little hope that airmen will ever understand the contribution it makes or how to integrate it into Aerospace operations.

Not only is BM a fundamental activity, it is also a *continuing* activity. There are very few missions that involve the application of Aerospace Power that do not involve some aspect of BM. MOST missions that are included as operational functions, and many that are not, require some form of BM in order to successfully complete the assigned task. BM crews are usually executing their missions before most of the other operational functions, and continue to execute after most of the other operational functions have completed their missions and/or tasks. For example, prior to the initiation

of hostilities in most recent major combat operations, BM crews were tasked with integrating ISR assets in order to provide planners and C2 authorities with the most current and relevant picture of the operational environment. Specifically, the crews attempted to locate enemy emitters, forces, and analyze adversary C2 nodes and communications architecture. This information can be used to update the running intelligence estimate C2 uses to make real or near-real time decisions. Whenever a viable C2 structure is established and operating in a theater, there is some element of BM that is performing tasks assigned by that C2 structure or authority.

That theater C2 entity is ultimately responsible for mission execution and uses the elements of the operational functions to accomplish the mission; in this example, it uses its assigned BM assets. Together, the operational functions “represent the means by which Service forces accomplish the missions assigned to the joint force commanders.” (AFDD 1, 2003, 40) The lessons from recent conflicts show, without question, the importance of BM in effectively accomplishing missions that involve the application of Aerospace Power or the integration of airpower with joint and coalition forces. ABMs are trained to not only understand the other operational functions, but are also skilled in how to best integrate these functions into a mission package. ABMs receive in-depth training in the concepts of integrating air assets from the time they enter their undergraduate training; this is one aspect of ABM training that makes it unique from other AFSCs.

According to the Undergraduate ABM Syllabus course description,

This course provides initial skill training...in the knowledge and skills necessary to perform duties as an air battle manager. The scope of training includes subjects designed to familiarize the graduate with: the capabilities and limitations of joint and threat fighters, bombers, tankers, [C2ISR] platforms, helicopters, air-to-air and air-to-ground armament; understand the principles of radar and [EA] and

[EP]; and be familiar with the [TACS]. Graduates will also be familiar with [BM] TTPs with regard to integration, force accountability, force management, recovery operations, special operations, global strike, and tactical data links.” (UABMT Syllabus, 2007, 1)

I make this point to show the breadth of knowledge ABMs receive from the beginning of their training. I am not advocating that young ABMs have the experience to lead mission packages early in their career, but even the youngest properly trained ABM, regardless of his or her platform/MDS, is an invaluable resource for a mission commander during planning, execution, and debrief of Aerospace Power missions. Without the recognition and proper integration of the BM skill set, assets, planners and mission commanders may have a more difficult time applying Aerospace power in the manner it was intended. There a number of lessons learned that document how a misunderstanding of BM, or mis-applied BM concepts, could be a contributing factor to an unsuccessful mission.

The last description AFDD 1 uses to explain what an operational function is states that “these battle proven functions can be conducted at any level of war and enable the Air Force to shape and control the battlespace.” (AFDD 1, 2003, 40). This hints at the importance of each of the operational functions to span the tactical, operational, and strategic levels of Aerospace Power employment. Like the other operational functions, BM has, and continues to have, an impact on all levels of war. BM crews are trained to understand that a seemingly “tactical” decision often times has strategic consequences. A decision made by a Captain or 1LT on an AWACS crew to declare a track “hostile” can easily affect the theater strategy; this impact can be either positive or negative. Positively, it could prevent the threat from engaging a friendly high value airborne asset (HVAA). (NOTE: A HVAA is an aircraft that does not have any self-defense capability and is “so important that the loss of even one could seriously impact US warfighting capabilities or

provide the enemy with significant propaganda value.” JP 1-02, 2001, 242) Conversely, the hostile declaration, if in error, could mean the destruction of a non-military aircraft which could have harmful second and third-order effects at the tactical, operational, and strategic level, especially when considering a coalition environment and the rapid rate at which mis-judgments in battle are proliferated via the media; a fact of the contemporary operational environment.

One final description of what a function is can be found in AFDD 2-1. It provides a generic description stating, “Functions must produce an effect.” (AFDD 2-1, 2000, 7) The AFDD 2-1, *Air Warfare*, definition of effect brings the discussion full circle. Effects are “the operational- or strategic-level outcomes that functions are intended to produce.” (AFDD 2-1, 2000, 7)

Now that operational function is defined and in accordance with the research methodology, I will answer the secondary questions in order to effectively answer the primary research question.

### Secondary Questions

#### Distinguishing between Command and Control and Battle Management

Lt Col James Liepmann, Jr. sums up the confusion between BM and C2 in his 1999 submission to the Air Power Journal. He describes a conversation he had with an Air War College (AWC) classmate.

AWC classmate (to Liepmann): “What do you do?”

Liepmann: “Instead of a simple answer like ‘I drive ships’ or ‘I fly planes,’ my long rambling response included equipment...planes and places...and tasks such as weapons control, surveillance, identification, weapons assignment, and battle direction.”

AWC classmate: “Sounds like you’re in C2”

“Does [BM] describe a product, a process, an organizational structure, some combination of each, or something entirely different?” (Liepmann, 1999, 61).

Since 1999, there has not been much documented clarification within or outside the BM career field. Throughout the BM community there are different terms that are synonymous with BM. The most common of these are “Tactical C2” (Tac C2), battle management command and control (BMC2).

Before reading this thesis further, it is enlightening to distinguish between the doctrinal definition of “Command and Control” and what I am referring to as BM. Since all doctrine should support, or at a minimum not conflict with, joint doctrine, I will start with the joint doctrine definition of C2 and compare that with the USAF definition of C2 and finally use those to contrast BM.

Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* defines Command and control as,

“The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called C2 (JP 1-02, 101). JP 3-30, *Command and Control for Joint Air Operations*, mirrors the first sentence of JP 1-02, but adds that C2 is “the means by which a JFC synchronizes and/or integrates joint force activities in order to achieve unity of command.” (JP 3-30, 2003, IV-15).

While not titled a “joint publication,” the universal joint task list (UJTL) is joint doctrine that “applies to the Joint Staff, Military Services, combatant commands, joint organizations...and other agencies responsive to the Chairman of the Joint Chiefs of Staff.” (UJTL, 2007, 3). Throughout the UJTL, C2 is referenced many times. Since the

UJTL is a strategic and operational level document, the C2 procedures referenced in the document refers to the authority of the specified commander and does not reference the execution of tactical missions assigned by an ATO (UJTL, 2007, multiple pages).

While Air Force doctrine does not significantly change the joint doctrine definition of C2, it adds a noteworthy twist. In addition to the definitions used in JP 1-02 and JP 3-30, AFDD 1 adds that

C2 includes both the process by which the commander decides what action is to be taken and the systems that facilitate planning execution, and monitoring of those actions. *Specifically, C2 includes the battlespace management process of planning, directing, coordinating, and controlling forces and operations.* (AFDD 1, 2003, 40)

Although the AFDD 1 definition references “battlespace management,” that term is neither defined nor expanded upon in AFDD 1, *Basic Air Force Doctrine* contributing to the confusion of what battlespace management is.

A number of questions about the exact definition of battlespace management arise from that definition in AFDD 1. “Battlespace” as defined in JP 1-02, *Department of Defense Dictionary of Military and Associated Terms* is,

the environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces; facilities; weather, terrain; the electromagnetic spectrum; and the information environment within the operational areas and areas of interest. (JP 1-02, 2001, 64)

How does battlespace management differ or compare to BM? Although BM is not defined in *Air Force Basic Doctrine*, it is defined in JP 1-02 as “The management of activities within the operational environment based on the commands, direction, and guidance given by appropriate authority, also called BM.” (JP 1-02, 2001, 64). At first glance this looks like the ideal baseline definition for the Air Force to reference when



considering adding BM to *Air Force Basic Doctrine*. However, the BM definition in JP 1-02 references JP 3-01 *Joint Doctrine for Air and Missile Threats* for a contextual example. The problem with using JP 3-01 as a frame of reference is that its definition of BM has very little to do with the tactical mission or integrating the tactical and operational levels of war. It specifically relates BM to the Area Air Defense Commander (AADC) in relation to “deconflict and control engagements.”(JP 3-01, 1999, II-IV)

While BM assets and crews are used to deconflict aircraft, fires, and control engagements, they do much more than the JP 3-01, *Joint Doctrine for Air and Missile Threats* definition states. The JP 1-02 definition of BM is not inaccurate; there is no other joint doctrine that supports the definition or discusses how BM is used in practice. There is one other mention of BM in JP 3-01, *Joint Doctrine for Air and Missile Threats*, but it applies only to the Defensive Counter Air (DCA) operational sub-function, and only in the context of the AADC exercising BM duties. In all actuality, the duties an AADC performs in a DCA scenario is most likely C2 while his instructions and intent are used to guide ABMs in the execution of BM duties.

There is one more mention of BM in doctrine--the only reference in Air Force Doctrine Documents. AFDD 2-1, *Air Warfare*, discusses the impact BM had on Operation DESERT STORM and implies it is a growing field.

As demonstrated during DESERT STORM, airborne elements of the TACS can rapidly react to changing situations by adjusting sensor and communications coverage to support ATO execution. As the technology for direct sensor-to-shooter links provide more options for aerospace force application, C2 and battle management techniques should grow to properly exploit those options. Airborne elements rely on onboard systems as well as direct connectivity with off-board intelligence collectors...to accurately assess the combat arena and adjust force execution. (AFDD 2-1, 2000, 60)

This comment emphasizes the importance of BM in DESERT STORM as well as hints at the importance of growing the BM career field and assets to further increase its impact on the application of Aerospace Power. While advocating for expansion of the BM role, the referenced comment also does not distinguish between C2 and BM. Although joint doctrine clearly defines and delineates the two concepts, AFDD 2-1 maintains the confusion between the two by attaching them together in the reference above.

While the above reference may be confusing, three pages later in AFDD 2-1 the distinction between C2 and BM is relatively clear. The authors of AFDD 2-1 mention BM as duties of both the AWACS and JSTARS platforms as well as describe the relationship between C2 and BM. “At the heart of effective C2 for forces is the battle management function.” (AFDD 2-1, 2000, 63) This leads a reader to believe that BM supports and has an impact on C2, but is not synonymous with C2. However, this insight to the relationship between C2 and BM is once again nullified in AFDD 2-1 by a caption under a photo. If one were to look at one of the figures in AFDD 2-1 that shows a picture of the E-3 AWACS with the caption that states, “The E-3 AWACS provides a forward C2 node for the AOC and greatly reduces the reaction time when countering time sensitive targets in the DCA environment,” he or she may be confused on the actual mission of the E-3 crews. (AFDD 2-1, 2000, 16) While BM does play a significant role in the coordination of “operational level C2” and the tactical fight, BM is much more than a C2 node. Once again, it is important to emphasize that the true role of BM platforms in regards to C2 is to execute in accordance with the C2 authorities guidance and intent. Additionally, BM assets and platforms coordinate information flow between the operational level C2 and tactical assets executing the ATO and integrating the ATO

assets with joint and/or coalition assets to accomplish a given mission or missions. A properly trained and integrated BM team will effectively communicate to all assets, an accurate description of the tactical and operational environment and adjust the gameplan as required in order to make certain the mission has the best chance of success.

Yet another contributor to the confusion between the C2 and the BM functions is ambiguous information in Air Force tactical level doctrine. Air Force Tactics, Techniques, and Procedures (AFTTP) 3-1.26 (volume 26), *Theater Air Control System*, TACS defines C2 as “the process by which the commander decides what actions [are] taken and the system that monitors the implementation of the decisions[s].” In this example, Air Force tactical doctrine is not nested with higher level doctrine such as the doctrine stated in AFDD 2 series. AFTTPs are usually the first place mission planners, mission commanders, or any other tactical level operator will look to learn the standard operating procedures of a given platform. The fact that the tactical level “Bible” for employment of the TACS has a definition that is not in line with basic Air Force doctrine serves to confuse other operators and is something that should be fixed if the Air Force properly delineates BM and C2 in AFDD-1 *Basic Air Force Doctrine*.

Finally, while not a doctrinal definition, the USAFWS uses the following to describe the “integrated battle management” core competency:

ABMs are battle management authorities and must be proficient at integrating all joint air and air defense artillery assets into a synchronized force. ABMs must be trained to make timely decisions required for the real-time execution of the kill chain regardless of mission type. They must be able to execute the air tasking order from the tactical and operational levels of war. This requires the ability to marshal forces, ensuring the joint / combined force is ready for mission execution on time and with maximum battle space awareness. ABMs must be adept at performing all aspects of the joint targeting cycle and be able to effectively direct the engagement of air and ground targets in accordance with the commander’s

objectives and priorities. They must be able to quickly adjust the game plan due to asset fallout, observed enemy force disposition changes, or evolving mission priorities. (Position Paper on ABM Core Competencies, 2006, 4)

The BM community is redefining what BM is and what an ABM can provide based on the recent changes to the contemporary operational environment. In July 2007, the Air Staff, in conjunction with the senior field grade ABM leadership, published an updated list of core competencies. As of this writing, these updated core competencies had not filtered through the rest of the BM wings, groups, and squadrons. It is unknown what impact the updated core competencies will have on training and education of the BM career field or on the rest of the Air Force and joint units that train with BM assets and crews.

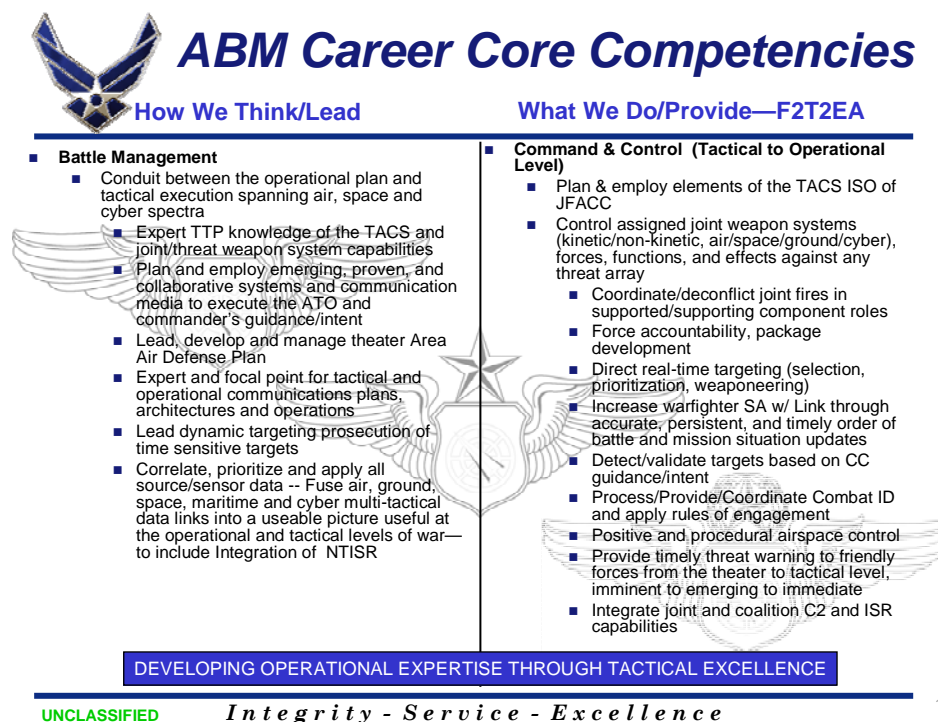


Figure 8. ABM Career Core Competencies  
Source: HQ USAF, AF/A3OY, briefing

While many of these definitions and examples of BM are valid, it is interesting to note the current ABM career field leaders' views. When asked how C2 differs from battle management, Col Patrick 'Bull' Sheets answered, "Air battle management is the execution of the JFACC's C2 authority." Brigadier General (BG) Lori 'Law' Robinson, 552 Air Control Wing Commander, agrees with Col Sheets' definition of BM, "BM is the execution of the ATO." The ATO is the primary document the rest of the joint and coalition forces see as the JFACC's means of executing centralized control over theater air assets. In BG Robinson's opinion, the TACS is actually the main engine the JFACC uses to control the theater air assets and the ATO is only one of the products that come from the TACS, specifically the planning cells in the AOC. In addition to the cells in the AOC, the TACS includes BM assets such as the E-3, E-8, and CRC. (See Figure 9)

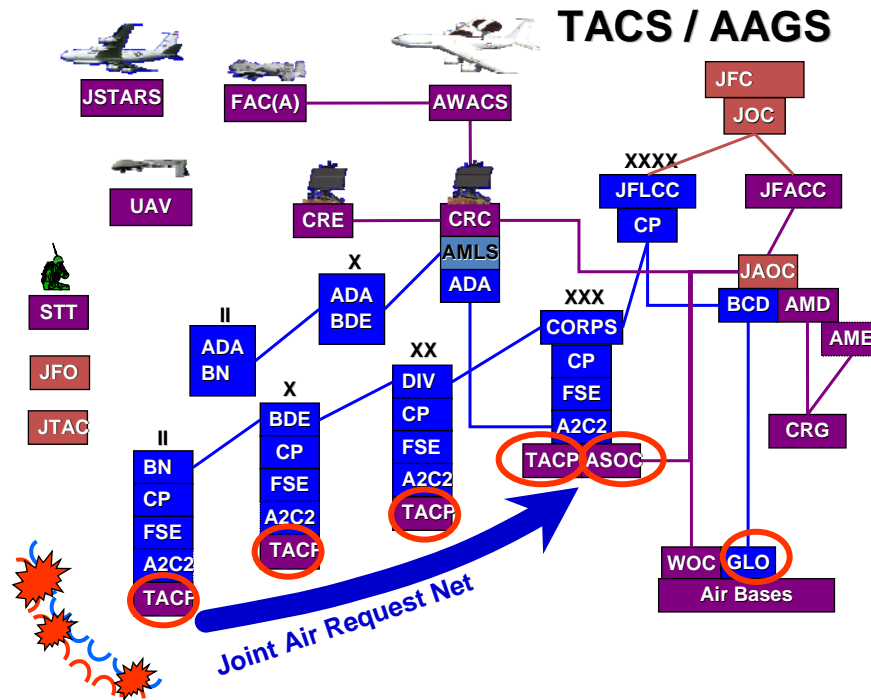


Figure 9. TACS Architecture  
Source: Command and General Staff College Academics, 2008

There is a not so subtle difference in *executing* C2 authority and *having* C2 authority. While C2 uses Aerospace battle management platforms and crews to disseminate guidance and gather situational awareness, this is only one part of what BM entails.

Col (s) Greg ‘Gooney’ Guillot offers another perspective on the how BM is distinguished from C2. In his opinion, C2 is a noun, and is the “structure of elements and procedures allowing a commander to exercise control of people and equipment.” He defines BM as “the execution of activities within [a given] C2 structure or one of the endeavors of C2.” Again, C2 and BM are related, but they have different functions and

impact Aerospace Power operations in significantly different ways. According to Lt Col Bingham,

The [BM] teams' role in effects-based joint operations could be compared to that of a football quarterback who is allowed by the coach (JFACC) to exercise his judgment and change plays (divert sorties and assign targets) at the line of scrimmage to counter developing threats or exploit fleeting opportunities...Like the quarterback calling an audible, when the [BM] team detects a developing threat or fleeting opportunity...it could be authorized to act quickly and divert aircraft...in the ATO to appropriate targets. (Bingham, 2001, 5-6)

While Lt Col Bingham describes the BM teams as the quarterback, Lt Col Liepmann uses a different example for the emphasizing the important role BM (and the ABM) plays in aerospace power employment.

the symphony conductor of the air battle. Air battle managers start with the air tasking order "score" written by the planners in the joint air operations center and ordered by the joint forces air component commander. Just as the symphony conductor integrates the music of the orchestra's string, woodwind, brass, and percussion sections into a coherent whole, the air battle manager brings together the many missions of air power. (Liepmann, 1999, 73)

Lt Col Liepmann's 1999 delineation between C2 and BM is still relatively sound. He states, "Battle managers work at the interface of the tactical and operational levels of war where the JFACC's intent is translated through tactical action into results that achieve the JFC's objectives." He also states that BM is "the enabling link between the intent input and the results output." Some of the confusion about the enigma called the BM is due to the fact that they (ABMs) employ, and are employed, at both the tactical and operational levels of war. In many instances, ABMs are required to be the conduit, and filter, of tactical information going to the C2 authority as well as operational information originating with the C2 authority.

Now that C2 and BM are distinguishable, the next step in answering the primary thesis question determining if BM meets the criteria listed in AFDD 1 for being labeled an operational function.

### Operational Function Criteria

There are currently seventeen operational functions listed in AFDD 1.

Operational Functions Taken from AFDD 1, p.39	
<ul style="list-style-type: none"><li>• Strategic Attack</li><li>• Counterair</li><li>• Counterspace</li><li>• Counterland</li><li>• Countersea</li><li>• Information operations</li><li>• Combat Support</li><li>• Command and Control</li><li>• Airlift</li></ul>	<ul style="list-style-type: none"><li>• Air Refueling</li><li>• Spacelift</li><li>• Special Operations</li><li>• Intelligence</li><li>• Surveillance and Reconnaissance</li><li>• Combat Search and Rescue</li><li>• Navigation and Positioning</li><li>• Weather Services</li></ul>

Figure 10. Operational Functions  
*Source:* AFDD 1, Basic Air Force Doctrine, 39.

Like many concepts in military doctrine, determining if a mission set meets the operational function criteria is very subjective and the interpretation of the mission set combined with the strategic, operational, or tactical situation has a significant bearing on whether an individual leader, or doctrine writer, determines that the criteria has been met.



In order to add some element of objectivity to my conclusions, I will use lessons learned from recent operations, which also have some inherent subjectivity associated with them, as validation. The lessons learned are influenced by the working groups established to define and bound the lessons, the experiences of the individual members of the working groups, the combat leadership during the operation, and the GO that approves the release of the lessons learned document. As a reminder, there are certain criteria a mission set must meet in order to be labeled an operational function.

### Warfighting Task

The first criteria established in AFDD 1 for labeling an operational function is that the task “must be a warfighting (operational) task and not an organizational (administrative) task.” (AFDD 1, 2003, 39) There are many “warfighting tasks” that some may not consider as such. While some of the tasks required of Aerospace BM can be considered organizational or administrative tasks, the same can be said of any other operational function. When considering Aerospace BM, most of the tasks are warfighting or operational. For example, a CRC warfighting crew is usually responsible for force accountability throughout any given mission. Many not familiar with the process of maintaining responsibility for the who’s, when’s, and where’s of any given player in a strike or mission package may consider force accountability an administrative function. In fact, many file force accountability under the umbrella of “Tactical admin” when breaking up the mission into phases.

Another BM function that is often viewed as admin is fuel management. While fuel management is not specifically mentioned in the latest BM core competency, it is, and will continue to be, one of the most important tasks assigned to BM crews. It is an

implied task under the “Force accountability and package development” bullet. Without accurate fuel accountability, the execution of the ATO becomes difficult, and will undoubtedly have a negative effect on the outcome of the mission.

In the absence of other authoritative guidelines on the delineations between a warfighting and organizational task, the litmus test for this document is whether or not the task provided directly impacts combat or Aerospace Power operations. Paul Dolson discusses the contributions BM teams make to warfighting operations in OAF by describing the “key command and control link helping North Atlantic Treaty Organization (NATO) air commanders to manage air support for Operation ALLIED FORCE” (Dolson, 2005, 70). While Dolson was specifically referring to the contributions the Airborne Battlefield Command and Control Center made, the statement applies to BM overall. (The ABCCC mission crew was lead by an ABM and since the retirement of the ABCCC, its duties have been distributed to the remaining BM platforms in the TACS.)

In addition to force accountability and fuel management, there are a number of other warfighting tasks performed by BM crews and assets. According to Col ‘Bull’ sheets, the most significant contribution Aerospace BM can make to the Aerospace operations is “flexible response, combat identification, and maximizing situational awareness to make an engagement happen when and where you want it to.” There are a number of independently operating parts that must be synchronized and orchestrated in order to make that engagement occur at the time and place chosen by friendly forces.

One example of a complex mission that must be organized from a number of different aspects is an alert, or an unplanned CSAR. BM crews are trained to employ as

the airborne mission coordinator (AMC) during CSAR and other personnel recovery (PR)

JP 1-02 defines AMC as

The designated individual that serves as an airborne extension of the component commander or supported commander responsible for the personnel recovery mission, through the designated personnel recovery task force to manage requirements for the rescue force by monitoring the status of all elements, requesting additional assets when needed, and ensuring the recovery and supporting forces arrive at their designated areas to accomplish the mission.” (JP 1-02, 2001, 12-13).

While the JP 1-02 definition of an AMC describes what an AMC is, the Air Force adds more detail to the definition of an AMC by adding a recommendation. AFDD 2-1.6 makes a recommendation as to whom should execute AMC duties. AFDD 2-1.6, Personnel Recover Operations was rewritten in 2005. The most significant changes ensured the definitions associated with PR and CSAR are nested with joint publications and directives.

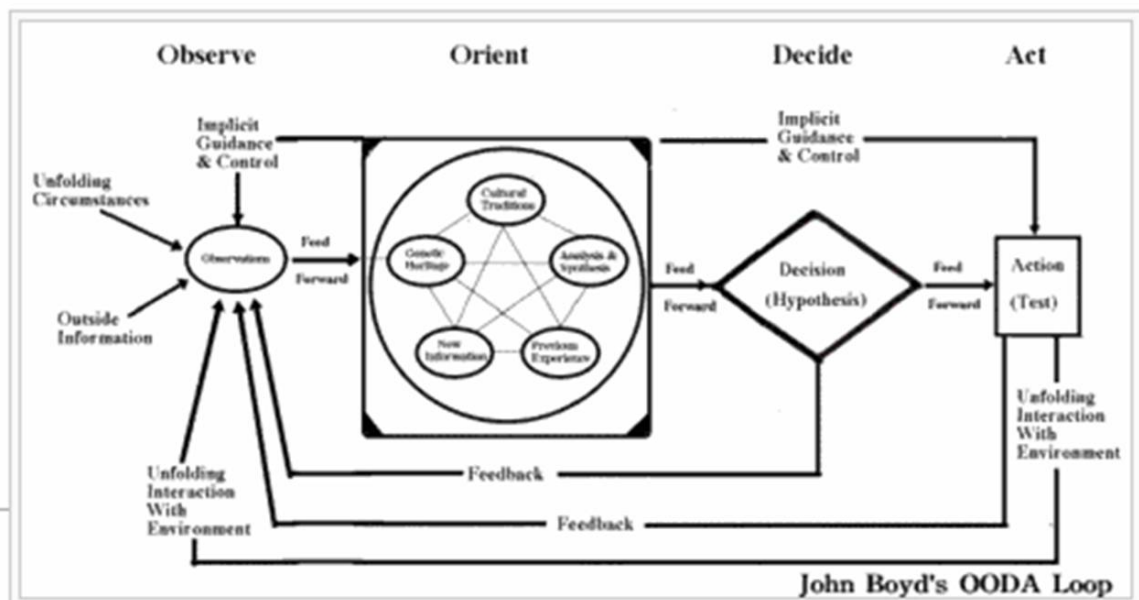
An AMC coordinates the flying mission for forces designated support a specific CSAR operation. The AMC may be designated by the component [Personnel Recovery Coordination Center] or higher authority to coordinate the effort of several assets. The AMC serves as an airborne communications and data relay between rescue forces and command elements. The E-3 Airborne Warning and Control System (AWACS), though heavily tasked, is the most capable AMC platform due to its extensive communications capability and ability to oversee the air picture. Other multi-crewed assets such as the Navy E-3 Hawkeye, and the E-8 joint surveillance, target attack radar system (JSTARS) are also acceptable AMC platforms. (AFDD 2-1.6, 2005, 15)

It is noteworthy that while the definition in JP 1-02 states that the AMC is an *individual*, USAF doctrine recommends (and USAF practices this) a *platform* be chosen to execute AMC duties.

## Operational Level Effects

In the COE, operational and strategic leaders seem to want the engagement to happen as soon as tactically possible (many times ASAP is the time and place chosen by airpower leaders). According to the 561<sup>st</sup> Joint Tactics Squadron's (JTS) Tactics Bulletin, 2007-01, Major Paul 'PJ' Maykish writes that BM can "speed-up tactical decision making and support alignment of tactical actions to operational guidance." (Maykish, 2007, 47) Major Maykish correlates the tactical decision-making duties of BM crews to the "decide step of Boyd's OODA loop." The Observe, Orient, Decide, Act was introduced by airpower legend Col John Boyd. This concept was developed by Col Boyd to "explain how to direct one's energies to defeat an enemy and survive..." Boyd's diagram shows that all decisions are based on observations of the evolving situation tempered with implicit filtering of the problem being addressed. The observations are the raw information on which decisions are based.

(<http://www.nwlink.com/~donclark/leadership/ooda.html>).



### Figure 11. Col John Boyd's OODA Loop

*Source:* Boyd. (<http://www.nwlink.com/~donclark/leadership/ooda.html>)

The decision to execute a given action in the execution of airpower missions is usually based on a number of inputs received from different sources. One of the most important traits of an effective BM plan is ensuring the personnel or assets receive the correct information, in the correct format, at the right time, and in a manner that is easily digested in order to produce a desired outcome. BM crews are trained to think beyond the tactical level and focus on the operational effects of the information they have prior to passing that information to those who will act on it.

In order to make sure the BM crews know how to package the information when it is passed, they should be incorporated from the initial planning phases of an operation. If the BM crews are not integrated from the beginning of mission planning, it is difficult for a BM team to respond to deviations in the game plan and orchestrate the inevitable changes and unforeseen aspects certain in airpower operations.

One of the most important pieces of information BM crews are responsible to obtain, and always maintain, is the identification of airborne targets. In many circumstances, BM crews are responsible for maintaining the identification of ground and surface targets as long as the BM systems are able to adequately continuously track the target once the identification is obtained through non-organic systems. BM systems usually play a more vital and common role in identifying airborne targets through either organic systems or through correlating and fusing information from both on and off-board sources. Without positive identification of targets, weapons cannot be employed

without fear of negatively affecting the operational and strategic outcome of the operation. Another important operational contribution is the prioritization of targets, especially in a dense environment that is expected in a Korea or China conflict. Even in a moderately dense enemy air environment such as DESERT STORM, the density of U.S. and coalition assets makes positive identification and prioritization paramount to effective operations.

This combat identification capability usually requires a platform to have the means to confirm a potential target meets lack of friendly criteria (i.e., there are no friendly indications coming from the target), as well as confirming the target can be positively identified as an enemy. In operation DESERT STORM, 39 of the 41 air-to-air kills were assisted by BM crews aboard the E-3 AWACS. (Operation DESERT STORM Lessons Learned, 1992) Col Sheets stated the importance of organic combat identification capabilities on BM platforms is essential, since many times the decision about what to do about a potential target is made by the BM team and the process they are trained to go through when identifying tracks. The BM platforms and crews must have the situational awareness and understanding to quickly mass all available elements that are able to bring effects against the target in accordance with the priorities set by the appropriate commander. Equally important is understanding where a particular target falls in relation to ATO tasked targets. If the emerging target has a higher priority, or has a good chance of preventing the prosecution of the ATO assigned target, then it may be operationally necessary to divert assets away from their ATO assigned target to focus on the emerging target. The operational implications of not attacking the assigned target range from minimal to having a significant effect on the following days' operations, or it

may have an immediate impact for other joint assets such as special operations forces (SOF) in theater.

This targeting and mission tasking adjustment are just two examples of operational effects BM produces. “Orchestrating targeting and effects” in order to accomplish the JFACC objectives, usually outlined in the Air Operations Directive (AOD) and/or the remarks section of the ATO, gives the BM crews their marching orders for execution. (Sheets personal interview, 05 Oct, 2007). This principle of producing the correct timing and effects does not only apply to airborne operations, it also applies to the space and cyberspace realm. In order to produce the desired effects of the cyberspace and space elements, someone (or crew) must orchestrate the events. With the classification of this paper in mind, I will attempt to give a working example.

If a strike package is assigned a target that requires penetration of anti-access threats, there is undoubtedly space, electronic warfare, and cyberspace elements assigned to support that package. The space elements may play an ISR role that may include locating or determining the status of the threats--Battle Damage Indications (BDI) or battle damage assessment (BDA), or passive detection of emissions. This information may be a go/no-go consideration for the mission. Likewise, cyberspace elements may be assigned a target set that should not be attacked until a certain point in the mission. For optimum effects, the “attack” must happen at X time based on the kinetic TOT. Along those same lines, the EW effects should happen Y minutes before the cyberspace attacks and Z minutes after the space based ISR assets complete their pass over the AO. If any of these events happen out of order or not on time, the enemy may be tipped off to the impending kinetic strikes, or the desired effects may not be achieved. It is the

responsibility of the BM crew to make sure all of these events happen in the correct order and at the appropriate time. If, for some reason, it is not possible to execute all phases of the operation as planned, the BM crews should inform the appropriate entities and develop an alternate plan, if at all possible, in order to ensure the commanders' intent is met in as timely a manner as possible.

According to Liepmann, BM crews

plan the implementation of the JFACC's intent...direct ATO execution to the changing air battle situation; and controls execution of combat operations as an operational-level extension of the joint force air component commander's authority to ensure the tactical action results achieve the joint force commander's theater objectives. (Liepmann, 1999, 73)

While all of these events are mission planned and timed to the minute, in many cases, like most events in combat, the enemy has a vote and no good plan survives the first engagement with the enemy. It is very likely that a myriad of events will contribute to some deviation in the timeline. The crews must solve the problems and use "adaptive ATO execution to ensure operational plans are tactically executed." (Maykish, 2007, 47. Since most of the assets involved in the application of joint air and space power are not usually collocated at the same operating base (or in the same geographic theater in the case of global strike assets), some asset must be responsible for coordinating any deviations or changes to the planned events. This is the essence of Aerospace Battle Management. The BM crew must be trained, organized and equipped to anticipate and/or recognize when deviations are going to occur, understand the impact those deviations could have on the mission, develop a plan to mitigate any negative impacts, and disseminate the new plan to all players involved, including those operating outside the



theater of operations. In the chaos of war, the BM mission set is there to provide “clarity and order to chaotic situations and contribute to the lethality of air power.” (Guillot personal interview on 15 Oct, 2007)

Maj Paul Maykish specifically mentions the force accountability duties that BM crews are called upon to perform. He states that “Force accountability and control comes from work that brings order to current air operations...directly impacts all phases of the kill chain.” Without accountability of all the forces assigned to a particular strike package, closing the “kill chain” is an impossible task. A kill chain is considered “closed” when the C2 authority receives confirmation that a given target of interest is neutralized. If the kill chain is not closed, other assets must be assigned to the target, or the C2 authority must accept the risk of leaving the target unserved. A shorter kill chain is desired in most engagements. In order to take advantage of the asymmetric capabilities air and space power provide, quickly servicing a threat to achieve the desired effects is favorable to increasing the length of the targeting process. Lt Col (ret) Price T. Bingham wrote in the Air & Space Power Journal entitled, *Transforming Warfare with Effects-Based Joint Operations*, “The success of effects-based joint operations depends on airborne battle management...decentralized airborne battle management is needed to achieve the ‘single digit’ response time required in effects-based joint operations.” As mentioned earlier in this research, this concept should be applied to air power as well as space and cyberspace employment. The BM systems and crews used in today’s combat missions provide “unprecedented airborne...battle management capabilities...make effects-based joint operations possible...The [BM] team’s combination of surveillance and surveillance management capabilities are the key to achieving dominant battlespace

awareness” (Bingham, 2001, 1). Without the situational awareness BM crews provide to the JFACC, the other theater component commanders, and ultimately the JTF, the decision process would become exponentially slower resulting in a sluggish kill chain.

OAF provides a telling example of the benefit BM provides operational leaders. “Experience in Kosovo...shows [ground moving target indication] cueing enhances battlespace awareness by making UAVs much more efficient, effective, and survivable” (Bingham, 2001, 3). OAF lessons learned back up Lt Col Bingham’s assertion by documenting how cueing prevented the inefficiencies inherent in many surveillance platforms. By using cueing from BM systems and crews to reduce the search and acquisition timeline of other sensors, it reduces the warning an enemy has of impending friendly action. Without the BM assistance, the enemy may have time to employ countermeasures or air defenses against the UAVs. (Smith, personal interview, 15 Jan 2008) Additionally, “Cueing decreases UAV exposure to point air defenses making UAVs more survivable, by reducing their need to loiter in an area searching for targets.” (Bingham, 2001, 3)

In addition to providing situational awareness and aiding situational understanding, the BM teams are intimately involved in pairing assets, based on weapons, fuel status, and aircraft capabilities, to specific targets. BM teams in theaters, especially in dynamic targeting (DT) missions, are “responsible for dynamically prioritizing targets and pairing weapons with targets based on changing conditions” (Bingham, 2001, 5). BM crews receive in depth training in weapons effects and understand the multitude of other considerations that must be taken into account in order

to effectively prosecute the emerging target (ET) without negatively affecting the delicate effects assigned by the JFACC via the ATO.

#### Delivers Air and Space Power to the Joint Force Commander

One of the most significant contributions those with BM experience have made since Operation DESERT STORM is lending their expertise in coordinating effects to the Combat Plans Division of the AOC, specifically in the Master Air Attack Plan (MAAP) Cell. In Operations ALLIED FORCE, ENDURING FREEDOM, and IRAQI FREEDOM, ABM experience in the MAAP was provided by officers with years of expertise in applying tactical level flexibility in ATO execution. Their experiences were useful at the operational level in the development of the Air Campaign Plan that was translated into the ATO (Robinson personal interview on 22 Oct, 2007). In large part because of the experiences the ABMs in MAAP provided to the AOC planning staff, the BMs at the tactical level were more effective at executing the ATO and ensuring that the JFACC's operational intent was met, which in turn allowed the JFACC to provide the appropriate effects to the joint force commander.

Additionally, during Operation DESERT STORM, BM crews executing from multiple platforms aided the ground war by ensuring CAS assets were assigned when needed. According to Dolson,

“Among the conclusions and lessons learned [from DESERT STORM] from a Command and Control perspective was that [BM assets] could indeed serve as the joint force commander's on the scene, air to ground battle managers, allocating CAS to the most lucrative targets.” (Dolson, 2005, 70)

The lessons learned by the BM crews in DESERT STORM translated into successful operations in Kosovo. Although ground involvement during OAF was limited

when compared with the number of land forces in DESERT STORM, BM crews still provided a vital service to the JFC. Dolson stated,

Kosovo illustrated the tremendous complexity of managing the battlespace and performing real-time targeting in urban environments. Even in the absence of significant ground forces...Kosovo demonstrated that the [CFACC] needed an on-the-scene command presence...Had the United States not possessed an ABCCC, the targeting information the strikers and FACs had to work with would have been only as good as the location information they had when they took off...The ABCCC was able to relay critical targeting information in real time between the CAOC...and the airborne FACs and strike aircraft in the Balkan, providing an increased combat effectiveness that otherwise would not have existed.” (Dolson, 2005, 71)

As mentioned earlier in this paper, failing to adequately integrate BM into planning operations could be a significant contributing factor to the mission’s failure. Operation ANACONDA during OEF is one example of a mission that was hampered because of a lack of integrated planning. Many of the problems during ANACONDA “stemmed from a flawed air-ground planning process that systematically excluded air component planners and leaders. In the months leading up to the operation, the CJTF made numerous decisions not to include experienced air component planners or their ideas for employing airpower.” (Andres and Hukill, 2007, 135)

In researching how BM delivers air and space power to the JFC, I asked personal interviewees what the biggest challenge to effective BM integration is. The author’s thought process was if the roadblocks, or challenges, to effective BM negatively impacted deliverance of effective airpower to the JFC, then BM is a critical mission set and meets this specific criterion.

The answers varied in their specifics, but all led to the conclusion that effective BM does deliver a unique capability to the JFC. Col ‘Bull’ Sheets considers the deviation

from Aerospace Power's "golden tenet" of centralized control and decentralized execution as the main challenge to effective BM. One of the main contributing factors to centralized execution is that technology gives multiple levels of war access to, and allows leaders to participate in, lower levels of war. An operational leader can directly impact tactical operations because he or she can view a consolidated operational picture, make a decision based on that information, and voice guidance and direction directly to those responsible for leading the tactical mission. This demonstrates that managing the battle effectively is of such vital importance that operational and strategic leaders feel there is no room for error.

One reason for such close control of assets is because leadership wants to confirm, as soon as possible, that the effects they are tasked to produce by higher headquarters are being accomplished. A contemporary buzzword among war fighters, especially at the JTF Commander level, is effects based operations (EBO). This concept gained altitude during the planning for Operation DESERT STORM and its edicts have been used to more efficiently apply kinetic and non-kinetic effects to the COE. At the same time, and in many respects because of EBO, the importance of effective BM has come to the forefront of many lessons learned and after action reports. "Effects-based operations would transform warfare by using a theater team of airborne Command, Control, Intelligence, Surveillance and Reconnaissance (C2ISR) systems to manage the decentralized execution of U.S. aerospace sorties" (Bingham, 2001, 1). What Lt Col Bingham describes is the effect the BM crews have on EBO.

### Planned and Executed at the Operational Level by a Component Commander

The JFACC is the component commander responsible to the theater commander for the conduct and integration of aerospace operations. There are a number of mission sets that the JFACC takes a special interest in. Many of these mission sets are operational functions previously listed in this paper. For example, the JFACC, or any other operational commander, has a vested interest in where DCA combat air patrols (CAP) are placed, especially when the JFACC is dual-hatted as the Area Air Defense Commander (which is the practice according to joint doctrine). Many times these CAPs are positioned to provide optimal protection of high value airborne assets (HVAA), friendly centers of gravity, or to protect a host nation from air attack.

In much the same way, the operational component commander is concerned with placement of BM assets in order to optimize the platforms' sensors and ensure the BM platforms and crews are adequately protected by DCA and/or friendly surface-to-air assets. Without BM assets, such as the E-3 AWACS, E-8 Joint Surveillance Target and Attack RADAR System (JSTARS), and the CRC, the component commander loses a critical ability to command and control the mission. While distinguishable from C2, one of the critical missions of BM is to provide the link (and sometimes filter) between the operational level C2 mechanisms and the tactical fight. There are many times the JFACC or the AOC staff needs to pass critical information that will affect the operational plan. This information must be communicated to the tactical mission commander. This responsibility is given to the BM assets. The JFACC planning staff specifically plans the placement of the BM assets to ensure they are able to maintain continuous communication with the AOC while simultaneously executing the rest of their BM

duties. Not only does the Aerospace operational leadership rely on BM to convey changes in the JFACC's intent, but important information also needs to flow from the tactical mission commander to the AOC. There are many instances the tactical mission commander will need guidance or clarification from the operational level C2 leaders. This job is one that BM is well suited for due to the connectivity the BM assets have with the AOC.

The connectivity with the CAOC is vital capability BM assets possess and is, once again, one of the reasons ambiguity exists in differentiating between BM and C2. Due to the extensive geographic separation between the C2 structure and assets employing in OEF, some significant challenges had to be overcome with respect to the coordination between the C2 leadership and tactical level assets. According to Dolson,

The air war was run from the CAOC at Prince Sultan Air Base, Saudi Arabia; the ground operations were controlled from Kandahar, Afghanistan; and supporting aircraft came predominantly from the 479<sup>th</sup> Air Expeditionary Wing at Al Udeid Air Base in Qatar, joined occasionally by aircraft participating in Operations NORTHERN, and SOUTHERN WATCH...Because of the tremendous distances involved, the COAC could neither communicate directly with, nor provide command and control to, many aircraft in the Afghanistan theater. (Dolson, 2005, 70)

This is where the communications capabilities and training of BM assets and crews paid dividends. The JFACC's staff planned operations and established procedures to ensure the C2 authority was able to get information to tactical assets as well as receive vital information from the assets. Without this linkage provided by the BM assets and crews, C2 of the airwar would have been even more challenging than it was.

### Primary Question

In Chapter 1 of this thesis, I made the following statement: “The research will attempt to answer the following question: Does BM meet the criteria dictated in AFDD 1, *Air Force Basic Doctrine*, to be considered an operational function?” Through answering the first two secondary questions: (1) Since C2 is already an operational function, is BM distinguishable enough to be a separate operational function? and 2) What are the criteria used to determine operational criteria?, the primary research question becomes easier to answer. Chapter 1, I listed three secondary questions. The third question was: How should the BM operational function be organized in AFDD 1? I will answer this question in Chapter 5 when I discuss my recommendations.

Noting that there is a difference between C2 and BM and that BM does, in fact, play a significant role in Aerospace operations and does meet the intent of the criteria stated in AFDD 1, *Basic Air Force Doctrine*, and finally, based on the information given by the BM career field leaders and experts, I conclude that the answer to the primary question is an affirmative one. A mission set that warrants in-depth analysis in lessons learned documents and that impacts and/or enables each of the other operational functions is one that should be given enough emphasis to ensure it is properly integrated into the application of Aerospace power. While the BM community and the rest of the operational USAF can take steps to make this happen, one important stride will be to adequately define and include BM into the capstone USAF doctrine document, AFDD 1. From there, the rest of the doctrine documents should nest with the guidance given in *Basic Air Force Doctrine* to make certain that BM is understood as well as operators understand DCA, or Strategic Attack. In BM, it is not uncommon for a tactical error to



have operational or strategic consequences. This is a sobering thought, and in order to minimize any negative impact, a greater understanding of BM is required throughout the CAF and joint forces. One giant step in that direction is to give BM its due attention in Air Force doctrine.

## CHAPTER 5

### RECOMMENDATIONS

#### The Way Ahead

This paper has documented just a few of the reasons BM is vital to the successful application of Aerospace Power. In order to maintain the level of decentralized execution the tenets of airpower demand, there must be some entity, below the operational C2 level, that has the training, situational awareness, and brain bytes available to observe the situation, make a decision on the best course of action, and relay that information to the tactical mission commander. Every team must have a quarterback who is able to call an audible to the gameplan. As long as that audible continues to meet the operational commander's (C2 authority's) intent, there is no need to reach back to the AOC for permission. Although ABMs are not the only planners and operators who are able to manage the aerospace battle, they are the best choice to do so. BM crews and assets are equipped and trained to do so throughout an entire campaign. While there are other assets who have impressive sensor and fusion capabilities, none of them have the persistence, training, or ability to disseminate the information to all of the other assets employing Aerospace power throughout a theater. There is discussion that some of the fifth generation platforms are able to execute this mission from a single seat fighter while executing other missions (see Air Force Magazine, *The Big Squeeze*, October 2007). Recent conflicts show that it takes a system of systems to organize and vet the information before making a decision and disseminating that decision to the appropriate assets. There is no evidence that task can be successfully accomplished by a single individual in a single (or two-seat) fighter. It will require crews specifically trained in

those warfighting tasks in order to successfully meet the JFACC and ultimately the JFC's objectives.

In essence, it will take ABMs who are adept at BM along with reliable systems that take advantage of US technological capabilities. Even with all of those characteristics, if the rest of the CAF and the joint airpower operators do not have a solid understanding of how and where BM fits into mission, BM's full capabilities will not be realized. Although there are several steps that can be taken to optimize people's understanding of BM, a logical starting point is making sure USAF basic doctrine accurately depicts BM.

Below is a recommended starting point for those who are responsible for writing USAF doctrine. It is meant only to generate discussion in the forums responsible for determining and producing USAF doctrine.

#### **BATTLE MANAGEMENT**

*The management of activities within the operational environment based on the commands, direction, and guidance given by the appropriate authority. Also called BM. BM is a concept and a function that influences all other operational functions. Military operations, especially Aerospace Operations, are highly reliant on complementary functions in order to produce a desired effect. BM orchestrates and synchronizes each of the different operational functions to ensure the C2 authority's intent is achieved as efficiently as possible without fratricide.*

*BM differs from C2 in the sense that changes to the plan can be made within the confines of the C2 authority's intent and directives. If a plan developed by the BM crew / agency deviates from the limitations or fails to accomplish one or more of the C2*

*authority's objectives, the BM crew or agency should get permission from the C2 authority prior to executing the plan.*

*BM is effective because of the specific training crews receive in asset integration, consolidated tactical picture (CTP), and consolidated operational picture (COP) management, and sufficient communication capability to communicate with and between operational and tactical commanders.*

*BM is effective only when integrated into the Aerospace campaign from the beginning of planning for operations. In order to be effective, those responsible for BM must understand the objectives and intent of the operational and tactical commanders. Without this inclusion from early in the planning process, the second and third order effects of the BM decisions may counter the desired effects of the C2 authority.*

BM operators do many of the things required to execute an Aerospace Power campaign that cyberspace operators, intelligence sensor operators, fighter, bomber, airlift, and refueling pilots and crews do not have time to do in the midst of the fight. *Generally speaking*, BM crews accomplish these tasks with such proficiency that no one has had to put much thought into *how* it has been done over the past two decades. Because BM is not seen as a liability or a limitation, few have taken the time to dissect it and ensure it is effectively defined and discussed in basic doctrine.

“The proper application of a coordinated force can produce effects that exceed the contributions of forces employed individually.” (AFDD 1, 2003, 43) This is the essence of what BM provides to the application of Aerospace Power. BM crews use the systems on board their platform along with the non-organic systems and their training to

orchestrate the joint and coalition air, space, and cyberspace platforms in order to produce an effect that is vital to and nested with the operational, and many times strategic, objectives set forth by the JFACC and national leaders. Since the end of DESERT STORM, and more so since the end of OAF, the BM function has inherited an ever increasing mission set. They no longer are responsible for vectoring fighter aircraft to the nearest enemy aircraft. They are now responsible for pairing an aircraft with specific weapons to specific ground or surface targets, for facilitating the information flow and targeting of emerging targets, for integrating and managing space and cyberspace effects into the strike package, for managing fuel and developing a plan when the ATO fuel flow plan is no longer viable, and for ensuring the JFACC's intent is met in each ATO. While AFDD 1 mentions the importance of ABMs, it does not distinguish their skills and duties from C2. "For this reason execution should be decentralized within a command and control architecture that exploits the ability of strike package leaders, air battle managers, forward air controllers, and other front-line commanders to make on-scene decisions during complex, rapidly unfolding operations." (AFDD 1, 2003, 30). With proper training and adherence to solid basic doctrine, BM will be better understood within the Air and Joint communities. With a better understanding of what BM does, ABMs will better be able to accomplish all the tasks given assigned by the JFACC and mission commander.

#### Final Thought

While I do believe that it is imperative to change Air Force doctrine to be nested with joint doctrine (joint doctrine has a specific definition of BM and a specific definition for C2; USAF doctrine should not combine the two resulting in ambiguous definitions

within the CAF and joint world), and, secondly, to increase the CAF and joint world's understanding of what BM is and what it provides to the fight, timing is always a consideration when making any significant change. The BM community is currently discussing noteworthy changes to how airspace is controlled in the stability and support operations (SASO) of OIF and OEF. During these joint discussions, CAF representatives are using the term C2 to describe what I refer to as BM throughout this paper. Assuming those responsible for the development and production of doctrine agree with the conclusions in this thesis, they should also consider the impact a change in definitions may have on any recent developments that impact current combat operations (e.g., JAGC2 discussions and TTP development). If changing the terminology will cause confusion, or in any way negatively impact the development of TTPs, especially joint TTPs, that cost should be weighed against the benefit of adding BM as an operational function. The best time for doctrinal change is sometime when the Armed Forces are enjoying a peace dividend and have the luxury of changing documents, manuals, and guides. Since it is unclear when, or if, we will enjoy such a time and circumstance, the responsibility of making a change such as the one recommended in this paper should not rest with the CAF's tactical leaders (Weapons Officers, Operations Officers, Squadron commanders), but should be directed by those with the sight picture to understand the second and, possibly, third order effects of such a change.

## REFERENCE LIST

- 552 Air Control Wing Lessons Learned, 1992. *Operation Desert Storm Lessons Learned*  
Tinker AFB, OK, USAF
- Air Education and Training Command, 2007. Undergraduate Air Battle Manager  
Training Syllabus.
- Air Force Link. 2008. <http://www.af.mil/factsheets/factsheet.asp?fsID=98>, (accessed 19  
October, 2008).
- Air Force Link. 2008. <http://www.af.mil/factsheets/factsheet.asp?fsID=100>, (accessed 19  
October, 2007)
- Air Force Link. 2008.  
<http://www.13af.pacaf.af.mil/library/factsheets/factsheet.asp?id=9226>, (accessed  
21 November, 2007).
- Andres, Richard, Jeffrey Hukill, 2007. Anaconda: A Flawed Joint Planning Process, *Joint  
Forces Quarterly*, Issue 47, 4<sup>th</sup> quarter, 135-140.
- Army Business Transformation Knowledge Center. 2008. On-line. Available from  
Internet, <http://www.army.mil/armybtkc/focus/sa/index.htm>, accessed 18  
February, 2008.
- Bingham, Lt Col Price T. 2001. Transforming Warfare with Effects-Based Joint  
Operations, *Air and Space Power Journal*, Vol. XV, No. 1 Spring, 58-66.
- Clark, Donald. 2004. OODA: Observe Orient, Decide, Act.  
<http://www.nwlink.com/~donclark/leadership/ooda.html>, (accessed 21 March,  
2008).
- Dolson, Paul, 2005. Expeditionary Airborne Battlespace Command and Control, *Joint  
Forces Quarterly*, Issue 38, 68-75.
- HQ USAF, 2004, Air Battle Manager Career Path Guide.  
[http://www.afpc.randolph.af.mil/ofcr-cpguide/New\\_Folder/Ch2-21.htm](http://www.afpc.randolph.af.mil/ofcr-cpguide/New_Folder/Ch2-21.htm), accessed  
10 November, 2007).
- HQ USAF, 2006, Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*.
- HQ USAF, 2000, AFDD 2, *Organization and Employment of Aerospace Power*.
- HQ USAF, 2000, AFDD 2-1, *Air Warfare*.
- HQ USAF, 2005, AFDD 2-1.6, *Personnel Recovery Operations*.

HQ USAF, 2001, AFDD 2-1.7 *Airspace Control in the Combat Zone*.

HQ USAF, 2005. Air Force Tactics, Techniques, and Procedures, 3-1.26, *Theater Control System*.

Johnson, David E., 2006, Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era, Washington, D.C., Rand

JP 1, 2000. *Joint Warfare of the Armed Forces of the United States*.

JP 1-02, 2001. *Department of Defense Dictionary of Military and Associated Terms*.

JP 3-0, 2006. *Doctrine for Operations*, September 2006. US Joint Chiefs of Staff, Washington D.C.

JP 3-30, 2003. *Command and Control for Joint Air Operations*.

JP 3-52, 1995. *Doctrine for Joint Airspace Control in the Combat Zone*

JP 3-56.1 C2 Doctrine for Joint Operations.

Kirkendall, David, 2005. *Redefining E-3 Core Competencies for Dominant Battlespace Knowledge in Future Combat Operations*, Sep, Naval Post Graduate School

Liepmann, James M., Jr., Lt Col, 1999., C<sup>nth</sup>I<sup>nth</sup>xyx, TACS, and Air Battle Management, *Airpower Journal* Spring, 61-74.

Maykish, Paul Maj, 2007. Correlating Tactical C2 Work to the Kill Chain, *561<sup>st</sup> JTS Tactics Bulletin* 2007-01, August.

Office of the Secretary of Defense, 2007 Universal Joint Task List (UJTL).

Peck, Allen G. Maj General, 2007. Airpower's Crucial Role in Irregular Warfare, *Air & Space Power Journal* Summer Air University, 10-15.

Position Paper on ABM Core Competencies, Oct 2006

Shanz, Mark V., 2007. Air Force Magazine, *The Sandbox Sentries*, Nov, vol 90, no. 11, 46-48.

Tirpak, John A., 2007. Air Force Magazine, *The Big Squeeze*, Oct, vol 90, no. 10, 32-36.

Tirpak, John A., 2007. The Big Squeeze, *Air Force Association Magazine* October, Vol 90. No. 10, 32-36.

Wathen, Alex, Lt Col, 2006. Joint Airspace Management and Deconfliction, *Air & Space Power Journal* September, 70.



## Personal interviews

Carpenter, Trent W., Maj, USAF. Interviewed by author, 16 January 2008. Personal notes.

Guillot, Gregory, Lt Col, USAF. Interviewed by author, 15 October 2007. Personal notes.

Robinson, Lori J. BG, USAF. Interviewed by author, 22 October 2008. Personal notes.

Sheets, Patrick, Col., USAF. Interviewed by author, 16 October 2007. Personal notes.

Smith, Matthew T., Lt Col, USAF. Interviewed by author, 19 February 2008. Personal notes.

## INITIAL DISTRIBUTION LIST

Combined Arms Research Library  
U.S. Army Command and General Staff College  
250 Gibbon Ave.  
Fort Leavenworth, KS 66027-2314

Defense Technical Information Center/OCA  
825 John J. Kingman Rd., Suite 944  
Fort Belvoir, VA 22060-6218

Chair  
Department  
USACGSC  
100 Stimson Ave.  
Fort Leavenworth, KS 66027-2301

First Reader  
Department  
USACGSC  
100 Stimson Ave.  
Fort Leavenworth, KS 66027-2301

Second Reader  
Department  
USACGSC  
100 Stimson Ave.  
Fort Leavenworth, KS 66027-2301