Time for a New Master Tenet?

A Monograph

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AY 05-06

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REPORT DOCUMENTATION PAGE

Form Approved
OMS No. 0704-0188

The 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 the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the 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 not withstanding 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.

1. REPORT DATE *(DD-MM- YYYY)*
25-05-2006

2. REPORT TYPE
MONOGRAPH

3. DATES COVERED *(From - To)*
SEPT 2005-MAR 2006

4. TITLE AND SUBTITLE
Time for a New Master Tenet?

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Maj John J. Schaefer III

5d. PROJECT NUMBER

***5e.* TASK NUMBER**

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
School of Advanced Military Studies
250 Gibbon Ave
Ft. Leavenworth, KS 66027

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Command and General Staff College
1 Reynolds Ave
Ft. Leavenworth, KS 66027

10. SPONSOR/MONITOR'S ACRONYM(S)
CGSC, SAMS

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED

13. SUPPLEMENTARY NOTES

14. ABSTRACT
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15. SUBJECT TERMS
Centralized Execution, Command and Control

16. SECURITY CLASSIFICATION OF:			**17 LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19B. TELEPHONE. NUMBER** *(Include area code)*
(U)	**(U)**	**(U)**	**(U)**	56	(913) 758-3300

Standard Form 298 (Rev. 8/98)

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major John J. Schaefer III

Title of Monograph: Time for a New Master Tenet?

Approved by:

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Abstract

Time for a New Master Tenet? By Major John J. Schaefer III, USAF, 56 pages.

This monograph addresses the continued relevance of airpower's master tenet in light of advances in technology. The purpose of this monograph is to examine the doctrinal assumptions used to justify centralized control with decentralized execution. Current Air Force doctrine assumes that this model of employment allows commanders "to achieve effective span of control and to foster disciplined initiative, situational responsiveness, and tactical flexibility." Each of these assertions is explored relative to technological advances in the employment of air and space power and the current trend toward centralized execution. Based on this analysis, this monograph concludes that the location of sufficient understanding of the commander's intent along the chain of command from the JFACC to the airborne asset determines the appropriate level of centralized execution. Successful future leaders will adapt the degree of centralized execution in their command and control model to fit their circumstances

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INTRODUCTION

> A Revolution in Military Affairs occurs when a nation's military seizes an opportunity to transform its strategy, military doctrine, training, education, organization, equipment, operations and tactics to achieve decisive military results in fundamentally new ways.[1]
>
> Secretary Of Defense William S. Cohen

Air Force Doctrine Document One, *Air Force Basic Doctrine* (AFDD-1) clearly states, "Centralized control and decentralized execution of air and space power are critical to effective employment of air and space power. Indeed, they are the fundamental organizing principles for air and space power, having been proven over decades of experience as the most effective and efficient means of employing air and space power."[2] The combination of centralized control and decentralized execution is the master tenet of airpower. However, advances in the state of technology warrant reexamination of the master tenet. In 1965, Intel cofounder Gordon Moore proposed that computer capabilities will double every 18 months.[3] This phenomenon is known as Moore's Law. More recently, Forbes Magazine editor Rich Karlgaard proposed the Flip Side of Moore's Law which states that technology becomes cheaper at nearly the same rate.[4] As the cost of communications technology goes down and its capability continues to rise, the Air Force will field technology that will make centralized execution easier. In light of the combined effects of these two laws, the Air Force needs to consider updating the master tenet to capitalize on the effects described. The following paragraph from AFDD-1 addresses the recent trend toward centralized execution:

> Modern communications technology provides a temptation towards increasingly centralized execution of air and space power. Although several recent operations

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[1]William S. Cohen, "Annual Report to the President and the United States" (Washington, DC Government Printing Office, 1999, 122.

[2] Air Force Doctrine Document 1, *Air Force Basic Doctrine*, 17 November 2003, 28, accessed 15 November 2005 at http://www.e-publishing .af.mil.

[3] Gordon E. Moore, "Cramming more components onto integrated circuits", *Electronics* 38, no. 8 (April 19, 1965) accessed 4 November 05 at http://www.intel.com/research/silicon/moorespaper.pdf.

[4] Rich Karlgaard, "More Cheap Thoughts," Forbes Magazine, 18 October 2005, 7, accessed 10 November 2005 at http://www.keepmedia.com/pubs/Forbes/2004/10/18/590809?extID=10026> .

> have employed some degrees of centralized execution, such command arrangements will not stand up in a fully stressed, dynamic combat environment, and as such should not become the norm for all air operations. Despite impressive gains in data exploitation and automated decision aids, a single person cannot achieve and maintain detailed situational awareness when fighting a conflict involving many simultaneous engagements taking place throughout a large area. A high level of centralized execution results in a rigid campaign unresponsive to local conditions and lacking in tactical flexibility. 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. Nevertheless, in some situations, there may be valid reasons for execution of specific operations at higher levels, most notably when the JFC (or perhaps even higher authorities) may wish to control strategic effects, even at the sacrifice of tactical efficiency.[5]

The Air Force's fundamental source of doctrine acknowledges a conflict between what Air Force doctrine dictates and the actual employment of air and space power in the field. New technologies are at the root of this conflict. Dr. Edward Smith, a researcher at the Department of Defense Command and Control Research Program, asserted that the current technological revolution of military affairs is not so much the technologies themselves but "the application of those technologies to new tactics, doctrine, and organization and to a new concept of warfare."[6] AFDD-1 asserts that centralized execution cannot stand up to the pressures of a dynamic campaign and dismisses it as a temporary solution without adequately exploring the issue. Air Force doctrine defines decentralized execution as "the delegation of execution authority"[7] and deems it superior to centralized execution because it allows commanders "to achieve effective span of control and to foster disciplined initiative, situational responsiveness, and tactical flexibility."[8] This monograph will use these four criteria to examine whether the current state of technology warrants an update to the master tenet.

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[5] AFDD-1, 28.

[6] Edward A Smith, *Effects Based Operations Applying Network Centric Warfare in Peace, Crisis, and Warfare*, (Washington, D.C.: Department of Defense Command and Control Research Program, 2002), xxix.

[7] AFDD-1, 28.

[8] AFDD 1, 28.

Definitions

Any discussion of the master tenet of air and space power requires a review of the definitions of the terms associated with the topic in order to ensure a common understanding of the subject. Accordingly, AFDD-1 defines centralized control as "the planning, direction, prioritization, synchronization, integration, and deconfliction of air and space capabilities to achieve the objectives of the joint force commander."[9] In his thesis about airpower command and control, Major David Gerber defined execution of airpower as "the act of launching a vehicle or formation, marshalling, maneuvering, and accomplishing an airpower role in support of strategy. In purely centralized execution, the detailed decisions reside in a higher command authority or in automated systems controlled by that authority."[10]A specific definition for the term execution does not exist in joint doctrine. AFDD-1's definition of decentralized execution is presented above. Notably, Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms* (JP 1-02) defines decentralized execution simply as "Delegation of execution authority to subordinate commanders"[11] and does not include the four assertions made in AFDD-1 as an integral part of the term. JP 1-02 does not contain a definition for centralized execution. However, Lieutenant Colonel Woody Parramore, in his *Air and Space Power Journal* article on the subject stated, "Centralized execution happens if a sortie carries out its mission under direct control of an air and space operations center (AOC) (whether a theater AOC, the tanker airlift control center, or the space AOC), with no other echelon in the chain of command issuing orders."[12] This monograph will use Parramore's definition.

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[9] AFDD-1, 28.

[10] David S. Gerber, "Adaptive Command and Control of Theater Airpower," (Thesis, School of Advanced Air and Space Studies, 1999), 6.

[11] Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, 145, accessed 15 October 2005 at http://www.dtic.mil/doctrine/jel/new_pubs/jp1-02.pdf

[12] Woody W. Parramore, "Defining Decentralized Execution in Order to Recognize Centralized Execution," *Air and Space Power Journal* Volume 18, No. 3 (Fall 2004), 25.

History of the Master Tenet

In order to understand the perspective of centralized control and decentralized execution presented in AFDD-1, a review of the historical development of this method of employment is appropriate. Until Napoleonic times, a single commander who was present on the field of battle commanded armies that maneuvered in unitary formations. Line of sight or the speed of an army's fastest horses limited the speed and reach of communications. Martin Van Creveld called this era "the stone age of command."[13] In this era, centralized execution commonly occurred as the commander could personally see events as they unfolded on the battlefield. The *levee en masse* produced armies of unprecedented size and led to the development of staff systems that allowed for decentralized execution. Additionally, improvements in road and rail networks coupled with the advent of the telegraph greatly expanded the range at which portions of a commander's force could operate and still maintain effective communications with their headquarters. Improvements in communications technology allowed for the decentralization of execution. Military staffs became efficient at translating the commander's intent to the various subordinate commanders and allowing them to execute their portion of the plan in a decentralized fashion. However, the decentralized execution that accompanied the development of the staff system was not always successful. The failure of subordinate commanders to execute Napoleon Bonaparte's intent greatly contributed to his defeat at Waterloo. David Chandler summarized the role poor decentralized execution played in Napoleon's defeat when he wrote:

> Throughout the battle Napoleon failed to exercise sufficient control over his subordinates. While it is not the responsibility of a commander in chief to interfere excessively in the details of the tactical battle, his overall supervision is vital to ensure that the master plan is put into execution with a minimum of delay and confusion. And yet Jerome was permitted to turn a feint attack into a major effort, d'Erlon to adopt an outdated formation, Ney to throw away the cavalry, and Grouchy to move away beyond recall. Napoleon should have never allowed these mistakes to be made. A high degree of personal control was possible on so

[13] Martin Van Creveld, *Command in War* (Cambridge, Massachusetts: Harvard University Press, 1985), 26.

> restricted a battlefield as Waterloo, but there is scant evidence of Napoleon exercising anything more than a negative influence on the conduct of events once battle was joined.[14]

Nevertheless, Air Forces inherited this method of command and control from their ground force predecessors. A historical review of command and control of air assets starting with World War Two shows why the Air Force have been reluctant to adopt any other model.

World War Two

World War Two air doctrine was significantly impacted by the lessons learned during the North African campaign and Operation Torch. The official United States Air Force history of Operation Torch claims that, "the Army Air Force (AAF) entered the war without an articulated air concept of employment." [15] The result was a long period of squabbling as to the proper role of airpower on the modern battlefield. Army commanders desired that air assets remain directly apportioned to Army units while airpower advocates argued for centralized control under an Airman to gain maximum benefit from airpower resources. During the initial phases of combat in Tunisia, "fierce battles and rapidly changing conditions made monitoring by headquarters difficult."[16] The result of these communications problems was the piecemeal application of airpower with correspondingly reduced effects. However, once Brigadier General Doolittle was ashore, he "regained control over his Twelfth Air Force units when effective communications facilities, denied by the separated amphibious landings, were established."[17] Luckily, the Allies were able to determine that their system of decentralized control was not producing acceptable results and switched to a centralized control model. Dale O. Smith's study of military doctrine in the North Africa concluded that, "Although there were more Allied than Axis aircraft available

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[14] David G. Chandler, *The Campaigns of Napoleon*, (New York, New York: MacMillan Publishing Company, 1966), 1092.

[15] Daniel L. Mortensen, et. al., *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine 1940-1943*, (Maxwell Air Force Base, Alabama: Air University Press, 1998), 83.

[16] Mortensen, 97.

[17] Mortensen, 97.

[when Rommel entered the Kasserine Pass on 20 Feb 43], the dissipated air organization prevented Allied air power from concentrating in time. … we learned a lesson about employing air power as an entity which was not forgotten for the remainder of the war."[18] The Operation Torch after action reports included the observation that "in the planning of "Torch", information and planning were highly compartmented, resulting in duplication and omission."[19] The reports detail numerous difficulties encountered as a result of compartmentalized efforts and decentralized control of airpower by ground commanders. The Army Air Force learned from its experience and converted to a centralized control model of command through the remainder of World War Two because it worked far better than decentralized control in North Africa. The limitations of the communications equipment of the era did not allow for experimentation with centralized execution. Communication with airborne aircraft was so poor that many units did not know the status of their aircraft after launch until they counted the number of returning aircraft in the evening. Under these conditions, the Army Air Force firmly adopted the doctrine of centralized control and decentralized execution. Specifically, Field Manual 100-20, *Command and Employment of Airpower* included the statement "Control of available airpower must be centralized" [20] but the manual left execution up to the lower level commanders thereby making it the official practice of the Army Air Force in 1943.

Korean War

Although the Air Force gained its independence between World War Two and the Korean conflict, it did not develop new doctrine for the employment of air power. The result was the continuation of centralized control and decentralized execution during the Korean conflict.

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[18] Dale O. Smith, *U.S. Military Doctrine: A Study and Appraisal*, (New York, New York: Duell, Sloan and Pierce, 1955), 145.

[19] Operation Torch After Action Report, accessed on 15 September 2005 at http://cgsc.leavenworth.army.mil/carl/resources/, 65.

[20] Field Manual 100-20, *Command and Employment of Airpower*, July 1943, quoted in Daniel L. Mortensen, et. al., *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine 1940-1943*, (Maxwell Air Force Base, Alabama: Air University Press, 1998).

The convoluted command relationships in place between and within the services in Korea made any evolution in doctrine unlikely. The Air Force did manage to establish a joint air operations center in July of 1950 that was "intended to facilitate the coordination of air and ground operations in the theater."[21] The joint operations center effectively served as the centralized control of joint air assets in Korea but was hamstrung by "poor communications, the absence of a joint (as opposed to service) doctrine for the control of air operations of different services, the initial physical separation of the two major components of the center, and so on."[22] Computers were nonexistent on the battlefield so aircraft tracking required labor intensive tracking by manual methods. Figure 1 shows the state of aircraft tracking technology in this era.

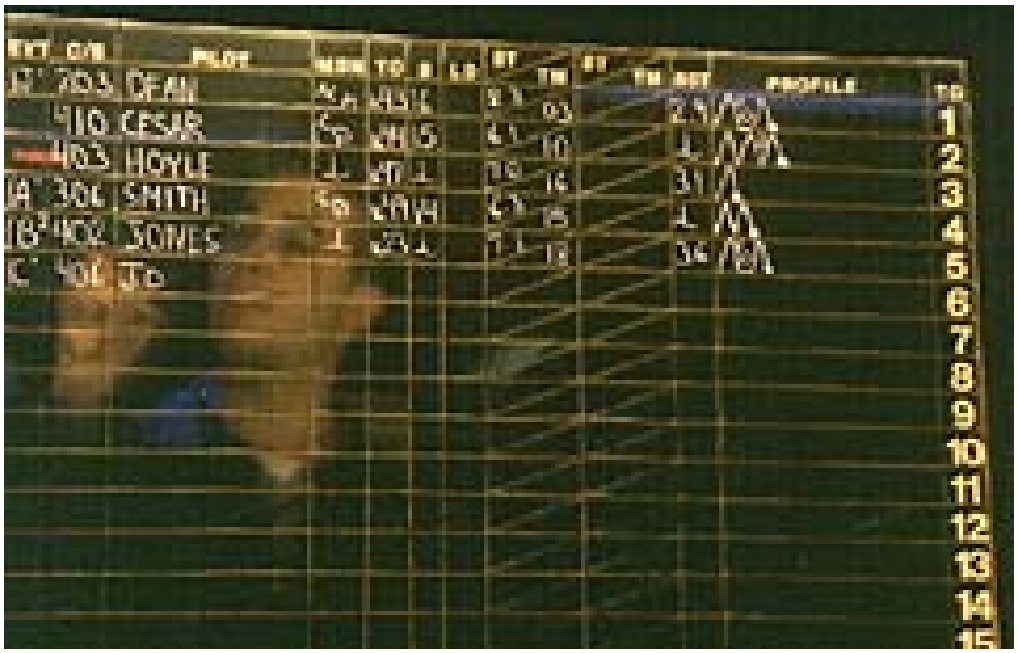

Figure 1 Hand Tracking of Air Assets

Communications equipment was not significantly better than that available in World War Two thus, "large numbers of aircraft on station, and the limited number of forward air controllers and

[21] James A. Winfield and Dana J. Johnson, *Command and Control of Joint Air Operations: Some Lessons Learned from Four Case Studies of an Enduring Issue,* (Santa Monica, California: RAND, 1991), 27.

[22] Winfield and Johnson, 27.

usable control frequencies often combined to saturate air control capabilities."[23] Faced with these significant initial hurdles and the near catastrophic entry of the Chinese Army into the war, the joint operations center was in no position to develop new doctrine for the employment of air power. Thus, while the military experience in Korea improved the employment of joint air power assets, air power doctrine was essentially unchanged from the centralized control and decentralized execution model in use at the beginning of the conflict.

Vietnam

Although Air Force doctrine still stressed that an Airman should exercise centralized control and decentralized execution, a different model appeared in Vietnam. Figure 2 and Figure 3 show that the command structure in the Vietnam War was anything but centralized.

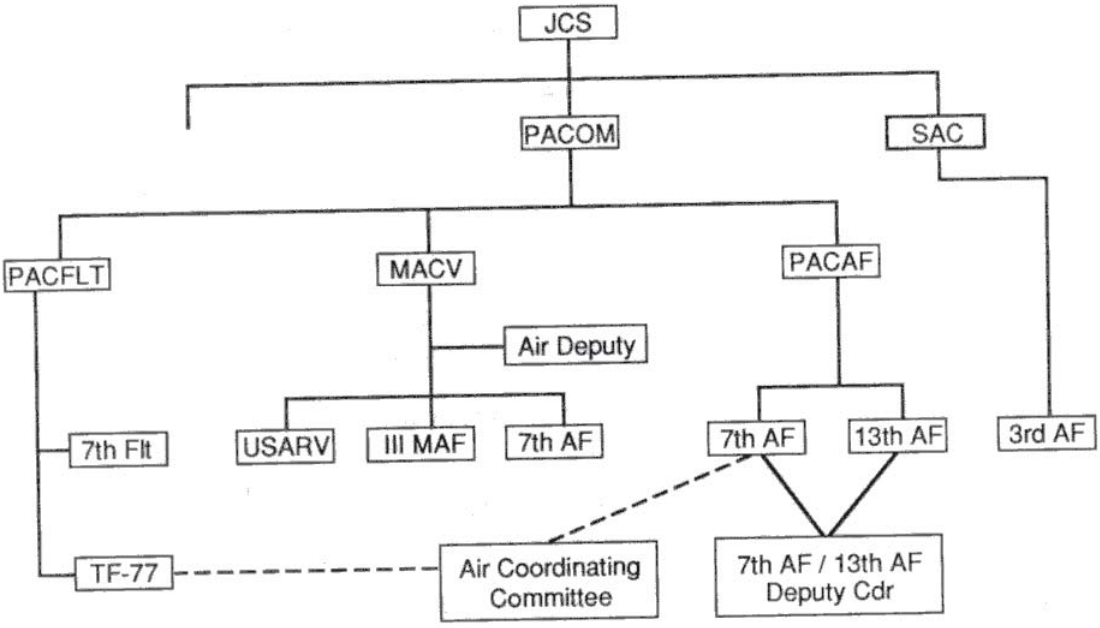

Figure 2 - Vietnam Command and Control Relationships[24]

In addition to organizational boundaries, North and South Vietnam were also divided into geographic "route packages" which further complicated the command and control situation

[23] Robert F. Futrell, *The United States Air Force in Korea, 1950-1953,* (Washington, D.C.: Department of the Air Force, 1981), 122-123.

[24] Winfield and Johnson, 75.

because different elements of the organizational structure were responsible for different geographic areas. Figure 4 shows the geographic divisions and the service responsible for each during the Vietnam War. In fact, the structure was so complex that it often led to separate agencies competing with each other to accomplish the same goal. This problem was complicated because the sheer volume of message traffic such a command structure created still easily overwhelmed the new digital communications systems of the day. Mark Clodfelter provided an excellent look into the command arrangements in Southeast Asia when he stated, "Instead of providing the Seventh Air Force with complete control over the 2nd Air Division assets, PACAF gave the Seventh Air Force "operational" direction over the fighter wings, while the 13th Air Force retained "administrative" control. The ultimate result of this bizarre arrangement was the creation of the 7/13th Air Force in Thailand, which then assumed *administrative* control of the fighters! 'Command arrangements were a mess,' a Seventh Air Force staff officer recalled. 'There was only one person that you could say was in command, and that was the President.'" [25] Instead of trusting the generals he appointed to run the air war, the President employed centralized execution to the extreme of micromanagement. In fact, President Johnson reiterated the point when he declared, "they can't even bomb an outhouse without my approval."[26] One commentator noted, "The organization of the air war provided the most glaring sin against a coherent doctrinal approach to the war."[27] The result was that the Air Force completely rejected the idea of centralized control or execution from anyone but an Airman. The Air Force's first real

[25] Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam*, (New York, New York: The Free Press, 1989), 128-129.

[26] John T. Correll, "The Confessions of Robert S. McNamara," *Air Force Magazine*, Volume 78, No. 6, (June 1995): 5, accessed 17 November 2005 at http://www.afa.org/magazine/june1995/0695edit.asp. In fact, President Johnson and his closest advisors actually picked targets during lunchtime meetings in the White House.

[27] Richard H. Shultz Jr. and Robert L. Pfaltzgraff Jr., *The Future of Air Power in the Aftermath of the Gulf War*. (Maxwell Air Force Base, Alabama: Air University Press, 1992), 106.

experience with centralized execution was a dismal failure because, in the leadership's view, it had amounted to political meddling at the tactical level.[28] In fact, although the concept had long

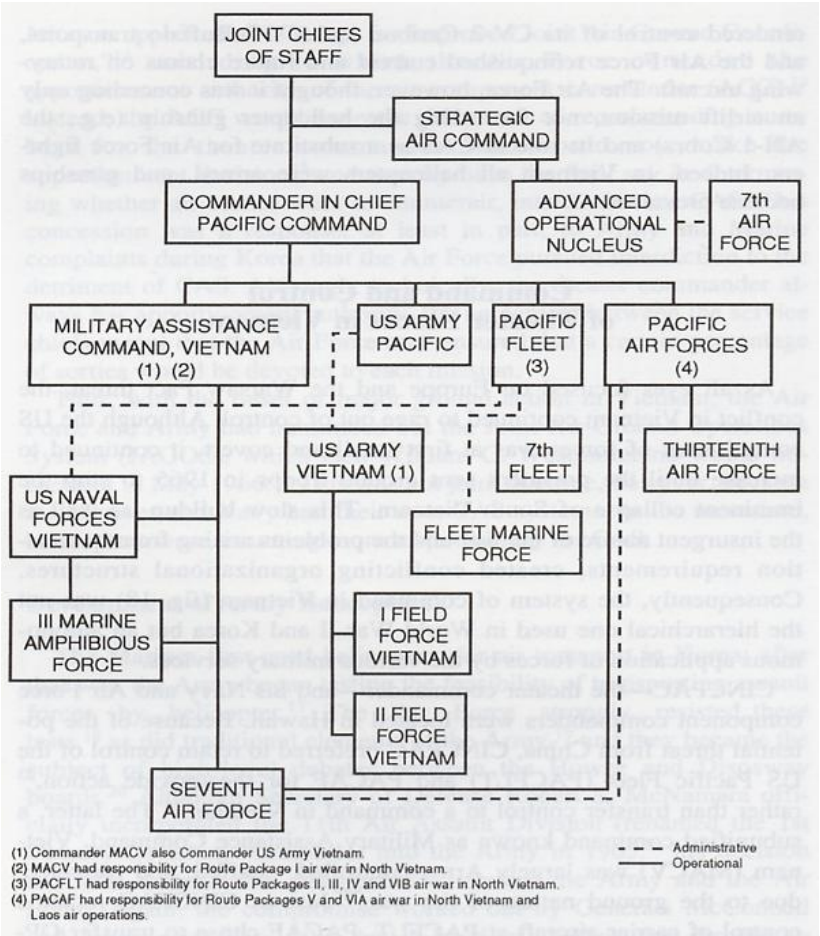

Figure 3 - Command Structure in the Vietnam War[29]

been advocated with different words, the term "decentralized execution" first appeared in Air Force doctrine in the 1971 version of Air Force Manual 1-1[30] largely in reaction to the experience of the Vietnam War. The next few generations of Air Force leaders carried the hard-learned

[28] William C. Westmoreland, *A Soldier Reports*, (Garden City, New York: Doubleday and Company, 1976), 411.

[29] John J Lane, Jr., "Command and Control and Communications Structures in Southeast Asia," (Maxwell AFB, Alabama: Air War College, 1981), 111.

[30] Air Force Manual 1-1, *United States Air Force Basic Aerospace Doctrine*, 28 September 1971, 2-1.

lessons that Airmen should control airpower and centralized execution amounts to meddling at the tactical level forward in doctrine for the next two decades.

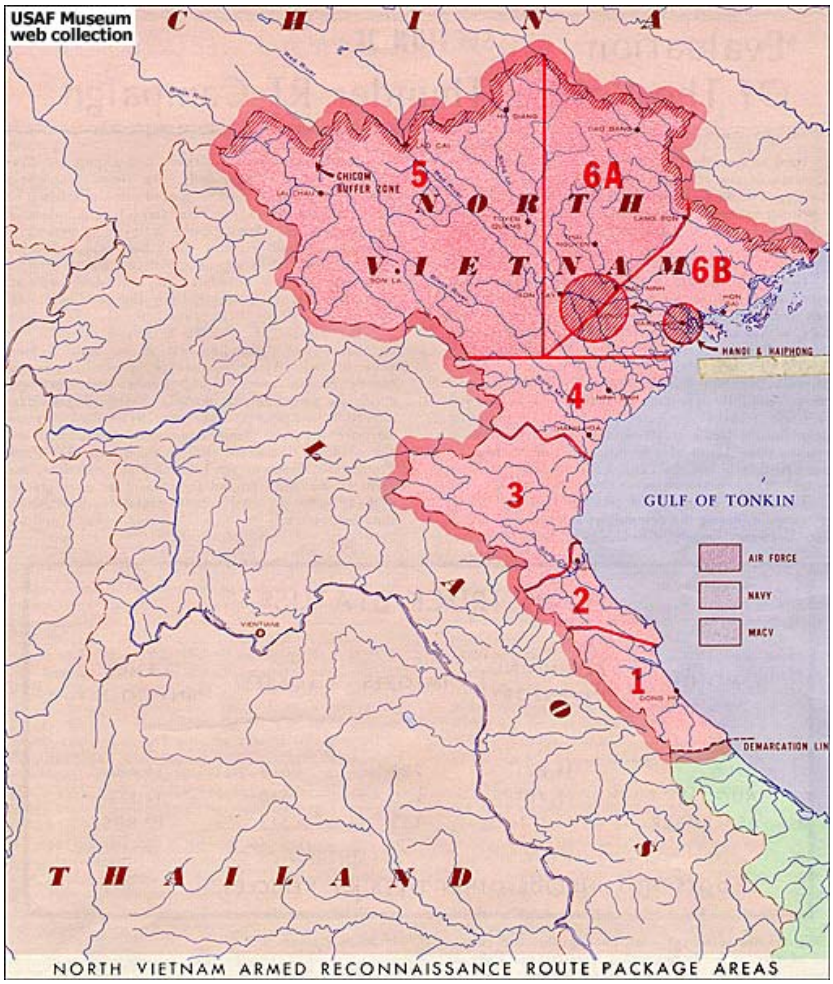

Figure 4 Route Package Map

Operation Desert Storm

The Air Force entered Operation Desert Storm with vastly improved technology but the same basic doctrine that was in place at the end of the Vietnam War. Computing power had greatly increased the organization's ability to process and transmit data. These improvements allowed the Air Force to build and execute air tasking orders that were far more complex than those used in Vietnam. However, glitches remained which prevented fully incorporating and harnessing these technologies. There were still interoperability problems such as the need to

physically fly air tasking orders (ATOs) to the Navy due to the inability to transmit them electronically.[31] The command and control philosophy in use was essentially identical to that used in Southeast Asia. Airborne retasking of some sorties occurred but not to a large extent and aircrews felt they were given incomplete information when retasked which contributed to combat losses[32]. Dr. Rebecca Grant detailed how this occurred in an article that appeared in *Air Force Magazine*:

> Senior commanders could and did pass orders to divert aircraft to new targets. Multiple feeds coming into the Tactical Air Control Center at Royal Saudi Air Force headquarters in Riyadh generated battle pictures. These enabled the Joint Force Air Component Commander, Lt. Gen. Charles A. Horner, and his deputy, Brig. Gen. Buster C. Glosson, to monitor the progress of the night's attack in real time. Glosson kept in reserve a handful of ready F-111s that could quickly exploit opportunities. Horner and Glosson gave Schwarzkopf nightly briefings on targets struck and plans for new attacks, but Schwarzkopf did not monitor air strikes in real time or personally approve lists of targets once the war was under way. Interventions from Washington were limited to advance planning.[33]

The Air Force used its new technology to reduce the time required to produce the greatly increased volume of products required by the size of the air effort but did not attempt to use it to employ centralized execution. Two possible explanations for this are the lack of trust in the array of new technology and the strongly entrenched culture of centralized control and decentralized execution among Air Force leaders who cut their teeth on the bitter lessons of Vietnam.

Iraqi No Fly Zone Enforcement

The Air Force inherited Operations Southern Watch and Provide Comfort, which later became Operation Northern Watch, from the aftermath of the first Gulf War. These operations

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[31] Sterling D. Sessions and Carl Jones, "Interoperability: A Desert Storm Case Study," (Washington, D.C.: Institute for National Strategic Studies, 1993), accessed on 18 November 2005 at http://www.ndu.edu/inss/McNair/mcnair18/m018ch01.html.

[32] Personal email to author from F-15E Weapons System Operator who flew multiple re-roled sorties in Operation Desert Storm. Aircrews felt airborne centralized execution unnecessarily exposed them to threats with little chance of destroying the newly assigned targets. The targeting pod technology in use at the time required extensive pre-mission target study. Today's targeting pod technology is far superior and aircrew training includes switching targets while airborne.

[33] Rebecca Grant, "Reach Forward," *Air Force Magazine*. Volume 85, No. 11. (October 2002), 43 – 47, accessed 17 November 2005 at http://www.afa.org/magazine/oct2002/1002reach.asp.

were much smaller in scale and became a Petri dish for centralized execution. The command and control structure used during the war could easily control the reduced number of sorties with capacity to spare. This robust command structure and the maturation of reliable communications and situational awareness technologies allowed commanders the ability to see their entire battle space in real time. Figure 5 shows the complexity to which the technology in the AOC blossomed during Operation Southern Watch. The rules of engagement developed in this environment required aircrews to get permission before engaging almost any target.[34] In his thesis on centralized control Lieutenant Colonel Daniel Baltrusaitus described an incident in the southern no-fly zone when the Joint Task Force Southwest Asia commander "directed the strike aircraft's run-in heading and required the pilot to describe the target seen in the targeting pod over the radio. Once satisfied that the pilot identified the proper target, the commander directed the release of a laser guided precision bomb, destroying the target."[35] The air tasking order amounted to a schedule that dictated when aircrews would be available to the chain of command for centralized execution. Aircrews enjoyed considerable latitude to employ the appropriate tactics but the Combined Air Operations Center (AOC) quickly redirected them while in-flight if they did not approve of something they saw on their computers. Two factors contributed to this shift towards centralized execution. First, the greatly reduced size of these operations compared to Operation Desert Storm meant that the available technology was capable of supplying a real time picture of what was happening in the area of operations for the first time. Additionally, these operations enforced no-fly zones and therefore had much stricter political constraints than those

[34] Author's personal experience while deployed to Operation Northern Watch from January to April, 1999.

[35] Daniel F. Baltrusaitus, "Centralized Control with Decentralized Execution: Never Divide the Fleet?," (Thesis, School of Advanced Air and Space Studies, 2004), 2. Lt Col Baltrusaitus went on to say that during his deployment to Operation Southern Watch, AWACS aircraft had to get verbal permission from the Joint Task Force Commander for every weapons release even if the attack was within the established rules of engagement.

normally present during wartime. Air Force doctrine did not change but a new way of conducting business certainly made an appearance in Iraq after the first Gulf War.

Figure 5 - Operation Southern Watch AOC Technology

Operation Allied Force

This trend continued when Operation Allied Force began in response to ethnic cleansing in Kosovo during 1999. Two factors encouraged the use of centralized execution in this air campaign against Serbia. First, during the years between the end of Operation Desert Storm and the start of Operation Allied Force the effect of Moore's Law finally allowed computer capabilities to support a robust system of real time monitoring and communications with large numbers of airborne assets. Second, an allied coalition conducted this air campaign and that brought along significant political constraints. These influences combined to produce a high degree of centralized execution.

By the start of operations in Kosovo, Air Force command and control technologies had been in continuous use since 1990. During nearly a decade of constant use the infrastructure was continually refined to be more reliable and present information in more user-friendly formats.

Commanders during the intervening years of no-fly zone enforcement demanded and received systems that enabled them to see events in the battlespace in real time. Notable increases in the reliability of computer hardware occurred during the 1990's as well. Technology matured to the point that "SACEUR ran day to day operations rather than delegating responsibility to his subordinate, the commander of Allied Forces Southern Europe. He also got bogged down in making tactical decisions instead of devoting himself to strategy and policy as the senior NATO military officer."[36] For the first time in modern air warfare computers were capable of presenting a picture of the battlespace in enough detail to allow the commander to focus on this level. The state of command and control technology at the start of Operation Allied Force created a situation that allowed commanders to centrally execute a large scale campaign for the first time.

The nature of the large coalition also caused Air Force leaders to use centralized execution in order to avoid cumbersome approval processes when reacting to certain types of targets. During the conflict Senator John McCain remarked, "'Running a list of targets through 19 countries cannot be an effective way of waging war."[37] However, this was a reality and influenced the way General Wesley Clark and his subordinate air commanders ran the campaign as political constraints meant aircrews could not fully employ their capabilities and tactics. As a result, when the now mature surveillance technologies detected targets of opportunity senior leadership did not hesitate to centrally execute airborne sorties since the long delay of the approval process often meant a missed opportunity. Centralized execution was both a method to engage fleeting targets and a way to circumvent the delays associated with the allied approval process. Lt Gen Michael Short, who was COMAIRSOUTH, recounted an extreme example of this phenomenon to the Air Education Foundation when he told them:

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[36] Milan N. Vego, "Operational Command and Control in the Information Age," *Joint Forces Quarterly* (September 2004), 100.

[37] Steven Lee Myers, "All in Favor of This Target, Say Yes, Si, Oui, Ja," *New York Times*, 25 April 1999.

> Real-time targeting. I will share a story. About 45 days into the war, Predator was providing great coverage for us. About 5 o'clock in the afternoon, we had live Predator video of three tanks moving down the road in Serbia and Kosovo. As most of you know, my son is an A-10 pilot, or he was at the time. We had a FAC [Forward Air Controller] overhead and General Clark [Gen. Wesley K. Clark, SACEUR] had the same live Predator video that I had. "Mike, I want you to kill those tanks." I quickly responded, I had something else in mind, "Boss, I'll go after that for you." When shift time came, [Maj. Gen.] Garry Trexler was on the floor, finishing up in the daytime, and Gelwix arrived to take the night shift. I was there because the SACEUR wanted those three tanks killed. We had a weapon school graduate on the phone talking direction to the FAC on the radio. Call went something like this: "A lot of interest in killing those tanks, 421. I'd like you to work on it." "Roger." Two or three minutes went by, and 421 clearly had not found those tanks. The young major's voice went up a bit and said, "ComAirSouth, and SACEUR are real interested in killing those tanks. Have you got them yet?" "Negative." About two more minutes went by and the weapons school graduate played his last card. "General Short really wants those tanks killed." And a voice came back that I've heard in my house for the better part of 30 years and he said, "God damn it, Dad, I can't see the f---ing tanks!"[38]

Air Force doctrine did not change but even senior Air Force leaders freely admitted that command and control of air campaigns had changed to include centrally executing sorties in ways that were not previously possible.

Operations Enduring Freedom and Iraqi Freedom

Centralized execution continued in Operation Enduring Freedom and Operation Iraqi Freedom and brought the term "reach forward" into the Air Force lexicon. "This term refers to a situation in which a commander thousands of miles from a theater uses the same communication system to manage a tactical event in real time. In Enduring Freedom, Franks *(CENTCOM's Commander)* or CENTCOM senior staff at MacDill AFB, Fla., often granted or withheld approval for tactical execution of a specific strike in Afghanistan."[39] Fighter pilots in the campaign reported that the CAOC redirected them on approximately 10 to 30% of the sorties they

[38] Maj Gen Michael Short, (Speech to Air Education Foundation, Orlando, Florida, 25 February 2000), accessed at 15 Sept 2005 from http://www.aef.org/pub/short200.asp.

[39] Grant, 45.

flew.[40] The much larger scale of Operation Iraqi Freedom meant that a much smaller percentage of sorties were affected in this manner but reach forward continued to occur.[41 42] Ninth Air Force reported diverting airborne aircraft to attack 156 time sensitive targets and 686 dynamic targets in its Operation Iraqi Freedom after action report.[43] The two most recent major air campaigns contained significant use of centralized execution despite the Air Force's doctrinal guidance to avoid it. While discussing the effects of new technology on airpower during his retirement exit interview, outgoing Chief Of Staff of the Air Force General John Jumper stated, "And we should be able to do this from the air operations center, too, or from any other platform. The display should not be just a comprehensive picture but one that reacts to instructions. …the AOC [should] be able to put a cursor over the target and make things happen, such as automatically dispatching the closest strike aircraft to destroy a pop-up target and deconflicting the aircraft with others in the vicinity."[44] All indications are that the shift toward centralized execution will continue.

Historical review shows the origin of doctrine and the gradual move away from it. Doctrine should not be a static collection of proper practices. Doctrine should be a living document that adjusts to changing methods of airpower employment.[45] It is time to take a critical look at the reasons AFDD 1 provides for decentralized execution and evaluate their continued

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[40] Personal email to author from F-15E pilot who flew numerous sorties over Afghanistan during Operation Enduring Freedom. This range reflects only sorties when an aircrew took off with an assigned target and was retasked. They often flew sorties without assigned targets knowing that they would receive tasking once they were established in the area of responsibility.

[41] Author's personal experience in Operation Iraqi Freedom.

[42] Harvey Rice, "'Boring' Mission Ends with SCUD Hit," *Houston Chronicle*, March 29, 2003. This article recounts an Offensive Counter Air sortie that was scheduled for 3 hours and was re-roled to an interdiction role. The sortie eventually stretched to almost twelve hours before the crews were cleared to destroy a SCUD missile near the Kuwaiti border. The author was a pilot on this mission.

[43] Lt Gen Michael T. Moseley, "OIF – By the Numbers." USCENTAF Assessment and Analysis Division." (17 July 2003), accessed on 1 Oct 2005 at http://www.urbanoperations .com/oifcentaf.pdf

[44] John A. Tirpak, "The Four-Year Sprint," *Air Force Magazine*, Volume 88, No. 10 (October 2005), 41.

[45] Dennis M. Drew and Donald M. Snow, *Making Strategy: An Introduction to National Security Processes and Problems*, (Maxwell Air Force Base, Alabama: Air University Press, August 1988), 160-167.

relevance in light of technological improvements, which have clearly allowed for successful use of centralized execution in combat.

CHAPTER 1: Effective Span of Control

> We can never forget that organization, no less than a bayonet or an aircraft carrier, is a weapon of war. We owe it to our soldiers, our sailors, our airmen, and our marines to ensure that this weapon is lean enough, flexible enough, and tough enough to help them win if, God forbid, that ever becomes necessary.
>
> Congressman Bill Nichols[46]

Span of control refers to the number of subordinates reporting directly to a supervisor. The application of new technologies to the fields of management and leadership is expanding an individual's ability to effectively command greater numbers of subordinates. Modern innovations have drastically increased the commander's ability to maintain situational awareness over a larger area with more participants. Terrain and the curvature of the earth once defined the limits of the area a commander could see. Any mental picture beyond this area was subject to the delay inherent in the transportation of the information to the commander by foot or horse. The satellite alleviated both of these problems. Our current constellation of satellites provides for the transmission of information at, literally, the speed of light to virtually any point on the globe. Additionally, computers are now capable of quickly collating diverse information into a real time picture of the battlespace. A commander no longer needs a large staff to translate the information from the field into an overall picture. General Gordon Sullivan and then Colonel James Dubik noted, "Staffs, as they have developed during the industrial age are changing dramatically. Bureaucracies will not vanish, but they will be organized around information, not functions."[47] The radical changes in capability associated with current and emerging technologies must also affect our way of employing air assets.

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[46] U.S. Congress, Reorganization of the Department of Defense, Hearings before the Investigative Subcommittee of the Committee on Armed Services, 99th Congress, 2nd Session, (Washington, D.C.: Government Printing Office, 1987), 8.

[47] General Gordon R. Sullivan and Colonel James M. Dubik, *Envisioning Future War*, (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College Press, 1995), 48.

Span of Control Growth

Studies performed in the 1930's identified the optimum span of control as somewhere between 1 and 10 subordinates. During this time period, V. A. Graicunas developed a mathematical relationship based on the number of relationships and sub-relationships a manager could handle effectively. Based on the mathematical proof he developed, he determined that a manager's span of control should not exceed six subordinates.[48] The introduction of computers into the workplace produced a growth in effective span of control to between 1 and 100 subordinates.[49] This same phenomenon is present in the military workplace as well. Sullivan and Dubik stated, "Computers 'talking' to themselves by digital transfer of information, and empowered workers becoming more self-regulated, are making much of the middle management obsolete. …Spans of control will grow larger; organizations 'flatter.'"[50] Because of this increased span of control, organizations are becoming flatter. Noted columnist Thomas Friedman recently declared, "we are in the process of connecting all the knowledge pools in the world together."[51] Friedman declared the world flat based on a recent trip to India that showed how technology and globalization allow anyone, regardless of location, to reach out and contact whomever he needs to in the business world. As the world's knowledge pools connect in a manner that allows for instantaneous access to the information required for making decisions a commander, who masters the ability to sift through all the available incoming information, can effectively manage a larger span of control.

Larger spans of control can actually contribute to greater efficiency in an organization. Management theorist Herbert A. Simon proposed this principle when he wrote, "Administrative

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[48] V.A. Graicunas, "Relationship in Organizations," quoted in Luther Gulick and Lyndall Urwick Eds., Papers on the Science of Administration, 183-187. New York. Institute of Public Administration, Columbia University, 1937.

[49] Downloaded from http://en.wikipedia.org/wiki/Spanofcontrol.

[50] Sullivan and Dubik 48.

[51] Thomas L. Friedman, "It's a Flat World, After All". New York Times Magazine, April 3 2005, 33. Friedman's article and subsequent book deal mainly with the business world but many of the concepts he discussed also apply to military organizations.

efficiency is enhanced by keeping at a minimum the number of organizational levels through which a matter must pass before it is acted on. In many situations the results to which this principle leads are in direct contradiction to the requirements of the *[limited]* span of control."[52] In direct opposition to this theory, AFDD-1 implies that efficiency increases through decentralized execution because the introduction of subordinate layers of commanders reduces spans of control. While this approach eases the volume and complexity of the decisions faced by the overall commander, it does not necessarily result in greater organizational efficiency. The additional layers introduced in the effort to maintain smaller spans of control invariably also introduce delay into the transmission of information. Additional layers also serve as information filters. While such filtering can reduce the volume of unimportant data a superior commander must sort through, it can also block the flow of crucial data to a commander. Successful Air Force leaders routinely operate in an information rich environment that involves multitasking. Thus, artificially reducing spans of control to keep them in line with a principle developed prior to the information age is not the best way for a military organization to structure itself. Jake Thackray pointed out that effective span of control can be increased by "an increased rate of information processing, increased delegation of authority to subordinates, increased freedom of action to subordinates and greater availability of information and intelligence in which the commander has confidence."[53] Sullivan and Dubik summed up the need to take advantage of information age developments when they stated:

> As the information age develops, corporations will not simply spend money on new technology and then use it in old ways. They will not simply ask how they can do things faster and better. These are actions that already will have been taken in the early stages of the information age. Rather, corporations will ask, 'Why do some things at all?' Success will come to the corporations that can exploit the full potential of computer technology within new organizations and

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[52] Herbert A. Simon, *Administrative Behavior* (New York, New York: The Macmillan Company, 1947). 26-28.

[53] David Potts, *The Big Issue: Command and Combat in the Information Age*, (Washington, D.C.: Department of Defense Command and Control Research Project, 2003), 118. Thackray's essay "The Commander-Centric Approach to Modernising Command Structures" is included in the compilation.

> develop new attitudes toward workers and work processes, new ways of operating and new management concept – as these new technologies, organizations and concepts are developed. That is, success will come to those who 'unlearn' the rules of the industrial age and adopt the new practices of the information age the fastest.[54]

Decentralized execution is partially a legacy of Graicunas' early 20th century management theory and information age developments warrant its reexamination.

Size Matters

The size of an air operation also affects the relative importance of spans of control to the commander. Roughly 90,000 sorties were flown during the 41 days of the air campaign in Operation Desert Storm.[55] On 21 March 2003, the first day of Operation Iraqi Freedom air operations, coalition air assets flew over 1700 sorties.[56] Two weeks later, while coalition ground forces paused to refit on their drive to Baghdad, the F-15E squadrons based at Al Udeid Air Base, Qatar surged for over a week and each flew nearly 100 sorties daily.[57] By contrast, CENTAF's airpower summary for 9 November 2005 reported only 63 close air support and armed reconnaissance missions and seven intelligence, surveillance and reconnaissance missions in support of the ongoing coalition presence in Iraq.[58] Considering the fact that these sorties are spread over a 24-hour span and taking their average sortie duration into account, this level of air activity amounts to, on average, less than ten sorties being airborne over Iraq at any given time. This level of air activity closely mirrors that seen during more than a decade of Operation Northern Watch and Operation Southern Watch. The AOC can easily execute such low volumes

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[54] Sullivan and Dubik, 50.

[55] U.S. Congress, *Operation Desert Storm: Evaluation of the Air Campaign*, Washington, D.C.: Government Printing Office, 1997), 2.

[56] Moseley, 15.

[57] Author's personal experience as 336th Expeditionary Fighter Squadron scheduler during Operation Iraqi Freedom.

[58] CENTAF Airpower Summary for 9 November 2005 retrieved from http://aimpoints.hq.af.mil/index.cfm on 12 November 2005. USCENTAF began releasing daily airpower summaries in October 2005. The number of sorties and their distribution by mission type has remained relatively consistent to date.

of sorties centrally. The state of the art technology present in the AOC is capable of presenting this volume of data in a manner that allows the commander to develop and maintain complete situational awareness of the air effort. Thus, the commander's span of control effectively encompasses all airborne assets. However, when the air effort grows to the proportions present during the opening weeks of Operation Iraqi Freedom, the commander can no longer develop the same detailed understanding of what is happening around all of his assets. The volume of information, even when presented in a user-friendly format, is too great for a single individual to assimilate quickly. In this case, a commander must limit his span of control in order to obtain maximum effect from his assets.

The necessity for a commander to limit his span of control in the face of overwhelming numbers of sorties does not translate directly to a corresponding requirement for the exclusive use of decentralized execution. The Joint Forces Air Component Commander (JFACC) has three valid options in this situation. First, he can employ an exclusively decentralized execution method. This choice is appropriate if his direct influence will not produce greater effects than those already being achieved. Pure decentralized execution is also appropriate if the AOC suffers degradation in its ability to monitor and communicate with airborne assets. Such degradation may occur through enemy action or simply through the technical difficulties every complex computer system eventually encounters. Second, the JFACC may choose to allow the majority of sorties to operate under a decentralized execution model while reserving a portion of the force for centralized execution. The AOC's ability to monitor, communicate with and control airborne assets should dictate the upper limit on the size of that portion of the force reserved for centralized execution. The JFACC should strive to minimize the portion of forces set aside for this purpose in order to allow the bulk of the force to continue creating the effects he desires. Thirdly, if the portion of assets the JFACC desires to set aside for centralized execution exceeds his personal tracking ability, the JFACC can appoint multiple deputies at the AOC and delegate them the authority to execute airborne assets centrally. This option effectively creates another

layer in the command structure that can slow the process and interpret the available information differently. For this reason, this third option should be avoided in favor of allowing elements outside the AOC to operate in a decentralized execution mode, unless information available only in the AOC will prevent those outside elements from achieving the commander's desired effects. Centralized execution is not an all or nothing proposition, the JFACC must consider the size of the operation at hand along with the quality of command and control infrastructure available when deciding to what extent he should employ centralized execution.

CHAPTER 2: Disciplined Initiative

> The advantage which a commander thinks he can attain through continued personal intervention is largely illusory. By engaging in it he assumes a task that really belongs to others, whose effectiveness he thus destroys. He also multiplies his own tasks to a point where he can no longer fulfill the whole of them.[59]
>
> Helmut Von Moltke

Field Marshall Helmut Von Moltke enjoyed highly successful military career but his thoughts on command and control of military forces were developed long before the information age. His assertion that personal intervention destroys effectiveness was never wholly true as the situation and manner in which personal intervention is used dictates the effect upon effectiveness. With the benefit of modern technologies that penetrate the fog of battle, today's commander can actually make his subordinates more effective through personal intervention. As new systems arrive on the battlefield they are generally implemented from the top down. Thus, systems that promise to bring total situational awareness to the lowest level sometimes never actually reach that level due to financial constraints on the number of systems procured or the intervention of higher levels of command. This situation results in the commander receiving the benefit of better situational awareness and having no easy way to share that awareness with his subordinates. When this occurs, the commander may need to resort to personal intervention in order to achieve

[59] Prussian Field Marshal Helmut von Moltke, quoted in U.S. Army Field Manual (FM) 6-0, *Command and Control* (Washington, DC: U.S. Government Printing Office [GPO], Final draft, August 2000), 1-14.

his desired effects. Lieutenant Colonel Robert Leonhard aptly addressed this situation when he wrote, "When the tempo of information flow gives subordinates a more accurate and timely view of the battlefield, then they should have decision making authority that is commensurate with that information. When, on the other hand, the higher headquarters has the information faster, decision making authority should be centralized."[60] Commanders need to consider the current situation and the capabilities of their subordinates when deciding on the correct balance between decentralized execution and centralized execution through personal intervention. Each situation is different and requires a different mix of execution style. For example, a brand new 2-ship flight lead will require much more detailed intervention to prosecute an emerging target in a high threat area than a combat tested Weapons School graduate. The JFACC should use his judgment and knowledge of his subordinates to determine what degree of centralized execution, if any, is appropriate.

Detractors of centralized execution sometimes cite *auftragstaktik* as proof that centralized execution negatively affects initiative without closely examining the concept. The Prussian military developed the concept of *auftragtaktik* as it reformed itself following Prussia's disastrous defeats by Napoleon. "*Auftragstaktik* subsumes all the following concepts: individual initiative, independent decision-making, and thinking leaders reaching tactical decisions on their own accord. In short, a commander would specify to subordinates what to do, not how to do it." [61] German successes in the early stages of World War Two were at least partially attributed to the initiative displayed by subordinate commanders when operating under this concept. German military doctrine defines *auftragstaktik* as:

> A command and control procedure within which the subordinate is given extensive latitude, within the framework of the intention of the individual giving the order, in carrying out his mission. The missions are to include only those

[60] Robert R. Leonhard, *The Principles of War for the Information Age*, (Novato, California: Presidio Press, 1998), 201.

[61] David M. Keithly and Stephan P. Ferris, "*Auftragstaktik*, or Directive Control, in Joint and Combined Operations," *Parameters* (Autumn 1999), 119.

> restraints which are indispensable for being able to interact with others, and it must be possible to accomplish them by making use of the subordinate's forces, resources, and the authority delegated to him.[62]

A close examination of the term's definition shows that it does not preclude a commander from issuing guidance to subordinates, rather it opposes micromanagement. Modern commanders can successfully employ centralized execution if they keep in mind that they should do so only to relay new tasks to the subordinate, not tell them how to accomplish new tasks.

Von Moltke's concern about over tasking the commander is still valid but modern technology has greatly expanded an individual's ability to manage multiple tasks simultaneously. A commander needs to use his judgment to determine the point at which efforts at personal intervention begin to detract from the overall attainment of his superior commander's intent. The AOC staff plays a central role in the organization and presentation of information to the commander. A proficient staff can collate large volumes of information and present it in a manner that allows the JFACC to achieve understanding of the situation. However, during large-scale air operations the volume of detailed information available with today's command and control technologies can be overwhelming even if it is properly organized. The JFACC needs to recognize when this point has been reached and allow his assets to operate in the default decentralized fashion when intervention from the AOC will not achieve additional effects.

Sources of Initiative

Initiative is "the ability to initiate: to start an action, including coming up with a proposal and giving or helping without first being requested to do so."[63] Four factors affect initiative within an organization. The first is the manner in which orders are given. The second is the organization's command climate. Thirdly, the type of training a subordinate receives also

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[62] "The German Army's Mission Oriented Command and Control," Armor, 90 (January-February 1981), 12.

[63] Accessed on 12 November 2005 at http://en.wikipedia.org/wiki/Initiative_%28disambiguation%29.

directly affects their ability to display initiative on the battlefield. Lastly, an individual's personality determines their predisposition to display initiative. A commander can foster or stifle each of these sources of initiative.

A well thought out order provides a subordinate with a task and broad limits as to the means acceptable in achieving it. A subordinate can display initiative within the confines of the limits imposed upon him by his commander. Giving an order does not automatically sap all initiative from a subordinate's brain. The manner in which the order is given has significant impact on how subordinates accomplish their assigned tasks. Perhaps one of the best historical examples of an order that left plenty of room for the subordinate to display initiative was the Combined Chiefs of Staff's order to General Eisenhower:

> You will enter the continent of Europe and, in conjunction with the other United Nations, undertake operations aimed at the heart of Germany and the destruction of her armed forces. The date for entering the Continent is the month of May 1944. After adequate Channel ports have been secured, exploitation will be directed towards securing an area that will facilitate both ground and air operations against the enemy.[64]

This order gave General Eisenhower his task yet left him ample freedom to display initiative while accomplishing it. The initiative displayed in the planning and execution of Operation Overlord proved highly successful. While this example is rather grandiose, the same principle applies at lower levels of command. Overly detailed orders that unnecessarily restrict a subordinate's freedom to accomplish the task in the manner he deems best amount to micromanagement and breed a lack of initiative in an organization.

An organization's command climate is "the atmosphere created by the chain of command within which the unit conducts its operations and training."[65] This atmosphere dictates whether subordinates are willing to display initiative. A poor command climate can cause subordinates to

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[64] Accessed on 12 November 2005 at http://www.ibiblio.org/hyperwar/USA/USMA/WEurope1/WEurope1-2.html.

[65] Center for Army Lessons Learned Report 96-06 accessed on 17 November 2005 at http://www.globalsecurity.org/military/library/report/call/call_96-6_roetoc.htm.

avoid displaying initiative due to the risk associated with failure when acting on their own. Conversely, a strong command climate can promote the tendency to act independently. One measure of command climate is how well commanders relate their unit's mission and goals to subordinates. Mission type orders are one of the ways this is accomplished and will be discussed below. If subordinates expect support and know the unit's mission and goals, they are more apt to venture out on their own and learn valuable lessons along the way. These lessons form the basis of experience from which subordinates can draw in the future. A strong command climate develops subordinates who can and will display initiative within the confines provided in the commander's orders.

Training during peacetime builds habit patterns used in combat. The common military adage to "Train like you fight" also applies in the command and control arena. Subordinates internalize lessons during training that shape their willingness and ability to display initiative in combat. A subordinate who is always led to the commander's desired solution in a very methodical and detailed manner during training will expect the same type of guidance in combat. In the extreme case, that subordinate may be unable to act independently when confronted with a new situation in the heat of battle. The Syrian Army suffered from this phenomenon during the 1973 Arab-Israeli War. Syrian tank commanders in the secondary effort through the Golan Heights caught the Israeli defenders off guard and quickly reached their objectives during the first day of combat. They could have continued on essentially unopposed and seized key terrain that would have prevented the Israelis from reinforcing their defenses. Analysts later estimated that the Syrians could have easily continued on to the Sea of Galilee if they had pressed their advantage.[66] However, the Syrian Army's training did not produce combat leaders who were capable of displaying initiative when presented with such an opportunity. The Syrian Army was very dependent on following its preordained plan for the battle without deviation. Instead of

[66] Frank Aker, *October 1973: The Arab-Israeli War*, (Hamden, Connecticut: Archon Books, 1985), 36.

taking advantage of the situation on the battlefield, they simply occupied their objectives and awaited further instructions. This pause allowed the Israelis to reinforce their positions and eventually turn the tide of the battle.[67] This phenomenon also applies to both aircrews and personnel in the AOC. Commanders must allow subordinates to experiment without detailed guidance, within the bounds of safety, during training so they can build enough personal experience to display initiative when it is called for in combat.

The fourth factor that influences whether or not a subordinate is likely to display initiative is that individual's personality. Some individuals are timid to the point of indecision. Others are prone to venture out on their own even when it is inappropriate. The Battle of the Ia Drang Valley provides an excellent example of inappropriate exuberance. During the early stages of the battle, Lieutenant Herrick took the initiative and ordered his platoon to chase down a fleeing North Vietnamese soldier. This decision led to the platoon becoming cut off from the main force ultimately resulting in his death along with most of his men. Attempts to recover this lost platoon greatly complicated the commander's tactical problem.[68] Training and command climate can influence people to some degree but different individuals will display different levels of initiative when presented with the same situation. Since centralized execution often affects fighter pilots, a review of common generalizations about their personality types illuminates how this type of execution is likely to influence their behavior. Throughout the history of aerial combat, successful fighter pilots have been marked by "aggressiveness, determination, patience and a cool head."[69] Author John Sherwood described the fighter pilot attitude as "a sense of self-confidence and pride that verged on arrogance."[70] This attitude is the product of a pilot's entire

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[67] Peter Allen, *The Yom Kippur War*, (New York, New York: Scribner's Sons, 1982), 99-115.

[68] Harold G. Moore and Joseph L. Galloway, *We Were Soldiers Once…And Young: The Battle that Changed the War in Vietnam*, (New York, New York: Harper, 1992), 103-426.

[69] Robert L. Shaw, *Fighter Combat: Tactics and Manuevering*, (Annapolis, Maryland: United States Naval Institute, 1985), xiii.

[70] John Darrell Sherwood . *Officers in Flight Suits: The Story of American Air Force Fighter Pilots in the Korean War*. (New York: New York: University Press, 1996), 6.

lifetime and reinforced by a career's worth of training and experience. Pilots with these characteristics are unlikely to appreciate outside interference in the pursuit of their assigned targets. However, when presented with that interference they are likely to quickly adapt and find ways to aggressively accomplish their assigned task despite the unwelcome intrusion. Although they are unlikely to embrace the concept of centralized execution, the vast majority of pilots will find a way to use their initiative within newly imposed restrictions. Centralized execution will not negate a pilot's "can-do" attitude; pilots will find ways to display initiative when this method of command and control is used.

Mission Type Orders

The manner in which orders are issued also affects their impact on a subordinate's ability to display initiative. Very detailed orders that describe how to achieve the desired outcome in a step by step process reduce a subordinate's latitude to show initiative. The use of mission type orders allows aircrews to display initiative within the commander's intent on a dynamic battlefield. JP 1-02 defines a mission type order as "1. Order issued to a lower unit that includes the accomplishment of the total mission assigned to the higher headquarters. 2. Order to a unit to perform a mission without specifying how it is to be accomplished."[71] This type of order is normally associated with decentralized execution but is also a valid method when the JFACC decides to employ centralized execution. In the concluding paragraph of his thesis, "Mission Type Orders in Joint Air Operations – The Empowerment of Air Leadership," Major Michael Fischer noted, "Mission orders also require that the tactical units share a common battlefield orientation shared through the distribution of all-source intelligence."[72] The AOC often has better situational awareness of the battlespace and can therefore see when airborne assets are missing an opportunity to pursue the commander's intent. Mustafa Koprucu summarized the

[71] Joint Publication 1-02, 347.

[72] Michael E. Fischer, "Mission Type Orders in Joint Air Operations- The Empowerment of Air Leadership," (Thesis, School of Advanced Airpower Studies, 1995), 63.

potential importance of this type of situation when he stated, "The key to determining the future validity of decentralized execution for air operations then becomes the degree to which technology allows information to become centralized in a single organization, or distributed throughout the theater and into the hands of the operators that are given the authority to execute the JFACC's intent."[73] According to Lieutenant Colonel Parramore's definition, centralized execution occurs if the AOC distributes that information directly into the hands of the operators. The AOC can reduce the impact on the operator's ability to display initiative by transmitting their improved awareness of the battlespace to the cockpit and allowing the aircrew to exploit that understanding of the situation as they see fit. Mission type orders and centralized execution are not mutually exclusive. On the contrary, centralized execution that assures a mutual understanding of the battlespace can improve the effectiveness of aircrews operating under mission type orders.

In 1996, Lieutenant Colonel Michael Straight argued, "Though the USAF often employs the concept, the Air Force has not doctrinally embraced commander's intent as a command tool for service wide use."[74] Since that time however, the Air Force has institutionalized the use of commander's intent through the implementation of an Air Operations Directive (AOD). The AOD embodies a method through which commander's distribute their intent. While writing about air operations in Operation Iraqi Freedom, Douglas Nikolai described the AOD as "a single, coherent, written document that captured the CFACC's strategy and guidance for each day's ATO."[75] Publishing this document gives tasked aircrew clear guidance as to what the commander thinks is the important thrust for that day's missions. This guidance has two

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[73] Mustafa Koprucu, "The Limits of Decentralized Execution: The Effects of Technology on a Central Airpower Tenet" (Thesis, School of Advanced Airpower Studies, 2000), 78.

[74] Michael Straight, "Commander's Intent: An Aerospace Tool for Command and Control," *Airpower Journal*, (Spring 1996), 2. Straight's article compared Air Force doctrine with the doctrine of the ground services and concluded that commander's intent is underemphasized in Air Force doctrine.

[75] Douglas J. Nikolai, "Centralized Execution of USAF Air and Space Forces: The Unspoken Trend of the Master Tenet," (Thesis, Naval Postgraduate School, 2004), 73.

immediate effects in the realm of centralized execution. First, it should reduce the need for the AOC to reach forward into the cockpit. This reduction in the frequency is a result of aircrews looking for and exploiting opportunities to meet the commander's intent on their own. Second, it lays the foundation upon which the AOC can issue subtle guidance corrections. This foundational mission order type guidance coupled with explicit directions at the pivotal moment played a key role in Admiral Horatio Nelson's victory in the 1805 battle of Trafalgar. Nelson's fleet was highly experienced from eight years of fighting together. Nelson's trust in his subordinate commanders is witnessed by his mission type order on the eve of the battle which simply stated "England expects every man to do his duty." However, during the three hours it took the opposing fleets to close with one another, Nelson issued orders for the English fleet to take advantage of two gaps in the line of the French and Spanish fleets. This subtle correction to take advantage of the situation ultimately led to one of the greatest naval victories in history.[76] A similar scenario is possible in air warfare. For example, an AOD can communicate that the commander's intent is to prevent a particular enemy armored division from repositioning to engage a friendly flank. Upon discovery of that division on the move along a road, the AOC needs only to broadcast this fact to airborne assets. Since lower-level commanders ensure their aircrews know the intent contained in the AOD, the simple transmission of this information should bring an immediate reaction from aircrews with the fuel and ordinance to target the enemy armor. Once given the required vector through centralized execution, American fighter and bomber pilots will display aggressive initiative in destroying the target. Thus the AOD, a document primarily intended as an aid to decentralized execution, also sets the stage for successful centralized execution when required.

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[76] Edward A. Smith. Jr., "Network Centric Warfare: What's the Point?" *Naval War College Review*, accessed on 17 November 2005 at http://www.nwc.navy.mil/press/review/2001/winter/art4-w01.htm. The keys to Nelson's resounding success were a highly trained cohesive force, his desire not to engage in a battle of attrition with a numerically superior force, and his recognition of the opportunity presented by the gaps in the opposing fleet's line. On the other hand, the French and Spanish fleets had not operated together and did not perform as well as the English.

Training with centralized execution will also reduce the risk of stifling initiative in battle. As commanders and staff experiment with the use of centralized execution models, they will improve the techniques and practices used to do so. Training which includes the use of centralized execution has three immediate benefits. First, commanders will learn the intended and unintended impacts on mission accomplishment when they use this execution model. The time to discover the second and third order effects of centralized execution is in training when the results can be debriefed and the lessons learned incorporated into AOC procedures. Second, the staff in the AOC will discover the best ways to relay the commander's new intent through experience. Experimentation in training will refine the manner in which the AOC relays new commands in combat. Lastly, aircrews will learn how to react to centralized execution and should be able to provide feedback when its use unduly restricts their freedom of action. The exchange of ideas that occurs in after action reviews will reduce any impact on initiative because all levels involved in the process will be familiar with potential pitfalls in this area and should avoid them in combat operations.

CHAPTER 3: Situational Responsiveness

> Our behavior is driven by a fundamental core belief: The desire and ability of an organization to continuously learn from any source-and to rapidly convert this learning into action-is the ultimate competitive advantage.
>
> Jack Welch, CEO, General Electric[77]

Situational responsiveness depends on one's perspective. The pilot who is offended by the intrusion into his cockpit can argue that his tactical responsiveness has been reduced. However, actions taken at the tactical level rarely win wars by themselves. During his discussion about the limits of decentralized execution Koprucu stated "As the size of operations have grown, and with airpower's ability to influence simultaneous events across an entire theater against tactical, operational, and strategic targets, the information has become centralized at command centers that

[77] Art Kleiner, Peter Senge, Charlotte Roberts, Richard Ross, George Roth, Bryan Smith, *The Dance of Change: The Challenges to Sustaining Momentum in Learning Organizations* (New York, New York: Doubleday, 1999), 22.

have access to much more information on, not only local conditions, but on the overall theater as well."[78] Centralized execution can provide increased situational responsiveness at the operational and strategic levels because the JFACC is in a better position to see opportunities at these levels as they arise. At our current state of technology, limited information flow to the cockpit means pilots rarely have enough information to develop sufficient understanding of the operational and strategic situation. Bandwidth constraints limit the amount of information available in the cockpit. Inadequate onboard computing power further reduces the fidelity and utility of information that reaches the cockpit in all but the newest aircraft. Additionally, the task loading associated with operating an aircraft in a combat environment, particularly in single seat fighters, can fully engage a pilot's mental and physical capacities. This may change as our command and control network reaches a self-synchronizing state and upgraded cockpit avionics present more information in better formats but, for the time being, centralized execution is sometimes the only way to make airborne assets responsive to the commander's intent.

The Air Tasking Order Cycle

> While we always seek to seize the initiative and make adversaries adapt to us, command requires the ability to steer airpower as the battle rhythm dictates, independent of the rigidities of an ATO cycle.
>
> Gen Hal Hornburg
> Commander U. S. Air Force Air Combat Command[79]

Although AFDD-1 touts decentralized execution as a means of maintaining situational responsiveness, the mechanism through which the Air Force achieves decentralized execution is inherently not responsive. The primary mechanism to schedule and execute sorties is the air tasking order which JP 1-02 defines as "a method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties, capabilities and/or forces

[78] Koprucu, 78.
[79] General Hal Hornburg, *Initial Command Focus*, issued 14 November 2001, accessed on 15 September 2005 at https://wwwmil.acc.af.mil/cc_corner/focus.pdf.

to targets and specific missions."[80] There are normally three air tasking orders at any one time: the air tasking order being executed, the air tasking order being developed/produced and, the air tasking order in planning.[81] Figure 6 shows the overlapping nature of the three air tasking orders. Under normal circumstances, a target will not appear on an air tasking order until 72 hours after it comes to the attention of the AOC. In exceptional cases, the AOC staff can inject targets into an air tasking order at the 48-hour point. This delay led to the development of the time sensitive targets execution process.

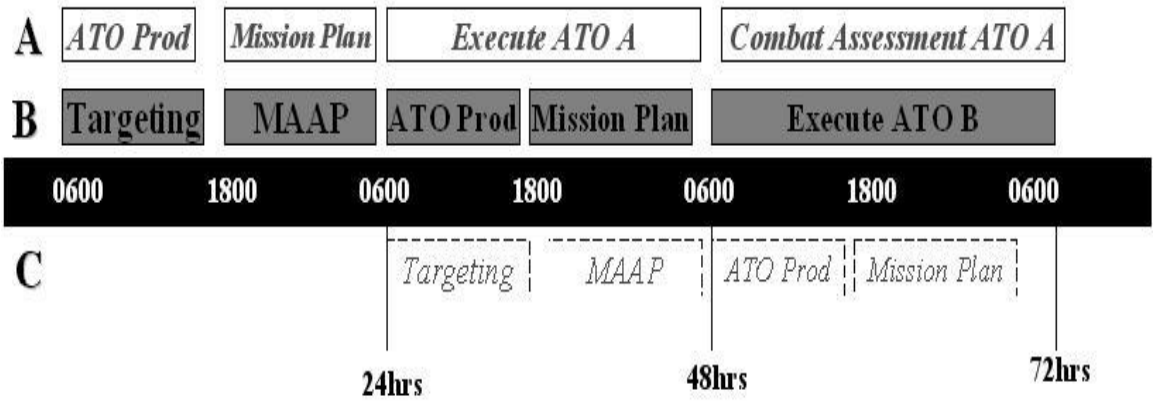

Figure 6 Notional 72 Hour ATO Cycle[82]

The time sensitive targeting process is an example of an organization redesigning a task to take advantage of a surplus of information. Martin Van Creveld said when organizations are "confronted with a task, and having less information available than is needed to perform that task, an organization my react in either of two ways. One is to increase its information processing capacity, the other to design the organization, and indeed the task itself, in such a way as to enable it to operate on the basis of less information."[83] The latter half of his statement is also applicable when organizations have more information available than is needed to perform a task. The time sensitive targeting process enables the JFACC, through the time sensitive targets cell, to

[80] Joint Publication 1-02, 29.
[81] Joint Publication 3-3, *Command and Control for Joint Air Operations*, 5 June 2003, III-20.
[82] Field Manual 3-60.1, *Multi-Service Tactics, Techniques, and Procedures for TST*, Air Land Sea Application Center, April 2004, I-1.
[83] Van Creveld, 69.

engage targets in a rapid manner. General John Jumper, former Chief of Staff of the Air Force, said the Air Force's goal is to destroy emerging targets within "single digit minutes"[84] of their discovery. The Air Force developed the time sensitive target execution cycle to meet this goal. Figure 7 shows the relationship between the normal air tasking order cycle and the abbreviated one used for time sensitive targets.

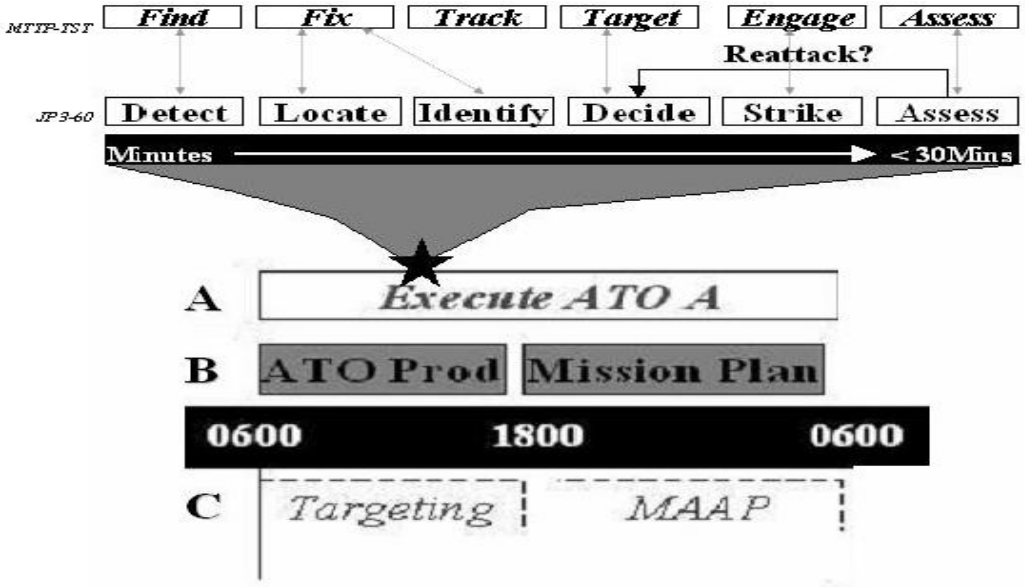

Figure 7 Comparison of ATO Cycle and TST Execution Cycle[85]

This significant compression of the targeting cycle dictates some degree of centralized execution. Each step of the find, fix, track, target, engage and assess (F2T2EA) kill chain, except "engage," can be accomplished by a variety of sources. For example, an F-16 pilot, a ground forward air controller or a satellite, may discover an emerging target. Although a wide variety of assets can perform each of the steps of the kill chain, those assets rarely have the ability to accomplish the kill chain from beginning to end autonomously. The AOC has the computing capacity, central location and overall situational awareness of the battlespace to accomplish each step except "engage." However, it has the authority to move from the doctrinal mode of decentralized

[84] John Hebert, "Compressing the Kill Chain," *Air Force Magazine*, Volume 86, No. 3 (March 2003), 50.

[85] Field Manual 3-60.1, I-1.

execution to a centralized mode of execution where it directs other assets to engage when appropriate based on the JFACC's guidance.

Robert Leonhard proposed that scarcity of resources brings about "the obligation to conduct the business of fighting economically."[86] Centralized execution in the form of the time sensitive target execution cycle or the personal intervention of the JFACC meets this obligation. The air tasking order is a means to schedule as much of the force as is possible, as often as is possible, against as many targets as is possible. Indeed, in a large-scale operation it is the only effective means to schedule and coordinate all the moving pieces of an air operation. It is an effective tool to employ air assets in a war of attrition. However, warfare in the information age is no longer solely about inflicting mass casualties on the enemy. The wealth of knowledge available to the commander allows him to employ economy of force in order to apply just the right amount of force against the enemy's critical points. Continually throwing the bulk of one's forces into hostile airspace will eventually produce more losses than carefully applying enough force at the right point. Modern technology reveals opportunities for the commander to avoid attrition warfare if he is willing to deviate from the tenet of decentralized execution and centrally execute at the right places and times.

Compressing the OODA Loop

The late Colonel John Boyd proposed the Observe, Orient, Decide, Act (OODA) loop depicted in Figure 8 as a strategy for air combat and warfare.[87] Boyd suggested that one of the keys to defeating an enemy is to get inside his OODA loop. In other words, the side that is capable of completing its OODA loop faster essentially drives the fight. The other side is continually reacting to events instead of dictating the flow of events. Centralized execution

[86] Leonhard, 126.

[87] Joe H. Lindley, "Measure Like A Fighter Pilot," The Journal of Defense Software Engineering, (September 2005), accessed on 20 November 2005 at http://www.stsc.hill.af.mil/CrossTalk/2005/09/0509Lindley.html.

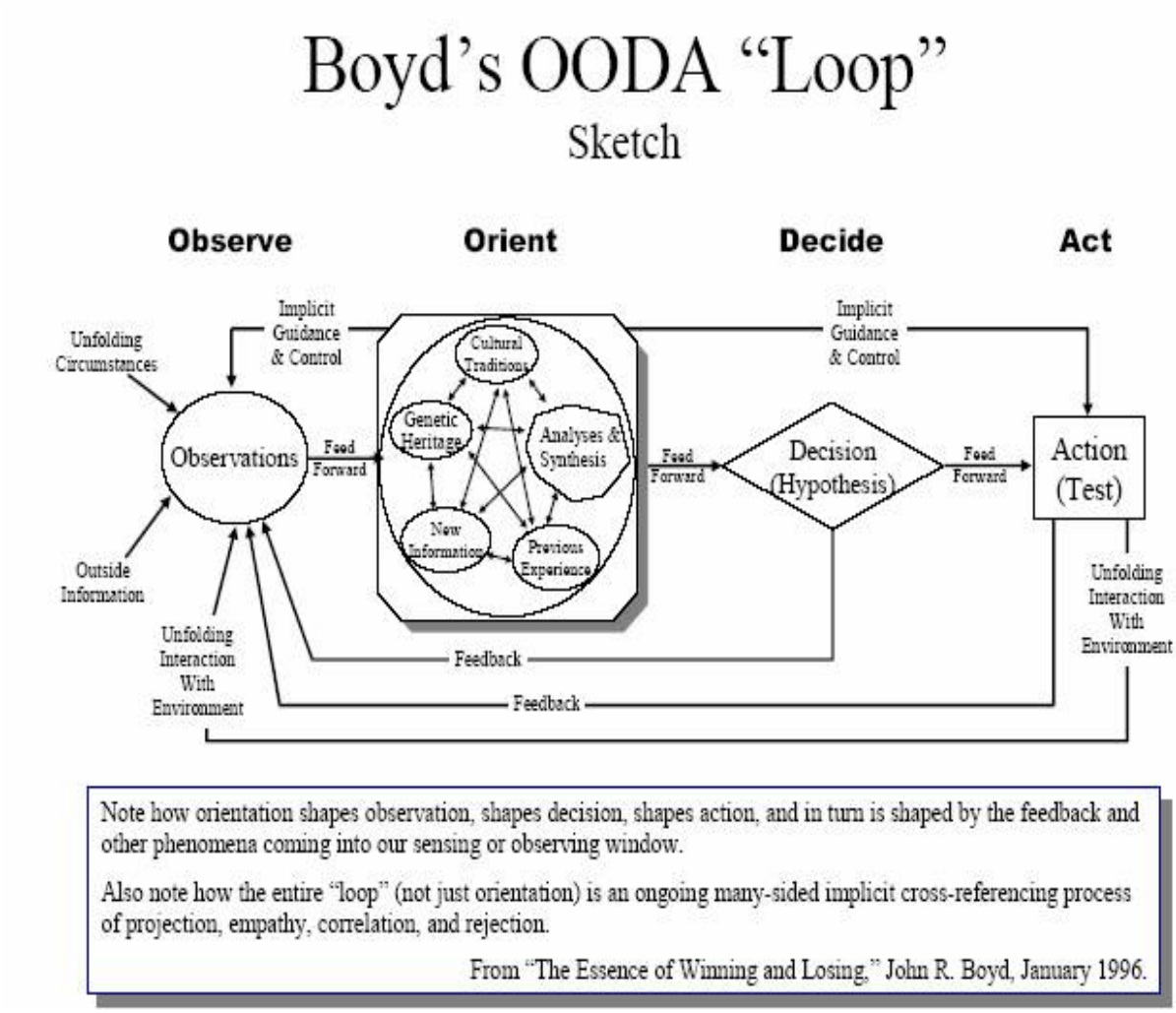

Figure 8 OODA Loop[88]

of air assets provides an opportunity to complete one's OODA loop more quickly. A quick examination of Boyd's final version of the OODA loop shows that the first three stages of the loop deal largely with the collection of data and the interpretation of information derived from that data. The AOC has far more computing ability and work force available to perform these activities on the operational level than airborne aircrews. The JFACC can shorten the length of his organization's OODA loop by assigning the AOC responsibility for the first three stages using

[88] John R. Boyd, "The Essence of Winning and Losing," briefing slides accessed on 22 November 2005 at www.d-n-i.net. Boyd used this version of the OODA loop during speaking engagements in the year prior to his death. This version contains far more details than his original concept and represents 30 years of thought on the subject.

centralized execution to assign the fourth stage to the asset best suited to act. The key to understanding how this division is possible lies in accepting the AOC as a weapons system.

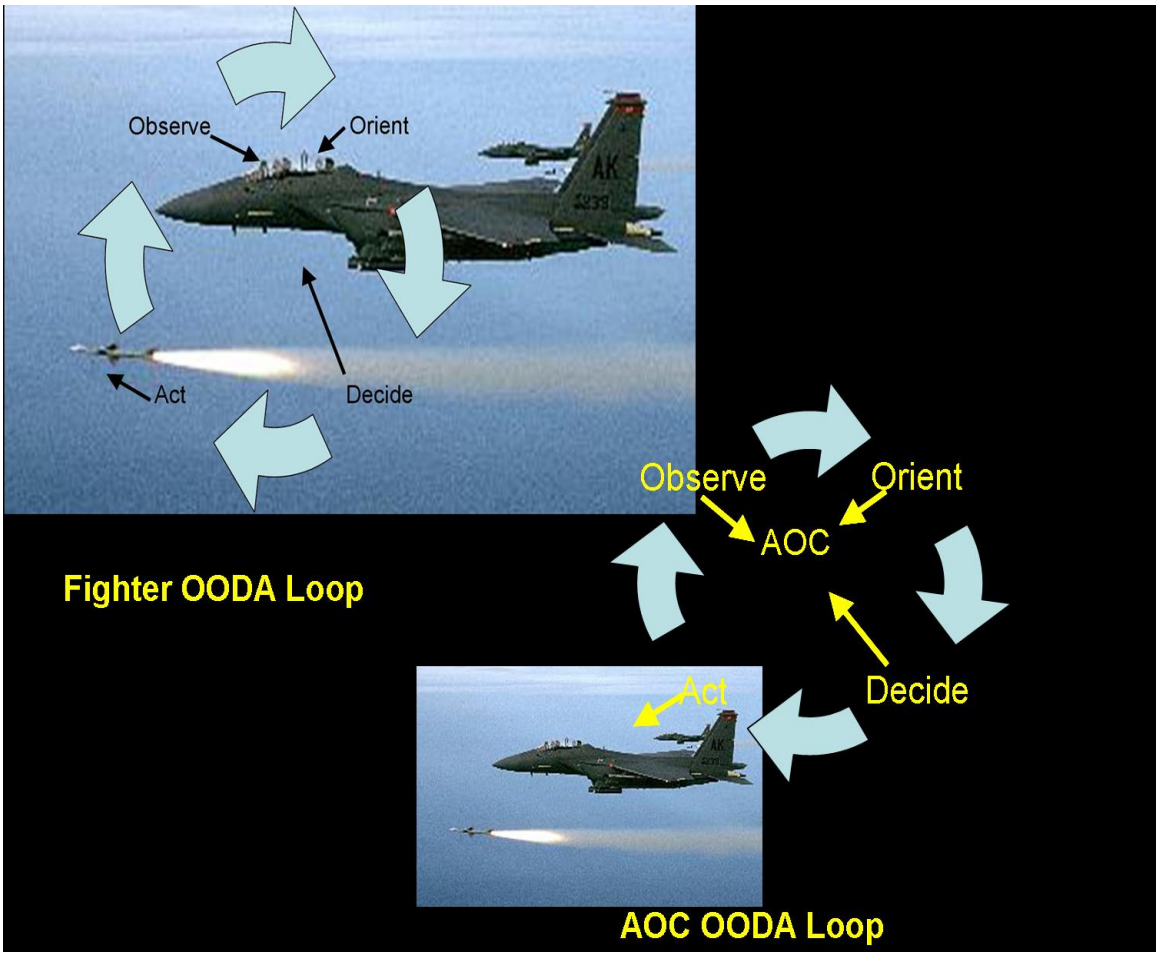

Figure 9 AOC and Fighter OODA Loop Comparison

In 1995 Air Force leaders decided to upgrade all AOCs to weapons systems.[89] The Air Force is investing over 25 million dollars annually in the effort to standardize AOCs and convert them into weapons systems.[90] Large sums are also being invested to train the personnel assigned to AOCs so they can function in a manner similar to other weapons systems. Once one thinks of an

[89] Patrick E. Clark, "Nerve Centers for Air Warfare," *Military Information Technology Online Archives*, (September 2005) Volume 7, No. 7, accessed on 20 November 2005 at http://www.military-information-technology.com/article.cfm?DocID=183.

[90] PEM report accessed on 20 November 2005 at http://www.dtic.mil/descriptivesum/Y2004/AirForce/0207410F.pdf#search='AOC%20weapons%20system'.

AOC as a weapons system, the comparison to other weapons systems clarifies how the parts of the OODA loop can be divided to the asset best suited to handle each. Figure 9 compares the division of the stages of the OODA loop when a fighter shoots an air-to-air missile to the division of OODA loop stages when the AOC, as a weapons system, employs a fighter. Just as a fighter pilot completes the information intense portions of the OODA loop then unleashes a missile to complete the "act" stage, the AOC can accomplish the first steps then unleash a fighter pilot when operating in a centralized execution mode. Assigning portions of the OODA loop to the entity best suited to perform the activities in that portion reduces the total time required to complete the cycle. Centralized execution using the AOC as a weapons system provides the commander a means to shorten the duration of his OODA loop and defeat the enemy.

The Command and Control Spectrum

In his recent book, *Power to the Edge*, Dr. David Alberts described the six different approaches that define the command and control spectrum. From most to least centralized they are: cyclic, interventionist, problem-solving, problem-bounding, selective control and, control free. The cyclic approach issues detailed orders according to a preset time schedule. This approach is "best suited for static warfare situations where there is time to gather all the information at the center, make it available to senior commanders, have them make optimum decisions, and issue detailed directives and plans to the forces."[91] The ATO is a prime example of the cyclic approach to command and control even though the Air Force recognizes that warfare is no longer static in nature. This awareness of the limitations of the ATO's cyclic nature led to the development of the time sensitive target cycle and other methods of the JFACC directly interacting with airborne assets to increase responsiveness. In theory, units simply execute the ATO and the AOC remains "hands off." In reality, the dynamic nature of warfare means that the

[91] David S. Alberts and Richard E. Hayes, *Power to the Edge*, (Washington, D.C.: Department of Defense Command and Control Research Project, 2003), 21.

AOC often goes into a “hands on” mode when critical events occur. The next model along the command and control spectrum is the interventionist approach. In this approach, a central command element still issues detailed directions but that element capitalizes on increased communications capabilities to adjust those directions in response to events as they unfold on the battlefield. The flexible on-call and alert sorties in current ATOs reflect a movement toward this type of execution. The problem–solving and problem-bounding approaches are similar to the mission type orders describe in the previous chapter. In each case, commanders provide guidance as to their intent but leave the subordinate room to determine how to meet that intent. In the problem-solving approach, commanders constrain the possible solutions by limiting resources and approaches available to subordinates. In the case of the problem-bounding model, commanders simply state the problem to be solved and let subordinates decide how to surmount the issues. Selective control is further along the spectrum. When using this approach commanders “establish the initial conditions for success (providing very capable forces and assigning them general missions) and monitoring the situation to ensure no major threats or opportunities go undetected.”[92] Commanders allow subordinates to act independently until conditions warrant redirecting them from headquarters. The last model on Albert’s command and control spectrum is the control free approach. The approach is exactly what its name implies as subordinates are free, while pursuing the commander’s intent, to determine what their actions should be and execute according to that determination. Commanders usually resort to this approach only when they do not have the means to communicate with their forces. Each of these approaches entails varying degrees of centralization. All of the approaches in the command and control spectrum are valid methods of employment. Commanders need to use the method best suited to the problem at hand and be flexible enough to adopt another method when the situation dictates.

[92] Alberts and Hayes, 24.

Responsive To What?

> I used to say of Napoleon that his presence on the field made the difference of 40,000 men.
>
> Duke of Wellington[93]

Human beings can interpret the same information differently and arrive at different understandings of the tactical, operational and strategic state of affairs. Centralized execution provides the JFACC a means to project his desires forward to prevent the squandering of an operational or strategic opportunity. Since the JFACC clearly understands his intent, his presence on the field through electronic means can have an enormous effect. The JFACC can use centralized execution to make sure actions in the air are responsive to his intent. A useful analogy is a fishing charter captain allowing the mates to catch bait fish while missing the chance to hook a world record marlin that is trailing the boat. A similar situation in a combat zone has far more serious consequences. Although admittedly rare in frequency, the successful engagement of some targets, such as enemy leadership, can end a war. Dr. David Alberts discussed the possibility for this type of situation to occur when he stated, "Industrial Age organizations create fixed seams through which information is lost. They create seams that prevent information from being brought to bear. And they create seams that prevent them from integrating effects. These organizations will survive only as long as it takes for others in their competitive space to take advantage of Information Age concepts and technologies. This will not be long."[94] Centralized execution provides the JFACC a means to reach across those seams and ensure his forces achieve the greatest effects possible. Figure 10[95] displays the transformation of data into an understanding of the situation and the relationship between that understanding and

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[93] Andrew Roberts, *Napoleon and Wellington: Battle of Waterloo and the Great Commanders Who Fought It*. (New York, New York: Simon and Schuster. 2001).

[94] Alberts and Hayes, 26.

[95] Accessed on 12 November 2005 at http://www.e-publishing.af.mil/afeim2004/operation_eim.ppt. This Air Force presentation explains the types of filtering that occurs between each level of the information pyramid and how that filtering impacts the commander's understanding of a situation.

the execution of orders to fulfill the commander's intent. The vast amount of data present at the bottom of the pyramid in Figure 10 does not guarantee a common understanding of the situation across the organization. Individuals apply different filters to the available data based on their capacity to handle data and personal biases. Data that, for whatever reason, is filtered out by an individual is not available to convert into information and then knowledge. Unfortunately, individual differences in the way people interpret data or the manner in which data is displayed to them can easily cause people who are supplied with the same data to arrive at different understandings of the situation. When this occurs, the JFACC must interfere in the decentralized execution model to ensure all his assets have the same accurate situational awareness. In an article for *Armed Forces Journal*, Alfred Kaufmann summarized this problem as, "Shared information does not automatically, if ever, lead to shared understanding."[96] In Air Force Doctrine Document 2-8, *Command and Control* (AFDD 2-8), General Jumper clearly admonished "We must command aerospace force, not just administer the air tasking order."[97] The JFACC cannot sit idly by and risk having this lack of common understanding result in his forces failing to achieve their maximum effects.

During Operation Iraqi Freedom, the AOC prosecuted 842 targets through centralized execution of airborne sorties in order to achieve maximum effects.[98] This means that on at least 842 occasions the JFACC, or his staff at the AOC, had a clear understanding of the situation not available to some airborne assets and took action to re-role assets in order to take advantage of the situation through centralized execution. As opposed to reducing responsiveness as AFDD-1 proposes, this action made airborne forces more responsive to the JFACC's intent. The JFACC can actually make his forces more responsive to his, or the Joint Forces Commander's (JFC),

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[96] Alfred Kaufman, "Caught in the Network: How the Doctrine of Net-Centric Warfare Allows Technology to Dictate Military Strategy," *Armed Forces Journal*, February 2005 (Defense Media Group), 20f.

[97] AFDD 2-8, *Command and Control*, 16 February 2001, 25.

[98] Moseley, 9.

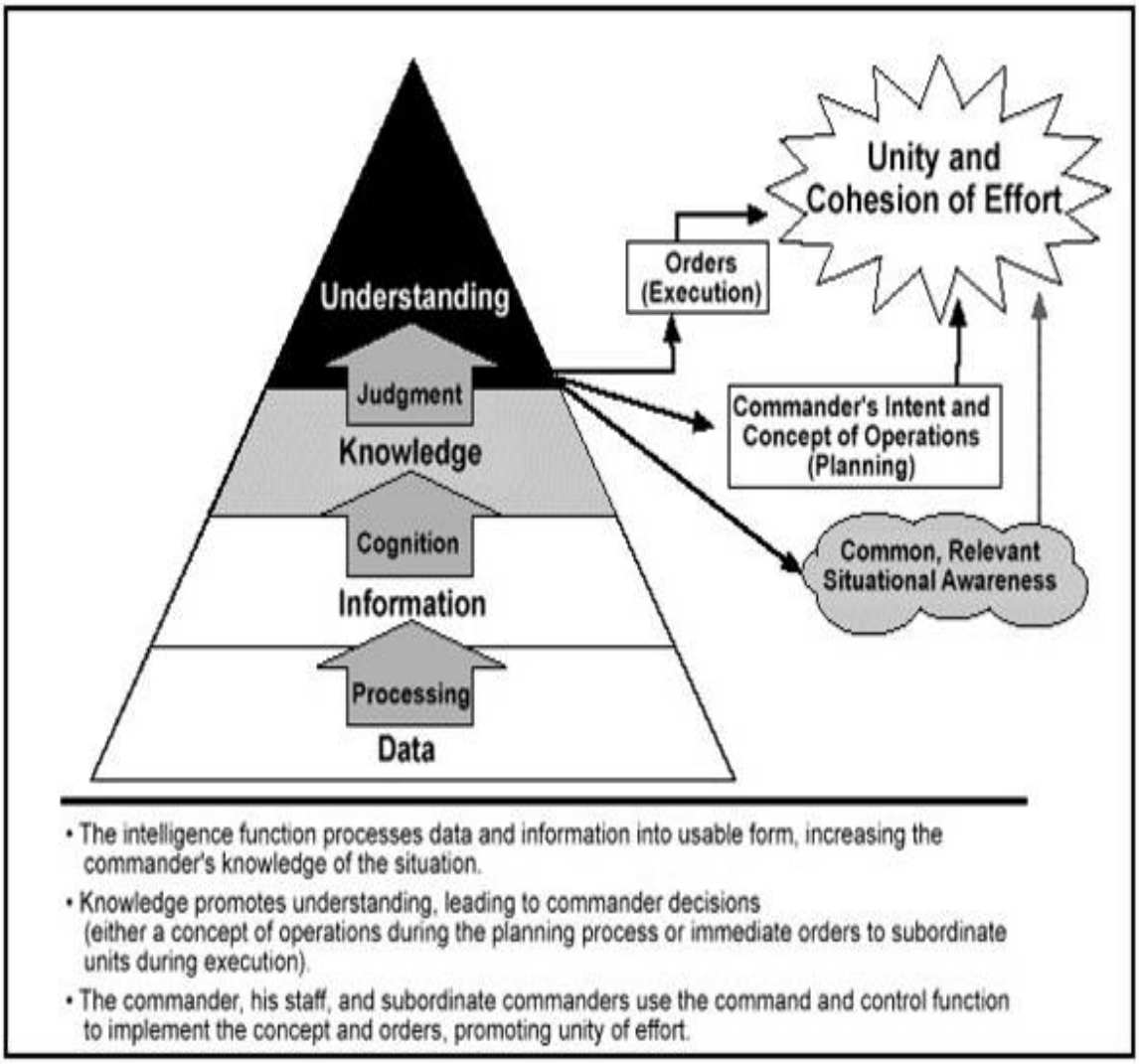

Figure 10 Developing Common Understanding

intent through centralized execution. Centralized execution provides the opportunity for the JFACC's presence on the battlefield to have disproportionate effects.

Improvements in the equipment associated with network centric warfare will make airborne assets increasingly more responsive to the JFACC's changing intent. As the AOC recognizes an opportunity that needs immediate attention, they will be able to make an input into the network that will select an asset for centralized execution and deconflict it from surrounding assets. Lieutenant General Ronald Keys described this situation during his 2005 speech to the Air Warfare Symposium as, "I roll up in my F-15E. It *(the network)* knows who I am, it knows what

my mission is, it knows what my weapons are, and now I start getting my assignment."[99] The Information Directorate at the Air Force's Rome Laboratory is investing considerable effort into developing hardware and software that can automatically calculate the effect of reroling a mission on nearby assets.[100] The goal is a system that can issue the appropriate deconfliction or supporting instructions to those assets. Once the AOC is freed, through the wonders of automated decision aids, from the laborious process of figuring out the ripple effects of centrally executing a sortie, such centralized execution will become more frequent. In the future computers associated with the network will become more and more capable of autonomously deciding which asset to employ against which target. For the time being the impetus for the types of assignments Lieutenant General Keys referred to will originate from a person in the AOC and will therefore meet the definition of centralized execution. Although this scenario violates the taboo against centralized execution, it certainly makes airborne assets more responsive to the JFACC's intent and therefore invalidates AFDD-1's claim to the contrary.

CHAPTER 4: Tactical Flexibility

> Never tell people how to do things, tell them what to do and they will surprise you with their ingenuity.
>
> General George S. Patton Jr.

AFDD-1's fourth reason for advocating decentralized execution is that is provides for tactical flexibility. While this assertion is true, properly employed centralized execution does not excessively reduce tactical flexibility. When retasking a sortie, the AOC should provide enough information to allow the aircrew to accomplish the commander's intent and the minimum restriction required to remain within that intent. Run in restrictions, weapons selections, delivery profiles, etc. should only be given if failure to adhere to them will prevent the sortie from complying with the commander's intent. Transient weather conditions, reduced visibility due to

[99] Lt Gen Ronald S Keys, (Speech to Air Warfare Symposium, Orlando, Florida, February 2005), accessed on 17 November 2005 at http://www.afa.org/media/scripts/Keys_AWS05.asp.

[100] Personal email to the author from Dr. Todd Humiston who is the director of the Information Directorate at the Rome Laboratory.

smoke, or a myriad of other battlefield conditions can make seemingly unobtrusive restrictions transmitted from afar cause the failure to destroy target. The bottom line remains that centralized execution does not inherently reduce tactical flexibility rather, the method of centralized execution determines if tactical flexibility is reduced. The key issue is obtaining the effect that achieves the commander's intent with the minimum practical restrictions on the aircrew executing the mission.

Maintaining Flexibility

How a sortie is centrally executed, vice if it is centrally executed, has a direct affect on whether tactical flexibility is reduced. Operation Allied Force provided numerous examples of aircrews being needlessly placed at risk and targets escaping due to centralized execution that reduced tactical flexibility. Colonel Christopher Haave recounted one instance where an A-10 pilot had to wait over a half an hour for the AOC to determine how he should attack a cache of Serbian surface to air missiles located in an orchard in close proximity to some civilian houses. When clearance finally arrived, it included the guidance to "use the gun and not hit any houses."[101] This guidance was unnecessary, as the pilot already understood the rules of engagement and it eliminated the possibility of employing onboard Maverick missiles that could have destroyed the target and avoided collateral damage. To make matters worse, a cloudbank obscured the target during the delay while the AOC debated whether to attack the target or not and the pilot was unable to destroy the missiles. Overly restrictive guidance coupled with excessive delay in making a decision make this situation an excellent example of how poorly performed centralized execution can limit the tactical flexibility of air assets.

[101] Colonel Christopher E. Haave, *A-10s Over Kosovo: The Victory of Airpower Over a Fielded Army as Told by the Airmen Who Fought in Operation Allied Force*. (Maxwell Air Force Base, Alabama: Air University Press, December 2003). 147-8.

The situation just described could have had a much more successful ending if the AOC had properly utilized centralized execution. In this instance, the AOC was unprepared to exploit a situation as it emerged on the battlefield. The result was an awkward response that ultimately

Priority	TST Target Type	Desired Effect	Approval Authority	Additional Restrictions[1]	Acceptable Risk Level	Other Requirements or Notes
JFC-1	Critical weapon system A	Prevent launch	On-scene flight leader	--	HI[2]	Strike immediately with any asset. Package recommended, but will go without if required.
JFC-2	Personnel or groups meeting X criteria	Isolate, capture or kill	JFC or above	Higher level notification required prior to striking	HI	Notify JFC immediately & maintain sensor track. Package recommended (threat dependent).
JFC-3	Critical weapon system B	Prevent movement or use	JFC		MED	Hazard analysis required. Package required.
JFC-4	Critical weapon system C	Neutralize for campaign duration	TST Cell Chief	--	LOW	Suppression of enemy air defenses (SEAD) required
JFACC-5	Specific key ground force /equipment movement	Destroy	JFACC	--	LOW	Convoy of military vehicles approaching Phase Line Green
JFACC-6	Important weapon system D	Neutralize for campaign duration	TST Cell Chief	--	LOW	SEAD required

[1] LOAC, ROE & CD guidance applies to all targets.
[2] JFC will accept increased risk of fratricide and CD.

Reprinted from *AFTTP(I) 3-2.3: Multi Service Tactics, Techniques, and Procedures for Time Sensitive Targets*, **Air Land Sea Application Center (Langley AFB, VA, Apr 04), p. III-6.**

Figure 11 Time Sensitive Target Decision Matrix

reduced tactical flexibility while the AOC sorted out what to do in such a situation. In order for an episode of centralized execution not to erode tactical flexibility, the AOC must invest the time required before situations occur to ensure any intervention comes with clear guidance delivered while the tactical situation still allows for its execution. Those Serbian missiles could have been

destroyed before the clouds interfered if the AOC had already developed a decision matrix for such targets and been able to quickly transmit instructions to destroy them while trusting the pilot to remain within the limits of the rules of engagement. The decision matrix should address target types, approval authority, desired effects and acceptable risk levels. Figure 11 is an example of just such a decision matrix. In this case described above, the method of centralized execution employed, not the mere employment of centralized execution, resulted in a reduction of tactical flexibility.

Just as the method of centralized execution used contributes to whether or not tactical flexibility is reduced, the node through which centralized execution is employed also determines if tactical flexibility is reduced. The use of joint air mission commanders is one example of a node through which airpower can be centrally executed while minimizing the associated risk of reducing flexibility. Joint air mission commanders are each service's most highly qualified instructors. They plan and coordinate complex missions involving up to 50 aircraft. Joint air mission commanders are normally mid-level field grade officers with over a decade of experience flying fighter aircraft and flexibly responding to changing tactical conditions. [102] When the need to execute airpower centrally arises, the AOC can capitalize on this training and expertise by using these highly qualified aircrews. The AOC can maximize the value of this node by transmitting the details associated with newly discovered targets to a joint air mission commander and then letting him use his training and experience to determine the best way to engage the target given the conditions in the target area and the resources available to him. Their training and experience qualifies joint air mission commanders to react flexibly in a dynamic battlespace. By utilizing this preexisting node, the AOC can achieve its goal while maintaining airpower's flexibility.

[102] Jeffrey D. Macloud, "Joint Air Mission Commander's and Time Sensitive Targets," (Monograph, School of Advanced Military Studies, 2005), 8-12.

In some instances, the use of centralized execution actually results in an increase of flexibility. Until all air assets connect to a self-synchronizing network, individual assets are limited to employing their own weapons or working in concert with other assets in close proximity. When network centric warfare technologies reach maturity decisions will be pushed to the edge of the network. Individuals making those decisions will have complete visibility of all relevant assets and weapons that can achieve the desired effect. However, this ideal situation does not currently exist. In the meantime, the AOC, which has this type of visibility, can use centralized execution to increase the options available to aircrews. Figure 12 shows an example where an AOC can exploit its broader picture to put the correct weapon on the correct target.[103] Although the example in the figure is a naval scenario, the concept is applicable to air operations as well. Air or space assets sometimes find targets that they cannot engage due to fuel considerations or mismatched weapons load out. In the scenario depicted, the handoff of target data occurs electronically. Such automated handoff requires compatible systems and a fully populated network. This level of fidelity is not currently present in most air assets. In order to capitalize on this type of scenario, the AOC must employ centralized execution to pass the pertinent information to the affected assets in a timely manner. Bonnie Young, from whose work this example is drawn, described numerous variations on this type of scenario. Many of the variations still require intervention from the AOC. In these types of situations, centralized execution actually provides airborne assets with options that would not otherwise be available. These additional options amount to increased flexibility, vice a reduction in flexibility, as a direct result of centralized execution.

[103] Bonnie W. Young, "Future Integrated Fire Control," 10th International Command and Control Research and Technology Symposium The Future of C2, (2005), 2-4. Young describes six different scenarios in all. The others are preferred shooter determination, remote fire, forward pass, engage on remote and, precision cue. Each scenario includes the passing of critical data across a network. While these scenarios envision machine to machine interfaces accomplishing the data transmission, the AOC is currently in a position to play this role in air warfare.

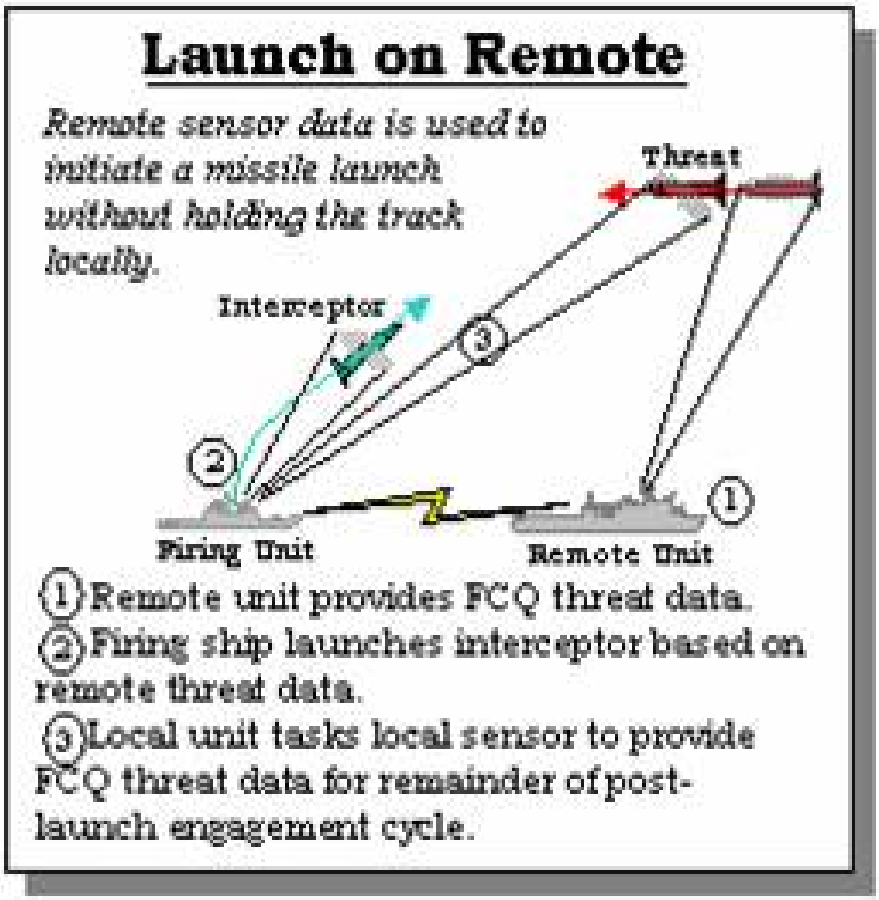

Figure 12 Launch On Remote Scenario

External Restrictions

The military don't start wars. Politicians start wars.
William Westmoreland[104]

War is politics continued by other means.
Carl Von Clausewitz

Even the staunchest proponents of decentralized execution must be prepared to employ skillful centralized execution when external restrictions dictate its use. After studying political interference in military operations, Kenneth Allard observed, “Defense centralization as well as its electronic extension into the domain of the service and operational autonomy is likely to be a

[104] Accessed on 17 November 2005 at http://www.quoteland.com/author.asp?AUTHOR_ID=421.

constant, differing only in degree from one set of political decision makers to the next."[105] Political considerations can force centralized execution upon military leaders. The Air Force has the benefit of knowing this has occurred in the past and can occur again. In the face of this knowledge, the Air Force should develop doctrine that serves as guidance for how to centrally execute air and space power. The purpose of expending the effort required to develop this doctrine is twofold. First, if the doctrine exists political leaders are more apt to allow an Airman to remain in charge of air assets when faced with a political situation that warrants a closer hold on air assets. Figure 13 shows the Air Force's proposal for where authority should reside in the event of centralized execution. It is important to note that even in cases where the target is politically sensitive, the Air Force's perspective is that execution authority should remain in the hands of the military commander. This view, that civil leaders should not control the execution of air assets, is unlikely to inspire unqualified support from politicians. In the absence of such centralized execution doctrine and training, political leaders will be tempted to maintain personal control over air and space assets. This temptation is natural because they will have little assurance that an Airman trained exclusively by an organization that denounces centralized execution will be able to perform as desired in a sensitive political situation. An example of this occurred when President Johnson employed extreme micromanagement of air assets in Southeast Asia partially due to his fear that allowing the military leadership to operate unchecked could potentially lead to nuclear escalation.[106] Secondly, the research and intellectual effort involved in the development of such doctrine will define the conditions when it is called for. Armed with

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[105] Kenneth Allard, *Command, Control, and the Common Defense*, (Washington, D.C.: Department of Defense Command and Control Research Program, 1996), 140. While discussing this topic Allard cited the Kennedy administration's handling of the Cuban missile crisis and the Johnson administration's involvement in the Southwest Asian air campaign. He also noted that even administrations that display a high degree of trust in military decision making such as the Reagan administration did in the downing of a Libyan fighter in the Gulf of Sidra can change tactics in other situations. The Reagan administration did just this when it kept close control of the intercept of the cruise liner Achille Lauro.

[106] Nina Tannenwald, The *Nuclear Taboo: The United States and the Nonuse of Nuclear Weapons Since 1945*, (Cambridge, Massachusetts: Cambridge University Press, 2003), 50.

clear guidance regarding the circumstances that warrant centralized execution, Airman will have a stronger position from which to argue for decentralized execution when the circumstances dictate. The Air Force's current doctrine does not rigorously explore centralized execution and thus leaves a weakness in the argument.

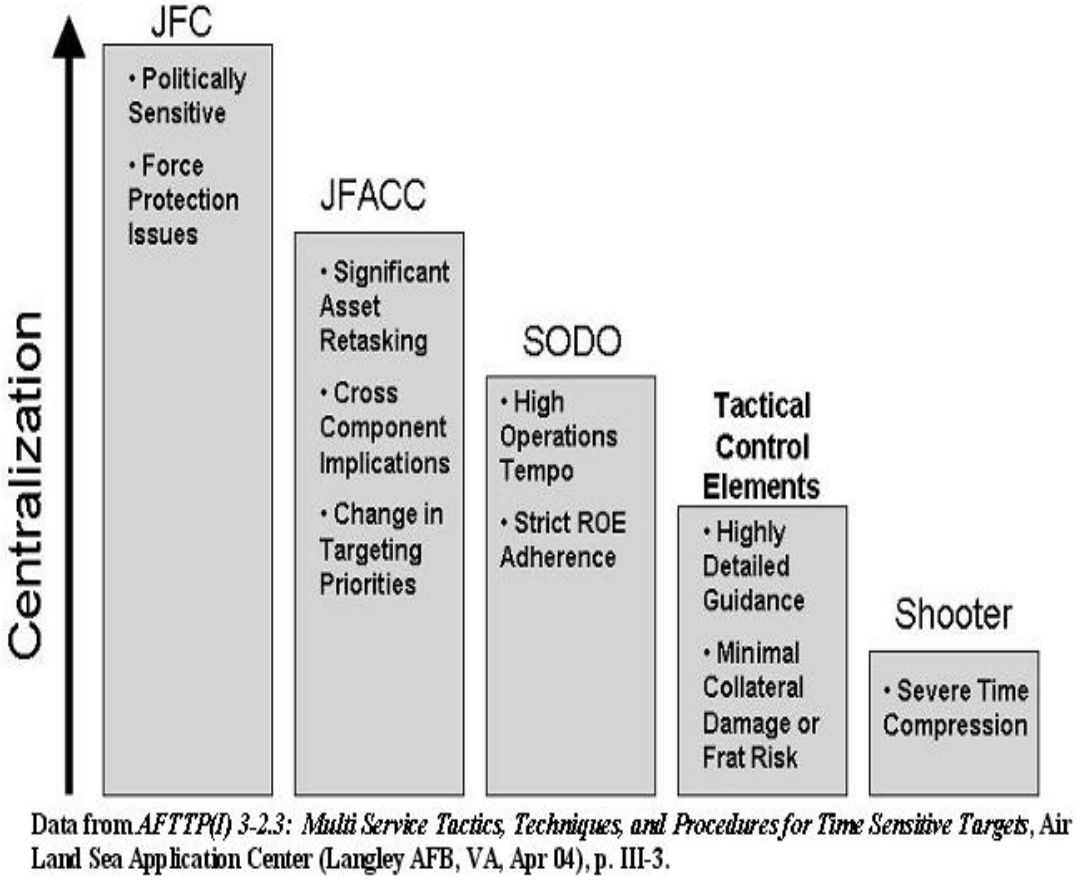

Figure 13 Degrees of Centralization[107]

In addition to restrictions originating from the political realm, external restrictions can originate in the intelligence community. The desire not to compromise sensitive intelligence sources and methods can also lead to external restrictions that dictate the use of centralized execution. Some sources and methods are so sensitive that the Air Force cannot risk transmitting

[107] Air Force Techniques Tactics and Procedures(I) 3-23, *Multi Service Tactics, Techniques and Procedures for Time Sensitive Targets* (Langley AFB, Virginia: Air Land Sea Application Center, 2004), III-3.

potentially compromising data to aircrews through the means currently available in the cockpit. In such cases, aircrews will receive only enough information to accomplish the mission in the prescribed manner. The need to protect vital collection means outweighs the aircrew's frustration associated with the loss of freedom of action. For example, if the military developed a space-based ability to detect a particular process involved in the manufacture of improvised explosive devices, compromising that capability would have serious consequences for U.S. forces. Although today's secure communications equipment makes the possibility unlikely, compromise through message interception would negate the capability. Aircrew behavior can also compromise this hypothetical capability. If aircrews always respond immediately upon detection of this process the enemy will soon associate the process with incoming bombs and change his method of manufacture. In either case, the sensitivity of the capability justifies the AOC utilizing a centralized method of execution in order to protect national interests.

CHAPTER 5: Conclusions

> As technology advances, the conduct of operations will continue to change. Each advance in information technology will help leaders form a more complete picture of the battlespace, generate faster, higher quality decisions, maneuver more rapidly in time and space and increase a unit's flexibility and agility. Nevertheless, this technology is only an enabling tool. Quality and well-trained leaders remain the true centerpiece to successfully planning and operating this increasingly digitized and automated information system of systems.
>
> FM 100-6, Information Operations[108]

Centralized execution is a valuable method of employing air and space assets. Commanders are using centralized execution with increasing frequency as improvements in technology make it easier to do so. The justifications for exclusive use of decentralized execution provided in AFDD-1 are valid only in a very narrow set of circumstances. When the current state of technology is considered, the historical reasons for avoiding centralized execution no longer support exclusive use of decentralized execution.

[108] Field Manual 100-6, *Information Operations*, August 1996, 30.

Advances in communications technology have flattened organizations and greatly increased a leader's ability to command effectively across an increased span of control. Additionally, small numbers of sorties characterize steady state air operations such as no-fly zone enforcement and the current air campaign in Iraq. The small size of these operations means a commander can keep awareness on all his airborne assets while employing centralized execution. Technologies and weapons currently in development will make each sortie more lethal and lead to even smaller numbers of sorties being tasked to achieve the same effect. For instance, the small diameter bomb will more than double the weapons payload on most fighter aircraft and have a significant impact on the number of sorties tasked to destroy a given number of target. As payloads increase fewer sorties will be flown to achieve the same effect. In light of these facts, AFDD-1's implication that centralized execution leads to a loss of effective span of control is not valid.

Both the centralized and decentralized execution models of command and control foster disciplined initiative when properly employed. AFDD-1 correctly states that subordinates are free to display initiative when execution is decentralized. However, skillfully employed centralized execution can also foster disciplined initiative. Assuming subordinates have been trained to exercise their initiative within the constraints provided by the commander; centralized execution does not prevent them from doing so. Centralized execution gives the commander a method to provide new constraints to airborne assets in reaction to changes on the battlefield. The format and tone of these new constraints determines if a subordinate's initiative is circumvented, not the mere fact that the commander provides new guidance. Commanders can use tools such as mission type orders and air operations directives to set the stage for subordinates to continue displaying initiative when redirected through centralized execution. While poorly employed centralized execution can indeed prevent a subordinate from displaying initiative, skillfully employed centralized execution merely redirects that initiative.

Centralized execution enables tactical assets to be responsive at the operational and strategic levels. Limits in bandwidth, onboard processing power, and aircrew task loading often mean aircrews do not have the same level of understanding that exists in the AOC. Decentralized execution gives tactical assets more leeway to react to tactical situations as they change on the battlefield but does not make up for current shortfalls in the operational and strategic level understanding of the battle in the cockpit. Additionally, centralized execution provides the JFACC a method to make up for the unresponsive nature of the 72 hour ATO cycle when conditions on the battlefield are rapidly evolving. A rapidly changing situation or the opportunity to make operational level progress with tactical assets are both circumstances when centralized execution actually allows air assets to be more responsive to the commander's intent.

AFDD-1's fourth justification for decentralized execution is the maintenance of tactical flexibility. Just as is the case in regards to maintaining disciplined initiative, the degree of skill with which centralized execution is employed dictates the impact on tactical flexibility. Well thought out instructions will not unnecessarily handicap aircrews. In fact, commanders may actually give aircrews more flexibility to attack targets when operating under closer supervision in a centralized execution mode. The AOC's greater awareness of surrounding assets can also allow the use of flexible cooperative tactics that airborne assets are unable to coordinate. Lastly, as AFDD-1 acknowledges, political or other restraints may intentionally limit flexibility at the tactical level. When this occurs, commanders must still be able to accomplish their goals using a centralized execution model. While decentralized execution generally allows subordinates more tactical flexibility, centralized execution remains a valid option because its skillful application has minimal impact on flexibility and external restrictions may force commanders to employ it.

This examination of the reasons AFDD-1 provides for decentralized execution shows that they are not sufficient reason to completely exclude the use of centralized execution. That said, commanders should not switch to this method of command and control simply because the current state of technology allows them to do so. However, externally imposed restrictions, a

short window of opportunity to engage a high value target, or the opportunity to achieve disproportionate operational effects from tactical assets are valid reasons to centrally execute airpower. Moreover, even as centralized execution of air power assets becomes a more frequent occurrence, commanders must be sure to honor the remaining tenets and principles of air and space power. For example, poorly thought out centralized execution of some sorties could prevent the remainder of that day's sorties from having sufficient mass to accomplish their objective. The commander must consider this type of effect when making the decision to employ centralized execution. While centralized execution can be a valuable method of employment, how and when a commander chooses to employ in this manner must be tempered by a critical consideration of the remaining tenets and principles of air and space power if air assets are to achieve the commander's intent.

Air Force doctrine requires updating to take advantage of new capabilities inherent in improved information age technology on the battlefield. Recent history has shown that the transition to network centric warfare enables commanders to use centralized execution models with air and space assets. The ability to conduct these types of operations is a side effect of the journey toward a self-synchronizing network that will give airborne assets the same situational awareness that currently exists only in the AOC. However, even when the technologies associated with network centric warfare reach maturity, commanders will still be tempted to centrally execute at least some portion of the sorties under their command. A careful examination of the justifications for decentralized execution provided in AFDD-1 reveals that these justifications are really just an enumeration of the potential pitfalls of poorly employed centralized execution. The Air Force must use a command and control method that fits each individual situation. The complexity and size of an operation, capability of theater communications infrastructure and presence of political restraints are a few of the numerous factors that can influence the commander's decision about the degree of centralization to employ in a campaign. Decentralized execution should remain the default condition when aircrews have

sufficient understanding of the tactical, operational and, strategic situation to make progress toward the commander's intent. The location of that sufficient understanding along the chain of command from the JFACC to the airborne asset determines the appropriate level of centralized execution. Successful future leaders will adapt the degree of centralized execution in their command and control model to fit their circumstances.

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