

Defining Aerospace Power

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Preface

As I was escorting a retired Air Force general who was attending the Air Command and Staff College's (ACSC) Board of Visitors meeting he asked me "If ACSC taught a lesson on the central, unique purpose of the Air Force would it improve the students' understanding of the material taught at ACSC?" I panicked for a moment because I could not think of what the "central, unique purpose" of the Air Force was. Fortunately, he let me off the hook by adding, "That is, ***IF*** that central, unique purpose was defined and blessed." Our subsequent conversation served to highlight that the Air Force has not been able to effectively articulate a common vision of airpower and what makes the Air Force unique.

This lack of a common vision manifests itself in many ways throughout the Air Force. Without a common vision that ties us together individuals tend to identify themselves primarily with their career fields or weapon systems instead of with the Air Force and the Air Force mission. The Air Force is also losing out in many of the current battles over joint doctrine. The inability to effectively engage in the debate over joint doctrine has directly affected the Air Force's ability to fight the budget battles on Capitol Hill. These problems all stem from an inability to define what airpower is and what airpower does.

In fact most airmen have a concept of what they think airpower is; however, it often is not the same concept held by other airmen. Some may refer to the Air Force core competencies or refer to "Global Reach – Global Power," while still others may state that particular weapons or operations constitute airpower. While these things are descriptive of or elements of airpower, they do not define airpower. Part of the confusion over what constitutes airpower stems from what is written in Air Force doctrine.

Air Force Doctrine and Definitions of Airpower

The current Air Force Doctrine Document (AFDD) 1 does not do a very good job of defining what airpower is and what is special about it. Unlike the old Air Force

Manual (AFM) 1-1 which dedicated a whole chapter to defining airpower, key elements of what constitutes airpower are buried within the discussions on the principles of war, tenets of air and space power, and the core competencies. On the other hand, the new AFDD 1 provides some perspective on airpower's relative contribution with respect to surface forces. This paper uses the current AFDD 1 and the old AFM 1-1 to define airpower and describe the tenets of airpower. The last portion of the paper attempts to build a conceptual bridge between the special characteristics of airpower and how they are optimized in air operations. However, before discussing or defining airpower it is necessary to revisit the issue of "air and space" versus "aerospace."

"Air and Space" versus "Aerospace"

One of the main problems that the Air Force has in defining its mission is the on-going debate over whether to use the term "air and space" or "aerospace." The debate centers around defining the operational mediums of air and space separately or as one. The main argument for making a distinction between the two mediums is that the systems and operations of air assets are inherently different than space assets. Air assets are governed by the laws of aerodynamics and tend to be more flexible and more responsive. Space assets are governed by orbital mechanics and tend to cover wider areas of the earth and provide a more continuous presence. The argument for defining air and space as one medium "aerospace" points to the fact that air and space platforms perform similar missions and the characteristics of air and space assets will merge as more systems that can operate in both environments become available (e.g. the Space Shuttle or platforms like the National Aerospace Plane). The term aerospace focuses on treating both mediums as one instead of emphasizing differences.

The Air Force has gone back and forth on this issue several times. In 1992 the old Air Force Manual (AFM) 1-1 used the term "aerospace," the new AFDD 1 just published this year uses "air and space," and now the Chief of Staff, General Ryan has indicated that he wants to go back to the term "aerospace." Whatever the relative merits of using "air and space" or "aerospace" may be the debate only serves to further confuse and obscure more important issues. For one thing the inability to agree to and stick with a single term is an impediment to building a common vision of what the Air Force is and why it is unique. While academics may relish the intellectual nuances of this debate, it does little to further the understanding of the average airman. The effectiveness of doctrine within an organization is directly related to the use of a common and easily understood terminology. Therefore, our goal should therefore be to write doctrine in simplest, most easily understood terms. The average airman or even man on the street knows what "air and space" is, a very small proportion of us within the Air Force may truly understand what "aerospace" is. For this reason alone and to prevent another switch in terms we should stick with "air and space."

Defining Aerospace Power and Its Tenets

The best definition of air and space power can be found in the old AFM 1-1. AFM 1-1 defined air and space power by first defining the characteristics that made operations in the air and space unique. The elevation over the earth's surface and the extent or surface coverage of air and space is different from land or sea. Elevation in air and space is unlimited and air and space covers one hundred percent of the earth's surface. The elevation and extent of the medium provides air and space platforms with advantages in perspective, range, speed, and maneuverability. After defining the characteristics of the medium and platforms that operate in that medium AFM 1-1 defines air and space power as the ability to use a platform or platforms operating in or passing through air and space for military purposes. The advantages of air and space power are identified as mobility, responsiveness, flexibility and versatility. These advantages are a direct product of the perspective, speed, range, and maneuverability of air and space platforms.

The new AFDD 1 does not include any qualitative attempt to define the important attributes of air and space power. The attributes of air and space power that were clearly laid out in AFM 1-1 are hidden within AFDD 1. Phrases that relate to air and space power's characteristics of "speed, range, and flexibility" can be found in the sections discussing the principles of war, tenets of air and space power, and the Air Force Core Competencies but are buried instead of emphasized.

Another important difference between AFM 1-1 and AFDD 1 can be found in the description of the tenets of air and space power. AFM 1-1 describes the tenets of air and space power as "important guidelines and considerations for commanders." AFDD 1 treats the tenets as axioms about air and space power. The difference may not be readily obvious but it is very important. For instance AFDD 1 states that for the air and space power tenet of flexibility and versatility that "Air and space power is flexible and versatile" and then proceeds to explain what flexibility and versatility is. AFM 1-1 states the tenet as "The unique flexibility and versatility of air and space power should be fully used." The importance between the two is that air and space power can be applied in ways that are neither flexible nor versatile. The tenet as written in AFM 1-1 places emphasis on ensuring that the flexibility of air and space power is utilized properly.

The tenet of persistence takes on a radically different tone in AFDD 1. AFDD 1 states that "Air and space operations are uniquely suited to persistent operations." Unfortunately, with the possible exception of geo stationary satellites, which are parked in one place over the earth's surface there is nothing inherently persistent about air and space operations. Unless targets are revisited, resourceful enemies can negate the effectiveness of air and space power by rebuilding destroyed targets or

developing alternatives. AFM 1-1 states that "Air and space power should be applied persistently" to ensure that the desired effects are achieved or maintained.

Treating the tenets as axioms instead of guidelines fundamentally changes the way they are presented. An axiom is a universally accepted principle or rule. AFDD 1 treats many of the tenets as simple statements of fact that when air and space power is used synergy, persistence, and flexibility automatically follow. Operation Rolling Thunder during the Vietnam War demonstrated that air and space power can be applied in ways that are not persistent, synergistic, or flexible. AFM 1-1 emphasizes the responsibility of airmen to ensure that air and space operations are persistent, synergistic, and flexible.

Aerospace Power's Contribution

Where AFM 1-1 presents a better picture of what makes air and space power different, AFDD 1 emphasizes air and space power's ability to shape the theater. In Chapter II, the section "The Nature of Aerospace Power - A Strategic Perspective" highlights air and space power's ability to shape the strategic level of a conflict or operation. Unfortunately AFDD 1 is not clear on what defines the strategic level of war. Joint Pub 3-0, Doctrine for Joint Operations, defines the strategic level of war as "that level of war at which a nation, ... , determines national strategic security objectives and guidance..." While this section of AFDD 1 discusses the application of air and space power in support of national policy and objectives the examples focus on the ability of air and space power to shape the conflict at the highest operational level within a theater. (While the highest operational level is sometimes referred to as the theater level of war this term does not exist in doctrine.) "The Nature of Aerospace Power - A Strategic Perspective" also emphasizes air and space power's role as "the great enabler that allows all land, sea, and special operations forces to optimize their contributions."

AFM 1-1's definition of air and space power and AFDD 1's emphasis on air and space power's impact at the operational level constitute the essential core of what air and space power is. What is lacking in both doctrine documents is a connection between the essential characteristics of air and space power and the application of air and space power to achieve operational level effects. John Boyd's OODA loop theory can be used to develop a conceptual framework for demonstrating how air and space operations can maximize the mobility, responsiveness, flexibility, and versatility of air and space power.

Air and Space Operations

Air and Space Operations are the employment of air and space power to achieve military objectives. Air and space operations employ the tenets of air and space power to maximize air and space power's mobility, responsiveness, flexibility, and versatility. Air and space operations shape the operational level of a situation in ways that cannot be achieved by surface forces. The ability of air and space power to shape the operational level can best be described by using John Boyd's OODA loop theory. The OODA loop is comprised of four basic operations observation, orientation, decision, action. (See Figure 1.)

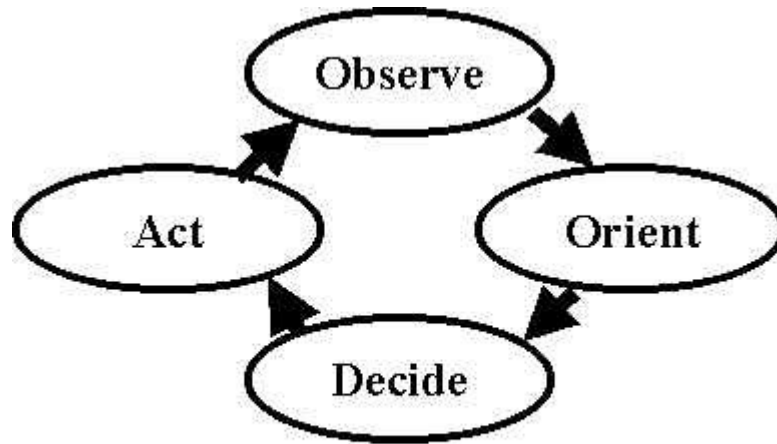


Figure 1. Basic OODA Loop

Boyd initially formulated his theory while flying in the skies over Korea. He noticed that his F-86 with full power hydraulic controls was much quicker in transitioning from one maneuver to the next than the MiG-15s he flew against. The ability of the F-86 to change maneuvers faster than the MiG-15 gave U.S. pilots the ability to force MiG pilots into tactically unfavorable positions during combat. Boyd expanded his initial observations into the OODA loop, and applied his theory to the strategic level.

Comprehending Boyd's OODA loop theory at the strategic or operational level is much more difficult than at the tactical level. Boyd intentionally refuses to provide a prescription on how to achieve strategic level paralysis and talks about penetrating an enemy's "moral-mental-physical being to dissolve his moral fiber, disorient his mental images, disrupt his operations, and overload his system." Despite Boyd's lack of prescription for achieving strategic level paralysis the concept is still the same. The opponent with the quickest ability to Observe what is going on, Orient themselves to the situation, Decide what to do, and Act at the strategic level will prevail in the war.

There are two objections to applying Boyd's theory at the operational level. First of all the theory has never been proven and secondly almost any military operation or

engagement can be broken down and analyzed using the OODA loop. It is not the intent of this paper to prove or disprove Boyd's theory or to claim that only air and space operations fit into an OODA loop. What is being claimed in this paper is that air and space operations are uniquely suited to achieving rapid and decisive operational level effects. Boyd's OODA loop provides a conceptual tool for demonstrating how air and space operations utilize air and space power's mobility, responsiveness, flexibility, and versatility to achieve operational level effects.

Most air and space operations are by their very nature cyclical. Space platforms in low orbits and air platforms cannot occupy single point in the air or space for extended periods of time. Air platforms are sent out for one or at most a couple of missions at a time. After each mission the air platform must return to a friendly base for refueling and rearming. Space platforms in low and medium orbits must often be tasked for each pass over the theater or area of interest. The effects from each mission must be evaluated and a decision on subsequent missions must be made. Joint Pub 3-56.1 captures part of the cyclical nature of air and space operations in the Air Tasking Order (ATO) cycle. The ATO cycle essentially consists of the four essential parts of Boyd's OODA loop. Figure 2 shows the ATO cycle from Joint Pub 3-56.1 with the corresponding functions from the OODA loop. One of the interesting aspects of Joint Pub 3-56.1 is that it was written after Operation Desert Storm. It attempted to capture the conduct of the air campaign and incorporate it into joint doctrine. At the time it was written Joint Pub 3-56.1 had no comparable counterpart in Air Force doctrine. The current draft of AFDD 2 will incorporate many of the elements of Joint Pub 3-56.1 into Air Force doctrine.

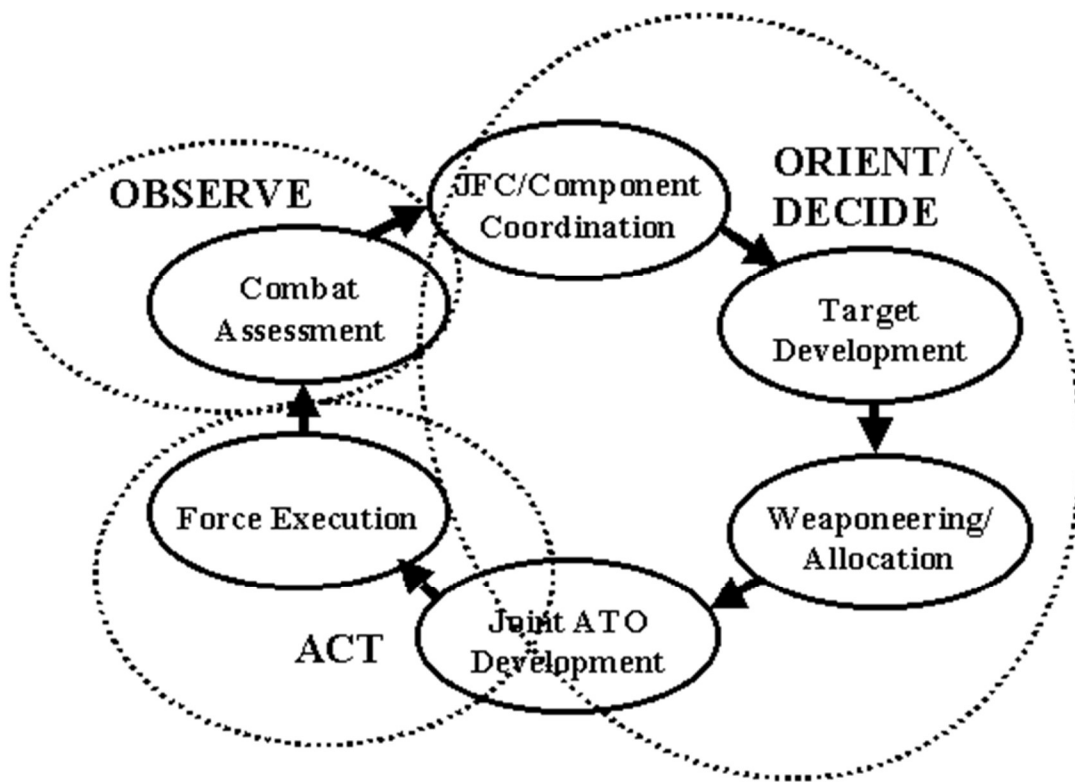


Figure 2. Joint Pub 3-56.1 Air Tasking Cycle

In Boyd's OODA loop theory he stresses ensuring the need to "get inside the enemies OODA loop." Successful air and space operations allow military commanders to get inside the enemy's OODA loop because air and space operations stress the need to achieve air and space superiority as one of the first objectives. The objective of air and space superiority is not to conduct air and space operations faster than the enemy, but to deny the enemy the ability to conduct any air and space operations at all. The side with air and space superiority has at its disposal a component of military power in air and space power that is more mobile, responsive, flexible and versatile than the enemy's surface forces. When applied against an opponent who is restricted to land or naval power, air and space power provides the key to "getting inside the enemy OODA loop."

In those cases where the objective is to gain and maintain air superiority throughout the theater, it has an immediate effect throughout the theater. Surface forces also typically establish the objective of denying the enemy forces the ability to operate in a theater but that denial is usually the end result of other operations. In air and space

operations air and space superiority is a precursor to other operations. Air and space superiority confers all the advantages of air and space power's mobility, responsiveness, flexibility and versatility to one side during a conflict. In it is the key enabler that allows the air and space operations OODA loop to achieve and maintain its maximum efficiency. Most of the important air and space assets which are essential to operations like the Air Operations Center (AOC), air bases, satellite ground stations, AWACs and other high value air assets are located beyond the reach of enemy surface forces. In most cases these high value air and space assets can only be attacked by enemy air and space forces. These assets play a major role in the observe, orient, and decide portions of the OODA loop.

Observe

Observation is the collection of data and information. The elevation and extent of air and space provides the airman with a perspective of the theater that is not afforded to the soldier or sailor. The ability to observe the whole theater of operations both close in and deep into enemy territory as well as across the spectrum of visible, radar, and infrared radiation is unique to the Air Force. Air and space platforms designed to exploit the perspective of air and space consist of satellite sensors, Unmanned Aerial Vehicles (UAVs), J-Stars, AWACS, Rivet Joint, ground based radar, and traditional reconnaissance assets.

Orient

Orientation is the process and disseminating information and data collected by observation. Merely observing or collecting lots of data is useless. Unless data is processed and disseminated in a timely manner it cannot be used in the decision making process. Processing data (long term collection and real time) is the primary function of the intelligence career field. AWACs and J-Stars operators, ground controllers, and forward air controllers also play a part in processing data and information for air operations.

Decide

Decision is using processed information to develop a course of action. The decision portion is encompassed within Air Force doctrine by several key concepts and organizations. One of the central concepts is that air and space power should be centrally controlled by a single air minded individual, the Commander, Air Force Forces (COMAFFOR). Air Force doctrine also specifies the organization for directing the central control is the Air Operations Center and that central guidance is disseminated through the Air Tasking Order (ATO).

Act

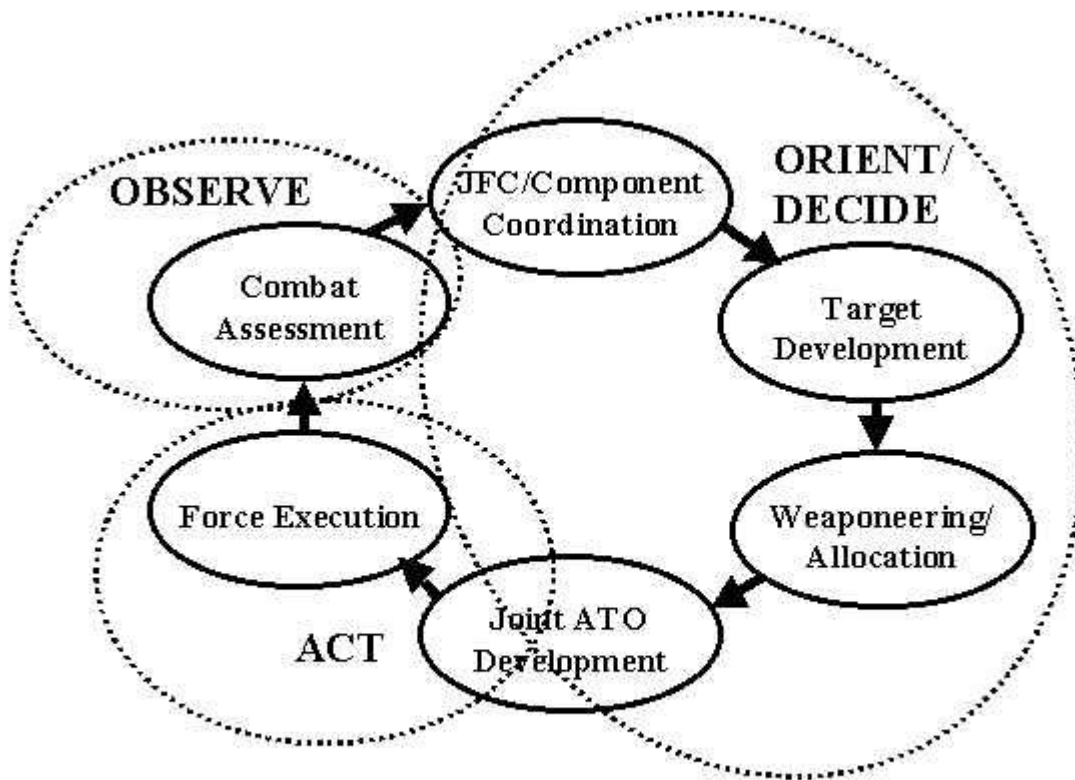
Action is the employment of forces to achieve a desired effect. This part of the OODA loop encompasses the air and space power functions of airlift, strategic attack, interdictions, and close air support. Air and space power provides the means to rapidly engage in decisive action anywhere within a theater or around the globe.

Communications

A key facilitator to the smooth functioning of a strategic level OODA loop is communications. A fighter pilot sitting in the cockpit does not have to worry about transmitting data between his eyes, brain, and hands but air and space operations like a Desert Storm style air campaign does. The sheer volume of sensor data that must be transmitted and the process of providing timely access of processed data and orders to units spread over vast geographical distances is a daunting task.

Air Force Operations as an OODA Loop

Figure 3 provides a view of Air Force Operations as an OODA loop. Assets and capabilities are indicated within the appropriate portion of the loop. The different portions of the loop are linked by a communications network, and the loop operates in an environment kept free of interference by air and space superiority.



Air and Space Superiority

Figure 3. Air Force Operations OODA Loop

The best example of Air Force operations as an OODA loop is Desert Storm. With air superiority firmly in hand the coalition air forces conducted an air campaign that sent the Iraqi leadership reeling. The pace and scope of the air campaign was unprecedented in terms of its effectiveness and its influence on the outcome of the war. Air and space power shaped the strategic level environment of the Gulf War not just by the physical destruction of enemy targets and systems but by the ability of air and space operations to collect data from a wide variety of systems (Observe), process the data into useable information (Orient), disseminate the information, and make decisions on what to attack (Decide) and then attack it (Act).

Observe: Air Force collection assets maintained constant surveillance over the Iraqi theater. Reconnaissance planes, satellites, AWACs, J-Stars, and gun camera film from fighters all played a part.

Orient: Air Force intelligence personnel, AWACs and J-Stars operators, air planners processed huge amounts of data to find targets to attack, re-attack, and how to disrupt enemy operations.

Decide: The JFACC and Joint Air Operations Center determined how to support the Joint Force Commander's objectives, the prioritization of targets, the allocation of resources, and the timing and tempo of the air operations. The JAOC generated the Master Air Attack Plan and daily Air Tasking Order to disseminate guidance to units throughout the theater.

Act: Airpower assets were employed to conduct strategic lift, strategic bombing, interdiction, close air support, armed reconnaissance, and psyops in support of the JFC goals.

Although the Desert Storm air campaign flew sorties every day, the Air Force's OODA loop actually took approximately 48 – 72 hours to complete one full cycle. Even with a 48 – 72 hour cycle this was more than enough. The essential ingredient of the air campaign that made it so effective was not just stealth and precision guided munitions but the ability to Observe, Orient, Decide, and Act with a vast array of assets in a continual cycle. The manner in which the Air Force shaped the operational level during Desert Storm was demonstrated in the following ways. Iraqi command and control was disrupted and destroyed to prevent Iraqi leadership from effective control of all armed forces. Air and space power blinded the Iraqi leadership so that they could not observe and counter the Coalition Ground forces "Left Hook." Close air support and interdiction helped destroy Iraqi forces engaged with and prior to engagement with coalition forces. In its simplest terms the tempo and timing of air and space operations denied Iraq the ability effectively mount any offensive land or naval combat operations or respond to coalition ground campaign. *Air and space power shaped the entire theater during Desert Storm.*

An example of a different type of Air Force operational OODA loop are the relief efforts in Rwanda and Northern Iraq. The ability of the Air Force to respond quickly with massive airlifts to remote, austere locations around the globe is unmatched. Again the essential ingredient for success was not just the airplanes but the process that kept the planes on schedule and loaded with the proper supplies. The speed and scope of these relief operations was able to change the environment by providing a massive number of airlift sorties on a daily basis. By slowing and stopping widespread starvation in these situations airpower allowed time for other solutions to be worked out. *Again the mobility, responsiveness, flexibility, and versatility of air and space power shaped the theater.*

Towards a Common Vision of Aerospace Power

The preceding section about air and space operations as an OODA loop defined the application of air and space power in not just as weapons systems and bombs or discrete roles and missions but as a process. This concept strikes at the heart of some of the problems discussed in Carl Builder's book. Too often we in the Air Force think of air and space power as individual platforms not as the successful employment of those platforms. Neither AFM 1-1 nor AFDD 1 provide the necessary focus on how to maximize air and space power's potential. In both documents the discussion of the principles of war or tenets of air and space power is followed by descriptions of discrete roles, missions, or functions performed by individual platforms. AFDD 1 points to the air and space power's ability to shape a theater or situation but does not provide a frame work for how best to achieve the desired effect. Using Boyd's OODA loop theory fills those gaps.

Thinking of air and space operations as a process also provides a connection between the some of the seemingly fractured and fractious specialties within the Air Force. All current air and space platforms can be placed within one or more portions of the OODA loop. This not only identifies the roles and missions of individual platforms but the relationship between the different platforms and their missions. The OODA loop also identifies the functions provided by the Air Force communications and intelligence career fields and their relationship to air and space operations. The incorporation of intelligence and communications into a general and easily understood concept of air and space operations provides an important perspective on how airmen from different specialties and career fields contribute to the projection of air and space power.

The best fighters and fighter pilots in the world are useless without the supporting infrastructure that provides targets, target data, integrated mission orders, and the necessary logistics and maintenance to do the job. Similarly airlift can only be maximized by rapidly cycling aircraft operations i.e. maintenance, loading and unloading, etc. Air and space power is derived not just from satellites and airplanes but from the collection, analysis, and dissemination of information that supports those operations. Although it has been done, air and space operations cannot typically shape the theater with a single mission. Operations must be continually repeated and must be able to act and react rapidly in fluid situations. Air and space power grows out of the ability to use a platform operating in or moving through the air and space medium, but it is maximized by effective application of the tenets of air and space power in cyclical air and space operations.

The OODA loop also helps tie together the Air Force's core competencies. Air and Space Superiority is a necessary precursor to successful operation of the OODA loop.

Major portions of the Information Superiority core competency are contained within the Observe and Orient portions. The core competencies of Precision Engagement, Global Attack, and Rapid Global Mobility are contained within the Act part of the loop. Finally Agile Combat Support focuses on providing quality support of the forces that are doing the Observe, Orient, Decide, and Act.

The Airman's Perspective

AFDD 1 describes the airman's perspective as being able to examine all aspects of warfare from the multidimensional air and space perspective as opposed to the two dimensional surface perspective. The document goes on to say that air and space power employment is guided by the principles of war, tenets of air and space power, and implemented through the core competencies and that airmen must understand them. While this is true, this is an incomplete picture of what the airman's perspective entails.

What is missing from AFDD 1 is that airman must understand that the extent and elevation of the air and space medium provides air and space platforms advantages in perspective, range, speed, and maneuverability. The relative advantages of air and space platforms over surface platforms leads to air and space power's advantages in mobility, responsiveness, flexibility, and versatility. Airman must know that air and space power can shape the operational level of war when air and space operations maximize air and space power's relative advantages.

Final Thoughts

Air Force doctrine needs to provide a clear definition of air and space power and it needs to emphasize the advantages of air and space power rather than bury them. The old AFM 1-1 did those things but unfortunately much of it has been dropped from the current AFDD 1. On the other hand, AFDD 1 highlights the fact that air and space power can shape the operational level of war in ways that surface forces cannot. This paper has attempted to pull the best from both of these doctrine documents and tie the concepts together in a cohesive fashion using the Boyd's theory. These things need to be included in Air Force doctrine before anyone can seriously consider building a common vision of air and space power for the Air Force. It should be noted that doctrine, no matter how well written, will not automatically lead to a common vision of air and space power. However, the task will prove impossible without well written doctrine.

Appendix A Proposed Doctrine

This section combines key concepts from AFM 1-1, AFDD 1, and the ideas presented in this paper as elements of basic doctrine. Section I presents the definition of air and space power from AFM 1-1 in a slightly different format. Section II provides the tenets of air and space power from AFM 1-1. Section III focuses on air and space operations and emphasizes their ability to achieve operational level effects using Boyd's OODA loop theory.

Section I. Aerospace Power

The Medium of Air and Space

The two things that make the medium of air and space unique when compared to land or water are elevation and extent.

Extent

Air and space covers the entire globe. All points on the surface of the earth are accessible from air and space.

Elevation

Air and space provides unlimited elevation above the earth's surface.

Attributes of Air and Space Platforms

Air and space platforms are designed to exploit the elevation and extent of air and space to produce perspective, range, speed, and maneuverability not available to surface platforms.

Perspective

The elevation and extent of air and space provides a broader field of view to air and space platforms than is available to surface platforms.

Range

Air and space platforms have access to any point on the earth's surface. Air and space platforms are not restricted by the topography of the land or the shores of the oceans.

Speed

By their very nature air and space systems are faster than land or water based systems. The elevation of air and space platforms allows them to fly over ground and water obstacles directly to their intended destination.

Maneuverability

The elevation and extent of air and space allows air and space platforms to operate in three dimensions.

Aerospace Power

Air and Space power grows out of the ability to use a platform or platforms operating in or passing through air and space for military purposes. The perspective, range, speed, and maneuverability of air and space platforms produce levels of mobility, responsiveness, flexibility, and versatility unique to air and space power.

Mobility

Mobility is the ability of military forces to move from one place to another. Air and space forces with their inherent range and speed have greater mobility than surface forces.

Responsiveness

Responsiveness is the ability of military forces to accomplish an assigned task quickly. The perspective, range, speed, and maneuverability of air and space forces makes them highly responsive.

Flexibility

Flexibility is the ability of military forces to accomplish a wide range of tasks either independently or with other forces. The range, speed, and maneuverability of air and space forces gives air and space forces unique flexibility. Air and space forces can be brought to bear against military, economic, and social structures instantaneously or separately. Air and space forces can be employed in support of national, theater/joint, or other component objectives. Air and space forces can be employed independently or coordinated with other forces.

Versatility

Versatility is the ability to accomplish strategic, operational, and tactical level objectives. The inherent perspective, speed, range, and maneuverability of air and space forces makes them the most versatile component of military power.

Section II. Tenets of Aerospace Power

Air and space power is intrinsically different from either land or sea power and its employment must be guided by tenets different from those of surface forces. The tenets of Centralized Control, Flexibility/Versatility, Priority, Synergy, Balance, Concentration, and Persistence are guidelines and considerations for commanders to use to exploit the mobility, responsiveness, flexibility, and versatility of air and space power.

Centralized Control

Air and space forces must be centrally controlled by an airman to achieve advantageous synergies, establish effective priorities, capitalize on unique strategic and operation flexibility, ensure unity of purpose, and minimize the potential for competing objectives. Execution of air and space missions should be decentralized to achieve effective spans of control, responsiveness, and tactical flexibility.

Flexibility/Versatility

The unique flexibility and versatility of air and space power should be fully used and not compromised. The ability to concentrate force anywhere and attack any facet of the enemy's power is the outstanding strength of air and space power.

Priority

Air and space operations must be prioritized. Given their flexibility and versatility, demands for air and space forces will likely swamp air commanders in the future unless appropriate priorities are established.

Synergy

The proper application of air and space forces in mutually supportive air campaigns produces effects well beyond the proportion of each mission's individual contribution to the campaign. The proper application of air and space forces in joint operations with surface forces produces effects that exceed the individual contributions of the individual forces if applied separately.

Balance

The airman should balance opportunity, necessity, effectiveness, efficiency, and the impact on accomplishing assigned objectives against the associated risk to friendly air and space forces.

Concentration

Air and space power is most effective when it is focused in purpose and not needlessly dispersed. Concentration of purpose should not confuse "mass" with "purpose." The versatility and flexibility of air and space power permits the simultaneous accomplishment of strategic, operational, and tactical effects through carefully dispersed and parallel attacks in order to achieve an overwhelming effect (concentration of purpose).

Persistence

Air and space power should be applied persistently. Destroyed targets may be rebuilt by resourceful enemies. Airmen should plan for restrikes against important targets.

Section III. Air and Space Operations

Air and Space Operations are the employment of air and space power to achieve military objectives. Air and space operations employ the tenets of air and space power to maximize air and space power's mobility, responsiveness, flexibility, and versatility. Air and space operations shape the theater in ways that cannot be achieved by surface forces.

A primary objective of air and space operations is to gain air and space superiority. Air and space superiority provides the essential security and freedom of action for all friendly forces in the theater. Air and space power's responsiveness, mobility, flexibility, and versatility are maximized when applied against an enemy who is denied access to air and space.

Air and Space Operations maximize the responsiveness, mobility, flexibility and versatility of air and space power through cyclical operations. Air and space operations must continually monitor events (Observe), evaluate the situation (Orient), re-prioritize requirements and assign air and space platforms against those requirements (Decide), and carry out the assigned missions (Act). The ability of air and space operations to rapidly Observe, Orient, Decide, and Act against a wide array of military, economic, political, and social targets permits air and space power to shape a conflict in ways that cannot be done by surface forces.

Notes

1. Carl Builder's book *The Icarus Syndrome* discusses many of the problems that the Air Force has experienced as a result of a lack of a common vision or purpose. The first chapter "A View of the Air Force Today" provides an excellent synopsis of the problems of loyalty to specialty instead of service, the inability of the Air Force to defend its missions and roles in inter-service debates, the impact on the Air Force budget, and the Air Force's unwillingness to adapt to new technologies. Carl Builder, *The Icarus Syndrome* (New Brunswick, NJ: Transaction Publishers, 1996) pp. 1-13.
2. Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 1, March 1992, p. 5.
3. Air Force Doctrine Documents (AFDD) 1, September 1997, p. 23.
4. Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 1, March 1992, p. 8.
5. AFDD 1, p. 25.
6. AFM 1-1, vol. 1, p. 8.
7. Joint Pub 3-0, *Doctrine for Joint Operations*, 1 Feb 1995, p. II-2.
8. AFDD 1, p. 43.
9. David S. Fadok, Major, *John Boyd and John Warden: Airpower's Quest for Strategic Paralysis* (Maxwell AFB, AL: Air University Press, September 1995) p. 13.
10. *Ibid.*, p. 15.

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