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Expansion or Marginalization

How Effects-Based Organization Could Determine the Future of Air Force Space Command

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Foreword

The importance of combat effects in warfare has no second. However, most combat effects would never be delivered without crucial information delivered from combat support forces. In this time of turbulent recapitalization and reorganization within the Air Force, the critical nature of combat and combat support effects must remain foremost in our decisions as we create new commands, place people and resources where needed, and forecast budgets.

Air Force Space Command has always been a force multiplier, and, in more recent history, it has provided its own combat effects. As demonstrated by the Chinese last year, kinetic attack is now in the arsenal of space operators, both foreign and domestic. However, providing nonkinetic combat effects and combat support effects is the primary military role of Air Force Space Command units and their people. As the Air Force considers new major organizations, like Air Force Cyber Command and the Air Force Intelligence, Surveillance and Reconnaissance Agency, we would do well to note the synergistic nature of combat and combat support effects within new and existing organizations and the budgetary burden associated with creating new Air Force commands.

Toward that end, Dr. Tomme provides a critical examination of Air Force Space Command, and by analogy, Air Force Cyber Command, in a discussion of the roles of combat and combat support organizations. His critical thoughts and enlightening points serve as a basis for further discussion and examination of how the world's premier air force—arguably the greatest air force in the history of mankind—could move forward in a high-technology age of both kinetic and nonkinetic combat effects in air, space, cyber, and intelligence operations. I encourage the reader to study the salient points of Dr. Tomme's paper for further thought, discussion, and debate. How we organize ourselves today will frame the structure of our service throughout this new century.

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About the Author

At the time of his retirement, Lt Col Ed "Mel" Tomme, USAF, retired, was the only combat pilot in the Air Force with a doctorate in physics. A distinguished graduate of the United States Air Force Academy (USAFA) in 1985, he attended pilot training at Reese AFB, remaining there for his first operational tour instructing in the T-37 Tweet. He was then selected to fly the F-4G Wild Weasel at George AFB; Spangdahlem Air Base, Germany; and King Abdul Azziz Air Base, Saudi Arabia.

He holds a master's degree in physics (quantum optics) from the University of Texas at Austin and a doctorate of philosophy in plasma physics from the University of Oxford in England. Colonel Tomme taught physics at USAFA for several years while also instructing in the T-3 Firefly and TG-7 Motorglider. He is the only officer at USAFA to ever have been recognized as both the outstanding academy educator by the dean and the outstanding associate air officer commanding by the commandant.

Colonel Tomme's final assignment in the Air Force was working in Air Force Space Command's Space Warfare Center at Schriever AFB, CO, serving first as Concept Development Branch chief for the Air Force Space Battlelab and later as the deputy director of Air Force Tactical Exploitation of National Capabilities (TENCAP). Championed by the commander, Air Force Space Command, he personally briefed his concept for utilizing the near-space regime for military purposes in the White House, to Congress, and to almost 200 stars and civilian leaders between April and November 2004, including the secretary of the Air Force and chief of staff of the Air Force. His work on near-space and on so-called tactical satellites generated two separate Air Force Scientific Advisory Board studies, both of which validated his controversial conclusions.

Colonel Tomme is currently a defense industry consultant.

Acknowledgments

My most sincere thanks go to two good friends and colleagues: Col Ed "Bull" Rios, USAF, retired, president, CyberSpace Operations Consulting and former commander, Headquarters AFSPC Space Operations Squadron; and Col Sigfred "Ziggy" Dahl, Directorate of Requirements, Air Combat Command and former director, Air Force TENCAP. Bull read and corrected numerous drafts of this article and steered me to many extremely valuable references and connections. Ziggy's constant chiding kept me focused on the facts. His sound advice to follow the path of Sun Tzu's *ch'i* instead of pursuing the *cheng* that is my natural tendency substantially (and appropriately) softened the tone of my arguments, making this paper much less confrontational and more palatable to my target audience. This paper would have been much less effective were it not for their greatly valued assistance.

I also owe a sincere debt of gratitude to the following individuals who spent many long hours with me, sharing their insights on intelligence collection and dissemination, space, information operations, political realities, doctrine, and organizational change: The Honorable Peter Teets, former undersecretary of the Air Force, former director, National Reconnaissance Office, and former president and chief operating officer, Lockheed Martin Corporation; Lt Gen Dave Deptula, deputy chief of staff for intelligence, surveillance, and reconnaissance, Headquarters USAF; RADM Tom Betterton, USN, retired, former director, Program C, National Reconnaissance Office; Brig Gen Jim Head, PhD, USAF, retired, former head, Department of Physics, United States Air Force Academy; Col Vickie "Wizard" Michaels, USAF, retired, Technical Services Business Development, Northrop Grumman and former chief, Space and Advanced Programs, Air Intelligence Agency; CAPT Scott Witt, USN, retired, former chief, Office of Weapons and Space, National Security Agency; and Lt Col Steve Carr, PhD, USAF, retired, supervisor of the Command and Control Group, The Johns Hopkins University Applied Physics Laboratory. Their valuable and considered input significantly increased the strength of the arguments in this paper.

Summary

Air Force Space Command is currently organized around a domain: it does things in and through space. Such an organization is not optimal, as it ignores synergies gained from effects-based organization, the grouping of missions according to similar effects instead of platforms and platform locations. Events already in motion appear poised to push Space Command to the sidelines unless it proactively embraces missions in other domains that produce effects similar to what it currently does exclusively from space. The newly announced Air Force Cyberspace Command could suffer from similar problems since it is similarly organized around a domain instead of effects.

This paper proposes a new split in the Air Force organizational structure deemphasizing the domain and stressing effects; combat effects are separated from combat support effects so that these effects-based synergies can best be exploited. An Air Force Space Command combined with the new Air Force Intelligence, Surveillance, and Reconnaissance Agency would become the cornerstone of a new combat support command that would enable a single commander to support joint Department of Defense operations and the intelligence community more effectively than is possible under the current structure. Such a new command could quickly become the nation's preeminent provider of high-ground command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) effects.

Expansion or Marginalization

How Effects-Based Organization Could Determine the Future of Air Force Space Command

No modern war has been won without air superiority. No future war will be won without air, space and cyberspace superiority. Accordingly, the Air Force must be better postured to contend with both today's and tomorrow's challenges. To promote and defend America's interests through Global Vigilance, Global Reach and Global Power, the Air Force must attain cross-domain dominance. Cross-domain dominance is the freedom to attack and the freedom from attack in and through the atmosphere, space and the electromagnetic spectrum. It permits rapid and simultaneous, lethal and non-lethal effects in these three domains to attain strategic, operational and tactical objectives in all warfighting domains: land, sea, air, space, and cyberspace. Cross-domain dominance integrates systems, capabilities, operations, and effects in air, space and cyberspace to gain competitive advantage in any and all domains. It transforms our operational concepts to maximize synergy among air, space and cyberspace, thus generating a new array of simultaneous, synchronized effects.

—Gen T. Michael Moseley
Former Chief of Staff, USAF
The Nation's Guardians:
America's 21st Century Air Force

Effects are the foundation upon which our modern military is based. *Effects-based operations* has been a common buzzword for almost two decades now. While the emerging concept had possibly been bounced around as early as the 1960s,[1] it quickly gained prominence within scholarly and military circles with the publication of a seminal article by then Col David

Deptula,* which laid out in an academic forum many of the ideas he had developed and championed during the first Persian Gulf War.[2] His ideas were further refined by the Joint Forces Command[3] and others to the point that most subsequent works agreed on the basic tenets: effectively and efficiently producing desired results where the focus is on the ends and not the means, with emphasis on the outcome and not necessarily raw, destructive military power.[4]

The logical grouping of effects producers is a key to successful military operations. The purpose of this paper is to examine the current organizational focus of Air Force Space Command (AFSPC) as viewed through an effects-based lens and to explain why that focus could be shifted to better serve our nation's defense. It will also investigate large organizational changes already at work within the Air Force that appear to be a reaction to the less-than-optimal organization of the full range of the service's intelligence-gathering and dissemination assets, both traditional and cyberspace.

The crux of the paper will be to suggest a path for organizationally separating combat effects producers from those units who produce support effects, taking advantage of synergies gained from organizing and training like units together to form a more potent fighting force. The spotlight will initially fall upon AFSPC, as that organization more than any other major unit in the Air Force epitomizes a haphazard juxtaposition of combat and support effects producers thrown together for no other apparent reason than sharing a common operating domain—space—for at least part of their mission. However, the focus will broaden to include the recently announced Air Force Cyberspace Command, as its organization seems to be a similarly eclectic collection of combatants and supporters. Examining the less-than-optimal organization of AFSPC could provide a wealth of lessons to be learned when designing the new cyberspace command. Organizing along lines of common effects in-

*General Deptula was the principle air-campaign attack planner for Gens Buster Glosson and Chuck Horner during Operation Desert Storm (1991) and worked for Col John Warden in the renowned AF Checkmate cell. During that period he and Colonel Warden began discussing the "effects-based" approach to warfare and used it to meter the actual attack flow used during the war.

stead of domain aligns perfectly with General Moseley's theme of maximizing cross-domain dominance to provide the absolutely best defense capabilities for our nation, filling critical seams that exist with the current structure.

To support this argument, we shall begin by explaining why it is *effects* that matter, not the location or the platform from which those effects are produced. We shall discuss how AFSPC's focus is only peripherally on coordinated effects production and provide a telling example in which the command intentionally discarded a mission set that complemented and significantly expanded its capability to produce effects because the mission set did not fit cleanly into the command's domain-based mind-set. We shall then foreshadow the possible absorption of the command into new, ascendant commands that do emphasize the primacy of effects. We shall suggest how a consolidation of all similar command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) effects producers—regardless of the domain in which they operate—would allow for much more efficient management and delivery of those effects. Using an analogy with the US Army practice of dividing its forces into warrior and support branches, we shall then show how the effects produced by some units currently under the direction of AFSPC are better suited within other organizations. Finally, we shall discuss why proper identification of support and warrior forces is necessary to hone the proper focus of each type of unit, with the goal of producing the most valuable combat effects for our nation. The end result of this discussion will be a recommendation for a complete revamping of the way that AFSPC does business, transforming the command into one that is not only the world's premier operator of space-based assets but also has assumed a much more crucial role as the linchpin of all C4ISR-related effects delivery for the nation.

In a paper where the term *effects* is so germane to the discussion, it is paramount to define up front what is meant by combat effects and combat support effects. Some have suggested that effects should be split on kinetic/nonkinetic lines.[5] Such a division appears to be artificial—a red herring. Whether the enemy is destroyed with bombs, light, or binary code, the effect is the same: he is dead. A more natural and organization-

ally useful split occurs between combat and combat support effects. Combat effects are the results of direct actions taken to deny the enemy the use of an asset or to defend a friendly asset. Many people associate combat effects with actions like dropping bombs. There the combat effect is, for example, destruction of an enemy tank. However, combat effects do not necessarily have to be kinetic. Maneuvering a small spacecraft near an enemy imaging satellite and deploying a large black plastic sheet in front of its cameras would be an example of a nonkinetic action that produces the combat effect of negating the usefulness of the enemy's space asset. Using the Internet to take down systems necessary to the operation of an enemy nation's financial system would be a cyber-based nonkinetic action that results in a combat effect. Conversely, support effects are the results of actions that enable combat effects to occur, but do not actually take the action associated with combat effects.

A good doctrinal example of the difference between combat effects and combat support effects may be found in the dynamic targeting kill-chain of find, fix, track, target, engage, and assess (F2T2EA). Joint doctrine states, "The find, fix, and track steps tend to be ISR-intensive, while the target and engage steps are typically labor-, force-, and decision-making intensive."[6] If it is not the role of an organization to carry out the actual targeting and killing of the enemy asset in the F2T2EA kill-chain,* the unit is performing a combat support function. Many combat effects providers *can* independently perform all steps in the kill-chain, but they are most often assisted by combat-support effects providers; combat-support effects providers do not target or engage.

In the small-spacecraft example above, combat support organizations likely found, fixed, and tracked the target, providing the information on the orbital parameters for the target satellite and determining that it was an imaging satellite. The combat organization then continued the track while targeting and executing by actually maneuvering the screening satellite in place to negate the asset through disruption of its mission.

*Here, *kill* may be interpreted to mean any method along the spectrum of negation—the ability to deny, disrupt, deceive, degrade, or destroy an enemy asset.

Combat support functions likely monitored the entire encounter to assess its effectiveness. Likewise, the process of finding the appropriate port in the appropriate computer into which to insert the command to disrupt the enemy's financial system is a form of cyber intelligence, surveillance, and reconnaissance (ISR), a combat support function. Transmitting the actual command to execute the action results in a combat effect, an effect that must be coordinated with all other ongoing and planned combat effects.

The term *combat support* is not intended to denigrate those missions or imply that they are only secondary considerations. On the contrary, combat support effects within the kill-chain are becoming ever more important. In a recent article, General Deptula noted, "Finding the enemy has become a great challenge. . . . Knowledge—having always been key—is assuming precedence over kinetics as the prerequisite 'weapon' of war. . . . We are in an era when we can already kill practically any target we can find. Our chief challenge is to find-fix-track low-signature targets, however fleeting and unique they may be. Without this capability, precise shooters are of little use."[7] The appropriate method of organizing our forces so that these combat and combat support functions operate as effectively as possible to ensure the shooter has the best information possible is the main concern of this paper.

Having explained this paper's purpose and defined key terms, we will now examine AFSPC's organization in detail and discuss why it is so fundamentally different from the rest of the Air Force. Though AFSPC is the specific focus of this paper, it would be worthwhile to keep potential Air Force (AF) Cyberspace Command organizational structures in mind to see where the similarities may lie. It is important to remember throughout that both cyberspace and space are domain concepts, not effects.

Domain versus Effect

In the early 1990s, the Air Force reorganized many of its major commands (MAJCOM) to better harness the synergies that come from grouping assets that deliver similar effects to the war fighter.[8] For example, Air Combat Command (ACC) became the center of almost all things related to the effect of putting

weapons on target, including, for the command's first year of existence, the nation's nuclear missile forces.[9] Air Mobility Command's core competency was delivering the effect of rapid, responsive logistics. Air Education and Training Command's core effect was to support all other commands by providing them with well-trained and highly-educated personnel. All but three of the service's nine commands are now organized along functional levels, and two of the remainder, United States Air Forces in Europe (USAFE) and Pacific Air Forces (PACAF), are aligned for geopolitical reasons.* There remains only one real holdout on the service's push toward universal effects-based organization—one command that steadfastly clings to a domain-based structure, a *raison d'être* that is based on being in a particular place instead of delivering a unique effect.† That command is Air Force Space Command, the organization that prides itself on delivering "space effects."

In testimony to the House Armed Services Committee and in a recent public speech at a major space conference, Gen Kevin Chilton, then the AFSPC commander, stated that the first of his four main priorities for the command was to "preserve and expand our ability to deliver *space effects* to the joint fight" (emphasis added).[10] There are two problems with this worthy goal. First, warriors do not care where their effects come from. The *space* modifier in front of *effects* is completely irrelevant to warriors. As eloquently stated by one current Marine space officer, "No one in the field has ever sent out an urgent call for more space. It's the effects they want."[11]

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*The major commands within the USAF are Air Combat Command, Air Education and Training Command, AF Materiel Command, AF Reserve Command, AF Space Command, AF Special Operations Command, Air Mobility Command, Pacific Air Forces, and United States Air Forces in Europe. The AF has announced plans to stand up a 10th major command in 2008, AF Cyberspace Command.

†It is difficult to classify PACAF and USAFE as effects-based commands. Instead they are much more correctly classified as domain-based commands; the "domains" in their cases are specific geographic locations. The argument can be made that a similar rationale exists for AFSPC. However, the existence of PACAF and USAFE is predicated on the garrison nature of the military established during the Cold War and the requirement to support thousands of Airmen and their equipment in forward operating locations. There is no similar forward basing requirement levied upon AFSPC. Additionally, as our military becomes more expeditionary in nature, the relative size and influence of PACAF and USAFE are on the wane as their assets are being transferred back to the stateside major commands based around delivery of specific effects.

A quote currently in vogue among senior space officers cites a young soldier who, when asked if he needed space to fight in today's wars, said, "No, all I need is my rifle, my box of ammunition and that little black box over there that tells me where I am."[12] Space officers proudly cite this soldier to show that space has become so pervasive that people don't even know they're using it; they appear to have missed the irony that the quote actually highlights the fact that warriors not only don't *need* to know but shouldn't *have* to know they're using space. Were the navigation information the soldier found so important delivered from some other source, it would be just as valuable to him. As long as warriors get the information about the enemy and their comrades needed to prosecute the battle and as long as they can effectively communicate and give and receive orders at will, they are happy and effective. The systems that actually deliver the C4ISR effects the warriors rely on could just as well be in the center of the earth or on a completely different planet for all they care. Just as people don't need to know the technical specifications behind how the signal gets to their house when they just want to watch their programs, warriors just want the effect; details of the delivery mechanism should be invisible to them.

The second problem with the phrase "space effects" is that many of the effects delivered by space assets aren't unique and warriors could actually benefit from the synergies of grouping them with other deliverers of similar effects. By combining the strengths of all overhead and airborne C4ISR assets under one commander and by leveraging the global overflight and deep-look capabilities of orbital platforms together with the tactically tailorable timing and localization available from airborne and high-altitude/near-space systems, the effects delivered by the command could become even more formidable and more useful both to commanders in the field and to the national intelligence community (IC) as a whole. The task of integrating IC and Department of Defense (DOD) assets to achieve this goal of optimal effectiveness is not trivial. One senior officer writing about interservice rivalries said, "When a single service attempts to achieve war-fighting independence instead of embracing interdependence, jointness unravels; war-fighting effectiveness is reduced; and costly redundancies, gaps, and conflicts likely

abound. . . . The services' inherent responsibility to the American taxpayer to operate effectively and efficiently is even more critical in light of increasing resource constraints."[13] The difficulties associated with rivalries between executive branch departments are even more intense, the players even more intransigent, and the costs to our national defense of failing to act substantially higher. This topic will be addressed later in this paper.

AFSPC is currently a *domain-based* command. It sees itself as the command that does things in and through the domain of space. This self-view is not a new one. As early as the mid-1980s, internal AF documents noted the problem that "space continues to be a place, not a mission for the United States Air Force."[14] Even the much more recent Space Commission report continued to promulgate that nonproductive notion when it said, "Space is not simply a place from which information is acquired and transmitted or through which objects pass. It is a medium much the same as air, land or sea."[15]

AFSPC operates satellites that provide much of the nation's strategic overhead C4ISR.* What if the command were to

- change its focus from the domain to the effect?
- decide that *where* it operates matters less than *what* it delivers?
- become an *effects-based* command?

Could it see its mission areas expand rather than contract? Could it, in the words of Maj Gen Craig Koziol, commander of the AF ISR Agency, develop "a capability-based vice program-based culture"?[16] Could it become an even more effective enabling linchpin in our nation's defense organization?

Military organizational structure needs to be derived from the large-scale goal of being able to deliver the most effective defense for the nation as a whole. It is evident to anyone who has spoken with them that the warriors at the pointy end of the spear who personally deliver an effective national defense are effects driven. It appears axiomatic that organization by do-

*The National Reconnaissance Office is responsible for a great deal of overhead ISR as well. Its role will be discussed later in this paper.

main is not necessarily the most efficient method of supporting them. We go to great lengths to ensure that human factors have been taken into account when designing rifles and aircraft cockpits. A great deal of effort is expended to ensure these tools are designed to fit the way the warrior will use them. Were our support forces organized to maximize coherent effects production, designed to fit the way warriors use them, it appears equally obvious that efficiency in battle would increase.

AFSPC's misidentification of its function within the larger machinery of national defense, its insistence on limiting itself to Keplerian physics,* is leading to its marginalization. Granted, this focus is not completely internally driven. Some of it is budget driven; adding further mission areas could cost money that is in short supply within the command. However, throwing up one's hands at that initial speed bump is to surrender to the bean counter's point of view instead of looking at the bigger picture of improved national defense. US Strategic Command (USSTRATCOM) and the DOD leadership also direct much of where AFSPC's attention lies. However, there are significant internal factions within the command that continue to shun anything nonorbital; these groups may be the greatest inhibitors to AFSPC becoming a more effective contributor to the national fighting force.

Notably, the space doctrines of the DOD and three of the four services[17] also treat the domain as more important than effect.† Like every MAJCOM, AFSPC directly operates under two sets of doctrine: joint and Air Force. Air Force Doctrine Document (AFDD) 2-2 deliberately orders the two views of space, domain and effect, in a way that highlights the platform-based, domain-first view:

> *First*, space may be viewed as a *physical environment*—like land, sea, and air—within which space-centric activities are conducted to achieve objectives. This view is particularly relevant at the tactical (e.g., operation of specific platforms) and strategic (i.e., space as a domain that must be protected and controlled) levels of war. . . . The *second* doctrinal

*Johannes Kepler (1571–1630) was the first to describe mathematically the behavior of orbiting bodies.

†Joint, Air Force, and Army doctrine treat space as a domain first. Only the Navy discusses effects ("capabilities," in their words) first without mentioning domain or platform.

view of space is an *effects-centric* view, and is primarily relevant at the operational level of war."[18] (emphasis added)

Many senior space officials and thinkers actively promote the idea that the space domain is so different and revolutionary that it, not effects production, becomes the primary consideration. For example, citing the rationale for separating the Air Force from the Army and the subsequent benefits reaped from that separation, Peter Teets, former undersecretary of the Air Force and former director of the National Reconnaissance Office (NRO), specifically addressed this mind-set. He discussed three guiding principles of airpower: gaining the high ground, applying the capabilities of the new medium to all conceivable forms of war fighting, and developing a new professional culture. He then emphasized the distinction of the space domain from that of the air by concluding with a remark analogizing those principles to what must be done in orbit: "It must be our goal that the United States carry this legacy of success into the medium of space."[19]

AFSPC is thus both internally and externally driven toward domain as its primary reason for existence and thus appears only peripherally focused on effects. For a major military organization with such huge potential, focusing on the domain leads inexorably down the path of mediocrity.* While such a doctrinal view of space may help those who seek a space force separate from other services, it prevents the command from reaching its full potential to serve the cause of national defense by not placing effects production in the primary position. It also endangers the command's continued existence because other organizations that do understand the benefits of massing similar effects under a single commander have their eyes on portions of its turf.

**Mediocre* is a relative word. Without question AFSPC currently controls the greatest, most powerful, most capable space force in history. However, when compared with what the command could be with the appropriate effects-based focus, *mediocre* is an appropriate description.

Kepler Only

One concrete example of the command's refusal to embrace non-Keplerian missions is its recent decision to discard the near-space regime,* transferring responsibility for it to another command because, although it provides satellite-like effects, it does not strictly operate in the domain of space. Near-space as a domain involves using very high altitude aircraft or lighter-than-air vehicles to provide satellite-like effects to tactical-level units.[20] Whether the use of near-space by the military comes to fruition in the near future is irrelevant to this discussion;† the pertinent facts deal with how AFSPC reacted to its existence, concentrating on domain instead of effect.

A telling comment foreshadowing this topic was a remark made by General Chilton to Gen Ron Keys, commander of ACC: "I do Kepler, and you do Bernoulli."[21] The command's domain-based mind-set was also highlighted when General Chilton commented that *near-space* was a misnomer because the region only went about one quarter of the way to orbit; the term concentrates on physical nearness rather than the similarity of the effects produced in space and near-space.[22]

As recently as 2004, Gen John Jumper, chief of staff of the Air Force (CSAF), assigned the mission area of near-space to AFSPC, seeing that it provided very similar effects to what warriors tended to associate with space but also complemented some of the weaknesses of orbital assets and gave the

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*Near-space is the relatively unutilized region above where most conventional aircraft fly and below where satellites can operate, generally defined to be 65,000 feet in altitude to the edge of space. Platforms operating in near-space have very large footprints similar to those of low-earth orbit (LEO) satellites but without the transitory nature of orbiting assets. If exploited, near-space could provide effects that are much more persistent and responsive to warriors at the tactical and operational levels of war when compared to orbital assets. Near-space, however, is subject to national airspace sovereignty limitations, just as aircraft are. It cannot provide the prehostilities deep look that satellites can.

†To be completely forthright, the author is a well-known advocate of near-space and its role in AFSPC. For a variety of reasons, both political and technical, near-space has not fared as well as had been predicted several years ago. Critics of this current paper may attempt to cast it off as the author's sour grapes because a pet project was not embraced by the command. Such criticism would completely miss the point of this work. The following discussion of near-space, contrasting it with tactical satellite platforms, is only included in this article as a necessary illustrative example to demonstrate just how pervasive the domain-based mind-set is within the command.

command a way to contribute in a very tangible way on levels of war other than the strategic one so frequently associated with satellites.[23] In a 2004 speech, General Jumper described his view of effects versus domain and his vision of tactically relevant "space":

> What if we created near-space? What if we gave it to the space guys so that the space guys were forced to be less platform-centric and more results-oriented? We tell them to solve the problem of persistence. What if we did that? I bet it would work![24]

In response to the chief's direction, the AFSPC commander, Gen Lance Lord, wrote a memo in 2005 to the CSAF asking for executive agency for near-space.[25] That memo spawned another from the CSAF to the chairman of the Joint Chiefs of Staff on the same subject.[26] Shortly after assuming command of AFSPC, General Chilton even wrote a memo that said "consider Near Space part of our Space portfolio. These new complementary systems will augment our strategic systems."[27] The command seemed to be moving steadily toward a more effects-based mind-set.

A little over a year later the situation had changed drastically. Near-space had suffered a forced name change,* and AFSPC had surrendered control of a promising mission area to ACC.[28] Why the sudden disinterest from AFSPC in an area that was so clearly related to its mission? In the same speech where he laid out his vision for a broader definition of space, General Jumper presciently described the demise of the concept when he foresaw the internal opposition it would generate within Space Command. "You go try and sell a concept that makes very good sense like the one I just outlined," he said, speaking specifically of near-space, "and you find antibodies all over the place."[29]

After General Jumper's and General Lord's retirements and the retirement or reassignment of numerous similar visionaries at the very top levels within AFSPC, near-space antibodies

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*The term *near-space* is no longer accepted within the DOD, being replaced by *high-altitude operations*. The coincidence of the change of mission-area ownership and directed name change, along with open hostility to the linking of nonorbital and orbital effects through the word *space* from some senior AF space officers points toward an intentional disentanglement of effects from domain. Lumping satellites together with similar effects producers could have a negative impact on any push for a separate space force and thus would appear to be an unacceptable situation for some politically active officers within the space community.

gained less-tempered access to the ear of the AFSPC commander. Instead of trying to consolidate the mission of C4ISR effects delivery regardless of domain, thus leveraging the combined strengths of diverse platforms to provide maximum effects for the warrior, the command pressed ahead with a supposed competitor to near-space, the tactical satellite program. It has been demonstrated by several groups that such a program provides effects complementary to those from near-space but cannot provide the persistence required for support to tactical operations.[30] However, tactical satellites remain the favored venue for attempting to insert AFSPC into tactical operations, a likely result of the command's view of where its core competencies lie as well as a way to promote its goal of developing transformational, cheaper ways to build and deliver satellites into space.[31] Near-space, on the other hand, a program that might actually deliver the effects AFSPC professes a desire to deliver and effects warriors need, was allowed to slip through its fingers, passing instead to an effects-based command.* In this case, AFSPC appears to have consciously chosen a space solution with its attendant high costs, high risks, and demonstrably less potential payoff for our tactical warriors because the domain was deemed to be more important than the effect.

AFSPC's domain-based proponents appear to have won the near-space battle, but are they on the way to losing the effects war? Has their steadfast adherence to the mantra of domain before effects pushed the command toward the sidelines of national defense instead of to the forefront? In bureaucracy as in war, Pyrrhic victories come at a substantial cost to the victor.

Filling the Effects-Based Void

In hindsight, the logic behind major military commands being organized by effect is almost self-evident. Assignment of

*During the 8 January 2007 decision brief on near-space delivered to the AFSPC staff by Lt Col Toby Volz, General Chilton discussed at length how balloons were governed by Bernoulli (by this, he meant aerodynamic forces; Archimedes, the discoverer of buoyant forces, would have been a better metaphor) while satellites were governed by Kepler (gravitational forces that are the basis of orbital mechanics). He then described how Bernoulli belonged under ACC while AFSPC specialized in Kepler, conferring primacy on domain rather than effect. That briefing sounded the death knell for the near-space mission within AFSPC.

responsibility for closely related effects to an organization allows single, very senior commanders to use their broad, big-picture views of the need for those effects to guide the organization of their subordinate units, the training of their personnel, and the acquisition of their equipment. They can thus ensure that all the intricate parts work together to provide a seamless, interwoven, redundant-where-necessary whole with which to support the combatant commanders. It is hard to imagine why it was ever done differently.

Establishing cross-domain dominance practically requires an effects-based orientation. As stated by General Moseley, "We are transforming our thinking from considering the space and cyber domains as mere enablers of air operations to a holistic approach that factors in their interdependence and leverages their unique characteristics. We must continue to push this conceptual envelope—and expand the boundaries of existing tactics, techniques and procedures—to fully exploit the synergies of cross-domain dominance."[32] To become more than mere enablers, practitioners of air, space, and cyber specialties need to be fully integrated into the appropriate effects-related portions of the kill-chain so that those interdependent synergies may be maximized. As General Koziol succinctly puts it, "We must focus on how we achieve and assess effects, not where."[33]

Conversely, organizing space as a domain is a concept that doesn't appear to survive an effects-based investigation. Throughout the literature and in many speeches delivered by prominent space advocates, there is one consistent theme: there is a separate space force patiently gestating inside the Air Force waiting until the proper stage of its development to emerge like Athena, fully armored, from the skull of Zeus. In the view of these domain advocates, a space force is the ultimate goal—the proper target at which space professionals should be shooting.

The problem with the separate-space-force argument is that, while good for space professionals who could finally prevent their budgets from being raided for air-breathing exigencies,* it does little else to help the greater cause of national defense.

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*This problem is actually in dire need of a solution at the present time and is perhaps the only existing rational basis for pushing for a separate space force.

The key defining capability of any war-fighting organization is the ability to apply force to the enemy's territory; air-on-air, ship-on-ship, and other such encounters are merely means to the territorial-conquest end. Until we've solved the dollars-per-kilogram-to-orbit problem, until we can launch on a few minute's notice, until we've truly solved the reentry energy-dissipation problem, and until we're able to change orbits at will, implementation of a separate space force is an academic exercise because force application where it matters—in the enemy's backyard at a time of our commander's choosing—is impractical. It is hard enough to rationalize the effectiveness of an air occupation, much less one from space.

Of course, space-on-space combat is much closer than space-on-other-domains. An air-on-air analogy would be if fighter aircraft had been developed in World War I to defend existing reconnaissance aircraft, but effective strike aircraft were not subsequently developed for decades or centuries. Such combat existing solely within space, while affecting the rest of the nation's war-fighting capability due to its dependence on C4ISR from above, is not a proximate contributor to taking the enemy's territory from him. With the ability to find, fix, track, and assess most earthbound sites but only target and engage a very tiny fraction of them, it is clear that for the foreseeable future orbital assets will remain almost exclusively in the combat support role, a role in which they produce effects complementary to those produced by nonorbital assets.

The other side of the coin of these dilemmas that prevent effective space-based force application is that if we shoot even higher than space force advocates are currently aiming, the need for a separate space force actually evaporates. Solve the expedient and affordable launch, maneuver, and reentry problems, and the space force begins to look a lot like today's Air Force, but a force with a greatly expanded service ceiling. From a tactical point of view, the artificial distinction between endo- and exo-atmospheric regimes disappears when warriors can maneuver in and out of space at will. The fallacious academic argument about an artificial dividing line in the continuous transition between atmosphere and vacuum dissolves; current nonmaneuverable space-asset manifestations are recognized as the functional equivalents of earthly television antennae and sea-based buoys; and the current

Air Force air-and-space mantra becomes reality. However, working within reasonable expectations of technological progress in the next several decades, instead of segregating space assets through an artificial domain distinction, the greater good is better served by integrating the effects produced by orbital assets with similar nonorbital effects producers.

While AFSPC has been moving away from effects delivery and toward a Kepler-only focus, others within the AF have picked up the dropped ball and moved out in a more productive direction. General Jumper's view that AFSPC was more interested in domain than effect is apparent from the speech quoted above. Apparently reacting to the same perceived proclivity among officers within the space community to favor platform over effect, the AF recently announced the formation of the very effects-based Intelligence, Surveillance, and Reconnaissance Agency, perhaps not so coincidentally headed by the same General Deptula who was so instrumental in focusing attention on effects in the first place.[34] This new agency may soon have the imperative to take a large portion of the current AFSPC portfolio—and then morph into a MAJCOM of its own—in order to deliver coordinated overhead/near-space/airborne ISR effects to the war fighter.

While General Deptula's efforts have been the prime mover behind the stand-up of the Air Force ISR Agency (AFISRA), it could not have happened without a champion at even higher levels. It is quite plausible that General Moseley was thinking at least in part about the potential of AFISRA when he wrote, "Airmen must develop creative solutions—ways—to gain and maintain superiority in air, space and cyberspace, exploiting the synergies of cross-domain dominance to attain a quantum leap in mission effectiveness."[35]

At the current time, stand-up of AFISRA essentially involves only renaming the former Air Intelligence Agency, previously located under ACC. However, it does not take a rocket scientist to read between the lines in the briefing presented to AF leadership that justified the agency's formation to see where leaders believe the future lies.[36] General Deptula's vision is to "transform AF Intel into a *pre-eminent* military intelligence organization; with the *most respected* personnel; and the *most valued* ISR capability" (emphasis in original). The briefing states this

goal as an approach designed to "manage ISR from a capabilities based perspective, and as a consolidated functional area."

How does one go about consolidating ISR as a functional area? The designers of this briefing clearly understood that in order to provide the nation the absolute finest intelligence capability, they needed to own and control not only the intelligence analysts but also the means of production of the data the analysts would use. The National Research Council also recognizes the synergy gained by locating collection and analysis within the same organization:

> The principal function of the intelligence, surveillance, and reconnaissance (ISR) component of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) is to find, fix, and track both friendly and hostile forces, as well as to assess* damage to hostile targets in an area of interest. In addition to sensing (collection), the function includes the tasking of sensors and the integration, interpretation, and exploitation of sensed information.[37]

On a slide from the AFISRA stand-up briefing discussing longer-term actions the nascent command saw as future requirements was a telling phrase: "Explore consolidation of related AF space activities into AF intel." That statement stabs right at the heart of the effects-based ethos and appears to be a reaction to AFSPC's apparent lack of emphasis on effects delivery.

The impetus behind the creation of AFISRA, giving a single commander control over both the means of production and the means of analysis for ISR, is a line of thought that logically crosses organizational lines at a higher level than just within the Air Force. The 2001 Space Commission report touched on this even more politically sensitive thrust when it suggested that the NRO shift a large portion of its responsibilities to the AF.[38] Many of its NRO recommendations have been implemented, such as making the director of the NRO three-hatted as the undersecretary of the Air Force and the executive agent for DOD space-system acquisition.† However, an even broader

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*Note the F2T2EA reference that leaves out *target* and *engage*; these authors definitely understood the break between combat and combat support.

†The status of the current director of the NRO has changed from that recommended by the Space Commission. The director is no longer the executive agent for DOD space acquisition and is only the assistant to the secretary of the Air Force for intelligence space technology instead of being an undersecretary. The current director also has a Central Intelligence Agency background instead of military experience.

consolidation would significantly enhance the nation's ability to deliver ISR effects. Former undersecretary of defense for intelligence Stephen Cambone commented on exactly that topic by saying that "the DoD and IC must refashion their forces when necessary."[39] Efficiently grouping organizations by effect also appears to be in line with the recommendations of the members of the National Commission on Terrorist Attacks upon the United States relating to improving the flow of intelligence information within the government.[40]

In its early days the NRO was an agile acquisitions organization that could quickly field systems vital to the nation's defense. However, according to the report, "The NRO's capacity to convert leading edge research and technology into innovative operational systems is inhibited by the requirement to maintain its legacy programs."[41] What better way to return to the lean organization of the NRO's glory days than to shed its long-term maintenance requirements by passing them on to an AFISR Command (AFISRC)? With such an organizational shift, AFISRC would assume control of all day-to-day space-based ISR activities, integrating them seamlessly into USSTRATCOM's global operating picture, while allowing the NRO to return to a "skunk works" mentality led by the considerable Central Intelligence Agency brainstorming and expertise that was present in its early days.[42] Such an organization could quickly deliver cutting-edge technology to meet war-fighter needs without having to devote large amounts of manpower to supporting the operational tail once the system was delivered. Considerable coordination between AFISRC and the NRO would need to take place to make each handoff run smoothly, but such coordination would undoubtedly facilitate a better understanding within both organizations of the requirements from the field that drove the development of each NRO system in the first place.

The reason that nontraditional acquisitions organizations, such as the services' tactical exploitation of national capabilities (TENCAP) programs, produce effects far in excess of their on-paper funding is that they develop innovative products quickly and then pass them on to the user commands. The NRO could be transformed into a similar organization, albeit with a vastly larger budget and vastly broader responsibility. It has been argued that the real strength of the old NRO was the

system-specific end-to-end responsibility and accountability for a single pillar of excellence vested in a single individual.[43] However, ship builders do not routinely go on to captain ships; aircraft designers are not ultimately the pilots. Even the acquisition arms of the uniformed services are separate from the operational arms. While all of those groups take input from the end users and are even manned in part by those who have been or will be end users, the entire organization does not normally become the operator.

The natural break between designer/manufacturer/acquirer and operator takes place after the initial shakedown of the system. There appear to be no fundamental reasons that such a model would not also work for a revamped NRO. Individual accountability could be assessed upon successful delivery of a fully functioning asset to the end user. Once NRO developers had designed and launched their few-of-a-kind birds, they could transfer day-to-day operations to AFISRC and begin working on the next generations of systems. Other than turf, organizational prestige, and the potential for domestic operations not sanctioned for the military, there appears to be little reason to have IC and AF satellites operated by separate organizations as long as the combined organization remains responsive to the National Command Authority.

The synergies of having IC and DOD overhead assets work together under one commander would appear to have an extremely valuable payoff in terms of effects-based capabilities. Mr. Cambone appears to agree, commenting that "the country doesn't need defense intelligence and national intelligence, but a single intelligence capability."[44] General Deptula adds similar thoughts:

> It does little good to perfect military capabilities and concepts of operations in isolation from the other elements of national power. Our greatest national security challenge today is to build a truly integrated architecture that optimizes capabilities in the [diplomatic, information, military, and economic] domains—an architecture that melds these capabilities in the context of long-range strategies and plans to defeat the broader spectrum of threats facing the nation.[45]

Unfortunately, arranging our intelligence infrastructure to achieve that single intelligence capability is easier said than done. While the IC versus DOD institutional jealousies men-

tioned above play a role in these difficulties, the root cause is actually much higher than the level of the individual agencies and cabinet departments. It lies in the basic structure of Congress itself. Both the House of Representatives and the Senate each have separate committees that oversee the DOD and the IC (the Senate Committee on Armed Services and Select Committee on Intelligence, and the House Armed Services Committee and Permanent Select Committee on Intelligence). Each of these committees fiercely guards its own empire and none is likely to surrender budgetary or oversight authority to another without momentous political bargaining, even if such actions result in demonstrably better effects production from the assets that are currently separately managed. It is difficult enough for military professionals to develop the trust required to implement such interdependent systems; developing that level of trust among politicians is likely to be considerably more difficult, especially in today's highly polarized and closely divided political climate.

Further discussion of the desperately needed consolidation of orbiting and airborne C4ISR functions controlled by the defense and IC divisions of Congress is beyond the scope of this paper. The subject was introduced here to give the reader an idea of just how daunting a task true effects integration may be. However, there are a number of things in addition to the stand-up of the AFISRA that the Air Force can do independently of other services and government agencies that can significantly increase the efficacy of the C4ISR effects for which it is responsible.

Further Consolidation for Better Effectiveness

The move by the Air Force to consolidate all of its ISR in one effects-based organization is definitely a move in the right direction. However, it could go just a little further and become even more effective. By just adding two characters to the command's name and mandate, the Air Force could fuse in one place all the assets required not only to gather and disseminate intelligence information but also to make sure that information

goes to the right place to influence good decision making. Those characters are *C* and *4*.

ISR does not operate in a vacuum, isolated from all other things. ISR information requires some means of being communicated across distances near and far, from point of collection, to point of analysis, to point of use. Most, if not all, of the information generated by our ISR system is passed machine-to-machine, being processed almost exclusively by computer. ISR information is also one of the primary influencers of the orders that pass through the command and control networks, likewise almost totally handled by computer. *C4* is the label commonly used to describe the four functions so critical to an effective ISR program: command, control, communications, and computers. Instead of stopping at the AFISRC, consolidating functions so that the command becomes the Air Force C4ISR Command (AFC4ISRC) would make it even more effects based.* With the addition of those functions, its commander could then concentrate on *all* the interrelated problems of being the premier deliverer of C4ISR effects to the entire DOD and the nation as a whole. It would become, in the words of General Koziol, "an all-source, full-spectrum ISR mission-capable organization."[46]

If one uses Col John Boyd's OODA (observe-orient-decide-act) loop model to see how interrelated these support effects are,[47] the grouping is even more logically effects based. In this model, the *observe* portion is obviously ISR. ISR observations are merely data until they are transformed into information through intensive computer and computer-assisted analysis—the *orient* portion of the model. ISR data are then transmitted to commanders via some form of communications. The commanders then *decide*—the command portion of C2—and transmit their decisions to subordinate units in the field, again using communications, for the control portion of C2. Only after

*It has been pointed out that "AFC4ISRC" is a mouthful. We shall continue to use it in this paper, as it clearly spells out what the command is intended to do. Should the consolidation actually occur, we hope that a better name can be found. Two suggestions from reviewers of drafts of this paper are "Neural Command" and "Cognition Command." An added benefit of the second name would be that the office symbol for the commander of Cognition Command would be CC/CC, or C4 for short, recursively referencing part of the original mouthful.

the entire C4ISR process has had its say do warriors execute the *act* portion of the loop. Thus C4 can be viewed as a domain of a sort—a virtual, digital medium from which effects can be derived and the domain that enables the entire OODA loop. Consolidation of C4 with ISR would certainly optimize the possibilities for improved delivery of ISR effects.

Once all this consolidation had occurred, C4ISR Command would certainly become a much more effective organization supporting USSTRATCOM's Joint Functional Component Command for ISR. It would work hand-in-glove with other intelligence organizations, such as the National Geospatial-Intelligence Agency (NGA) and the National Security Agency (NSA), to satisfy combatant command and national operational and intelligence requirements. The critical effects for which a C4ISR command would be responsible would even enable much of the work of those other agencies. Having a single person responsible for coordinating delivery of all Air Force ISR effects—whether derived from satellites, unmanned aerial vehicles (UAV), or near-space platforms—can only improve the service's ability to function in the joint arena.

So what would a C4ISR command look like in practice? It would certainly start with the structure being established for an AFISRC, including the previously mentioned assumption of control of much of the AF space ISR collecting structure. However, it could also draw upon the existing structure within AFSPC. AFSPC primarily consists of two numbered air forces and an in-house acquisitions arm. The Fourteenth AF is in charge of operational control of the Air Force's satellites. The Twentieth AF commands the nation's land-based intercontinental ballistic missile (ICBM) fleet. The Space and Missile Systems Center (SMC) is the AF's procurement arm for rockets and satellites.[48] The key to organizing the new command is to first be explicit that its function is one of support.* Seen in this light, whether AFSPC absorbs AFISRC or vice versa is irrelevant as long as the effects producers end up in the right relative positions.

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*There are elements currently within AFSPC that are not support units. These units do not logically fall under the proposed C4ISR Command structure. Their disposition will be discussed later in this paper.

Combat Support Is the Mission

But what are the right relative positions, and what portions of the two commands should actually join? To answer this question, it is instructive to look at how one of our sister services describes its own organization. The Army classifies its units under three different functional labels: combat arms, combat support, and combat service support. The definitions of these types of units are as follows:

- "*Combat arms* are units and soldiers who close with and destroy enemy forces or provide firepower and destructive capabilities on the battlefield." Examples of these kinds of units include infantry, armor, and artillery.
- "*Combat support* encompasses critical combat functions provided by units and soldiers, in conjunction with combat arms units and soldiers, to secure victory." Examples of these kinds of units include military police and military intelligence.
- "The primary role of Army tactical [*combat service support*] units is to sustain Army forces." Examples of these kinds of units include finance, supply, and transportation.[49]

While this paper is not a call for branching of AF troops like the Army does, if the Air Force were to similarly classify its units, it is clear that the new C4ISR Command would fall under the heading of combat support. It would not contribute to sustaining troops, nor would its personnel be charged with firing shots in anger. It would exist to support the warriors in the field. This distinction is critical because it is the warrior that establishes requirements, and the support troop's function is to respond to those requirements.

The proposed AFISRC structure is inherently combat-support oriented. AFSPC, however, has operated for 25 years with a split personality. A large portion of its tasks are combat-support related. However, a significant minority of its functions are distinctly combat arms. The most obvious of these functions is that of the ICBM force. For reasons that have never been satisfactorily explained, the formerly distinct specialty codes for missile crew members and space operators were merged, although it seems that the only similarity in the two missions is

that they both rely on rocket power. Once the boost phase is over, the mission similarity and overlap of required expertise ends. Combat arms troops fire shots in anger. While the vast majority of satellite operators are unquestionably support troops, it is difficult to imagine more anger than would be required to fire shots from a missile silo. Missile crews definitely fall in the combat arms category. Those specialty codes need to be separated again to allow better tracking of actual capability and experience: combat versus support.* Likewise, there are a relatively small number of AFSPC personnel who plan for actual space-on-space combat. These specialists in offensive and defensive counterspace (OCS and DCS) also are without a doubt combat arms troops.

Neither of these groups, the ICBM crews or the OCS/DCS warriors, belong in a support command. They are more logically grouped with the effects-based command that specializes in actually putting weapons on target: ACC. Under that new mantle, they would be able to work with their brothers in arms to develop coordinated tactics to deal out destruction in even more effective ways. Removing them from the mix, were AFSPC and AFISRC joined, would allow the newly formed C4ISRC to concentrate on becoming the premier supplier of C4ISR effects, a support function, to warriors across the DOD and the IC.

Similarly, there are a number of systems that currently reside within ACC performing purely support missions that could much better serve the nation by being located in the C4ISR command. These systems include the U-2, RC-135, and all unarmed, unmanned aerial systems (UAS). These systems are already tasked with providing C4ISR support to the war fighter, but are assigned to a command whose mission is weapons delivery. Moving these systems to a command whose focus is C4ISR effects delivery would allow them to garner the budgetary attention they need and would also allow single-commander oversight of the integration of the data they provide into a single

*This problem is already recognized within AFSPC, as those personnel wearing a space badge are being internally tracked by the command with a code to make sure the leadership knows what type of specialty they have. Once the two career fields were artificially joined, it became impossible to ensure the right officer would be assigned to the correct billet based only on his or her Air Force specialty code.

integrated database from which users could pull an overall picture of the battlespace appropriate to their needs.

The split-out of combat/combat support functions in the cyber world are a bit more on the gray side, as the difference in many cases is the intent of the actions taken by cyber personnel. Cyber warriors may probe enemy defenses one day in a combat support function and then put on their combat hats the next day to conduct an actual attack. There are some information operations (IO) functions that are clearly combat related and would belong in a combat command: computer network attack (CNA), computer network defense (CND), and computer network exploitation (CNE). Although one could argue that CNE is a combat support function, it would be difficult to separate, in this case, CNE from CNA/CND because in some cases the same resources could be used to support all three activities. Other IO functions such as electronic warfare, operations security, and psychological operations are more frequently used to influence enemy actions rather than deny them the use of their assets. Perhaps those functions would be a part of a combat support command. Now is the time to be thinking about these issues of cyber combat. As the command is so new, they will be much easier to resolve than they will be for space since we won't have to sort out the nonsensical structures developed during a decades-long organizational mistake.

We don't have all airborne assets in the same command. They are organized according to the effect they provide. Space assets should be similarly apportioned according to effect. Such a structure runs counter to some recommendations in the Space Commission report that called for a near-complete segregation of space assets and personnel from the remainder of the Air Force,[50] but conversely that structure is quite compatible with the report's overall emphasis on developing space capabilities. The AF has recently become aware of some of the flaws in segregating space activities and is in the process of reintegrating them with the rest of the service. After having set up a high-profile operations directorate office for space on the Air Staff as a direct response to the Space Commission report, the AF has recently closed that office and reassigned its space experts within the staff to facilitate better understanding of space throughout the organization.[51]

It is the production of a single, integrated picture of the battlespace, from the mud to the stars, that should be the goal of the new C4ISR command. Populating the battlespace with information and enabling the timely command and control through robust communications channels that allow the picture to be used should be the effect that defines the command's core competency. Total consciousness should be its overarching goal. As stated previously, warriors don't care where their information comes from. If they have target imagery when they need it and can talk when they want to, they're happy and effective. They could not care less whether their images come from a satellite or a UAS or whether they are communicating via satellite link or fiber optic cable, as long as credible and correct information arrives when they need it.

General Chilton has noted that one of the best counters to recent antisatellite tests is to acquire redundant C4ISR capabilities, both in space and in the air.[52] General Deptula is adamant that all services buy systems that can feed common distribution pipes.[53] The most effective way to ensure such an omniscient picture exists and can be delivered when and where it is needed appears to be locating all the means of picture production, all the personnel required to process and distribute it, and all the means of acquisition and delivery under a single commander who can ensure that the disparate data streams play well together to provide a seamless, transparent view of the battlespace to all users who need it. General Deptula's vision for an AFISRC is proceeding along those lines. It won't take an extraordinary organizational leap to finish the job.

There will no doubt be some who will resent being told they are not combat troops. The problem is not that we're now telling them they're *not* warriors; it began long ago when, in an attempt at inclusiveness, we began telling all Airmen they *are* warriors instead of leading them to *act* like warriors, to have a sense of urgency and a feeling of deep camaraderie, regardless of their actual function within the service. An obvious example of the dilution of the word *warrior* is that phrases like "trigger pullers"—the F2T2EA link is obvious—have entered the service's lexicon precisely to distinguish those people who actually deliver combat effects from the rest of the Air Force's warriors. Regardless of what we are called, it is critical that each of us

understands what it is we do, what the importance of our job is, and where we actually fit in a structure designed to prevent and, when necessary, prosecute wars.

There is no shame in being a combat support or combat service support troop. As is evident in military organizations throughout history, there are always many more people required to support the frontline warrior than there are warriors themselves. It is still possible to have the "warrior attitude" without actually being a warrior, and it is highly desirable to cultivate exactly such an attitude. Failure to *appropriately* cultivate that attitude brings with it problems, though. When you tell people they are warriors long enough in an attempt to cultivate the warrior attitude, many people begin to believe that they are actually warriors instead of support troops with the warrior attitude. It is far too easy for them then to lose sight of the mission of supporting warriors and responding to their needs. They can then begin to believe that they set requirements instead of respond to them; the tail attempts to wag the dog.* The Army's explicit division of functions into combat arms, combat support, and combat service support is a much better way to delineate these differences than the current Air Force mind-set in which everyone is a warrior. The Army's division of functions focuses its soldiers on their important part in getting the mission done to generate their sense of pride and place in the conflict.

One way to help clarify these differences that will not only properly identify the dog and the tail but also allow much more effective delivery of support effects like C4ISR is to change the way we develop our combat support troops. It's especially important for combat support troops to understand how the war is fought. We must avoid stovepiping through effective crossflow of officers between the different commands, ensuring that our warriors spend time in the combat support fields so they

*A related problem is that while warriors establish requirements, it is also incumbent upon them to set them broadly. Too often, warriors think they know what the solution is and write a narrow requirement that will get them exactly what they think they need. Setting broad requirements that concentrate on the effects needed allows the expertise within the support community to devise the appropriate means with which to satisfy the requirements, following the dictum of Gen George S. Patton, who said, "Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity." (Patton, *War as I Knew It* [New York: Houghton Mifflin, 1947].)

understand combat support troops' pain while simultaneously ensuring that Airmen in the combat support specialties experience at least one tour of duty in a warrior command, preferably actually taking part in combat-related activities. Such is not the currently preferred method.

The Space Commission report did not help on this front either. Its dictum to create a professional space cadre[54] has been interpreted in such a way as to develop an even more insular corps of personnel who, in their quest for the ultimate technical competence, can spend an entire career shuttling between Colorado Springs, Southern California, and perhaps Albuquerque or Washington, DC.* While certainly a good way to create a professional with extreme competence in the craft of space and inculcated with the technical culture of space, such a career does a disservice to the nation by minimizing the ability of such a person to understand and contribute fully to the larger function of national defense. Only a very few AFSPC personnel below the grade of colonel ever get out to see the world, the place where the very warriors their space careers are designed to support train and sometimes die. As one retired naval flag officer with extensive NRO experience recently noted, "Only the Air Force defines space 'operations' as hands-on satellite command and control by uniformed personnel. The benefit of this 'operational' experience is questionable."[55]

Senior AF space officers are close to recognizing and admitting this problem. In a recent interview Maj Gen Roger Burg, then the deputy director of operations for space on the Air Staff, discussed how "having a [separate] space office [in the Pentagon] meant that airmen coming from other backgrounds to the Air Staff did not have to learn about space because the questions did not cross their desks."[56] A corollary of that statement

*Colorado Springs is the home of Headquarters, AFSPC; the 21st Space Wing (missile warning and space object identification); the 50th Space Wing (controls AFSPC's navigation, communications, and warning satellites); and the Space Innovation and Development Center. Southern California hosts SMC, the Air Force's procurement arm for space and Fourteenth Air Force (commands AFSPC's satellite assets). Albuquerque is the location of the Air Force Research Lab's Space Vehicles Directorate which works closely with SMC to develop technologies required for advancing the capabilities of military spacecraft. Space assignments in Washington, DC are usually at the Pentagon or the NRO.

with perhaps broader implication is that Airmen coming from space backgrounds do not have to learn about issues critical to warriors because those questions do not cross *their* desks. "The Air Staff needs to be integrated," Burg said in that interview. It is not only the Air Staff that needs integration. Integration with, or at least intensive personal exposure to, combat arms units is an essential part of the development of a truly useful space officer.

Unfortunately, integration is not a major focus of the current space training mind-set. Following the Space Commission recommendations, AFSPC would like nothing more than to take in young second lieutenants, provide them with the appropriate training to work on the operations floor of a satellite squadron, and keep them in space-related billets within Fourteenth AF and SMC until a leader eventually rises to command Space Command. The command is very proud of the fact that its officers are deploying to theater along with the rest of the AF.[57] However, many of those deployments are to rear areas where all they get to see is how a combined air operations center (CAOC) works and not the end user's needs for C4ISR support. A few months of casual exposure to combat operations is a start, but not really the correct prescription to cure what ails the command.

A better model appears to be that of the Army. Army space operations officers are typically drawn from a pool of captains with seven to 10 years experience in a primary branch. While not required by written policy, most Army space officers have experience in combat arms units along with command and staff experience.[58] Such officers have a much bigger picture about why they are providing their space support than the typical Air Force officer who was intentionally grown solely in the space career field. They do not typically have the depth of knowledge that their AF counterparts do in the day-to-day operation of satellites, but that is not generally their function. They exist to ensure their bosses have an expert in their organizations who can advise them on what space can provide. It is their experience with space that makes them so useful to their units. It is their previous knowledge of combat operations that allows them to understand the true utility of their space experience.

The AF does have a much greater requirement for hands-on satellite operations than the Army, and using the first third to half of officers' careers to gain operational experience in the field with the warriors they will eventually support is probably excessive for their needs. However, at least one tour early in those young space professionals' careers would be profitably spent down in the weeds with the operators they are destined to support. Their experience with warriors would make them even more valuable to their space units. General Lord recognized the need for this career broadening much earlier: "The expeditionary nature of our service must extend to include all space professionals if we are to fully embrace and comprehend the complexities of joint warfare."[59] With the predominance of single-seat weapons systems in the frontline combat arms role of the Air Force where only the pilot will be directly exposed to tracking and engaging functions, it is likely that the best way to get this kind of experience would be a joint tour with the Army as an intelligence officer.

The above discussion of how to develop a warrior attitude among space professionals harks back to the thoughts of many space-force visionaries. One of the persistent themes of their writings, and one of the major themes of the Space Commission report, is the need to develop just such a warrior culture. Frequently making an analogy with the development of a unique air-warrior culture in the early years of the Army Air Corps, some writers implicitly or explicitly extrapolate the similar development of a unique space-warrior culture.[60] The problem with that analogy is that it does not truly apply. It implicitly assumes conditions necessary for the accuracy of the analogy that do not actually exist.

The development of the air-warrior culture was a direct result of the shared threat of death or injury at the hands of the enemy. That condition does not exist among space professionals. By and large, space professionals inhabit a shift-work office environment where military members are surrounded and frequently outnumbered by contractor support. The *esprit de corps* required for the development of a warrior culture does not flourish in such an environment, at least not the kind of camaraderie experienced by warriors bound by the common experience of mortal combat or even of training that can be nearly as deadly as combat itself.

Certainly there are situations where space professionals work long, hard hours directly supporting a critical operation to save warrior lives, perhaps maneuvering a critical communications satellite into position so it can pick up the load from an overtasked asset. However, such action is not the norm. For the most part, these officers go back home to their families and lawns every day, even in war time, never giving a second thought to the possibility that their jobs may require the ultimate sacrifice at any time. In the personal experience of the author, developing *esprit de corps* is much more problematic in an office environment than in an operational unit. These comments are not meant as a criticism—it is not the job of space officers, or of most other combat support specialties, to put their lives on the line for their country. The subject is only brought up to point out a critical and perhaps fatal impediment to the development of the warrior culture so desperately hoped for by space-force advocates.

Constantly wearing a wry smile is an almost universal experience for those officers with extensive experience in a "warrior command" who are then assigned to AFSPC and subsequently told they are warriors when they maneuver their satellites. If more officers in the command actually experienced duty in combat operations, there would be no need for this section of this paper. In the personal experience of the author, it is not the years spent as a warrior that were the pinnacle of his career; rather, it was the time spent in AFSPC delivering program after space-related program designed to keep warriors from dying needlessly where the author feels he made his greatest contributions. He was a support troop and knew it; however, it was his previous experience as a warrior that allowed him to understand why his support was so important to the much bigger picture. A cross-cultural training program that exposes support officers to combat arms officers in the field as outlined above will go a long way toward allowing the space professional to gain such a perspective.

Conclusion

While chief of staff of the AF, Gen Michael Moseley articulated three precepts for revolutionizing airpower.[61] The two of these precepts germane to this discussion are developing new

operational concepts that integrate air, space, and cyberspace; and transforming the AF culture and how it is organized. An effects-based way to integrate the three existing organizational domains of air, space, and cyberspace is to group shooters together and nonshooters together, regardless of domain, gaining synergies from organizing, training, and equipping combat effects producers and combat-support effects producers in only two organizational locations. This separation of effects also transforms culture and mind-set, helping execute the broader mission by clearly defining which organization is the supporting and which is the supported function. Finally, it minimizes the overhead money required to set up major commands whose function is to organize, train, and equip by almost a factor of two; instead of ACC, AFSPC, AF Cyberspace Command, and AFISRC, there are now only a combat command and a combat support command to fund. Organizing by effect is a key enabler to the goal of establishing cross-domain dominance. It "refocus[es] our organization and culture on the warfighting mission [by] implement[ing] advanced operational concepts to fly, fight and win in all domains."[62]

Being able to operate in space, having personnel who understand that domain in exquisite detail, is without a doubt one of the key enablers of modern warfare. However, just like a hilltop taken by ground forces, being in space is of no inherent value. Troops in combat do not take a hill just to be there. They understand that it is what they can *do* from the hilltop that makes it valuable. Likewise, it is the effects we produce from space and cyberspace that matter.

The primary goal of all the recommendations in this paper is to develop a new structure that supports joint DOD operations, combat operations, and the national intelligence community more effectively than the current organizational structure can possibly do. At the present time, disparate organizations are responsible for small, isolated bits of C4ISR effects delivery. Large combat arms units not related to those effects are ineffectively lumped into what is primarily a combat support organization, a situation that leads to a bit of organizational schizophrenia as commanders try to satisfy two very different missions. Training and career progression in this support command is insular enough that many of its officers never truly

understand that their real purpose is to provide support to warriors in the field. By focusing on effects instead of domain and by exposing support officers to warriors through cross-flow assignments early in their careers, a new approach such as is outlined above will solve many of these problems, enabling the even more effective support that is surely the goal of all of us on the team.

It is apparent that the tide is running strongly against AFSPC's domain-first proponents. The signs of impending hemorrhage are all too apparent. How can the command halt its slide toward marginalization? That answer is easy. It is time for AFSPC to adopt the effects-based attitude the rest of the military has been pursuing for decades. To effect this change, it will be necessary to consolidate all support functions that deal with C4ISR effects, regardless of whether the platforms delivering those effects reside in air, space, or cyberspace, under one command. The command needs to embrace an expanded vision of its role within the greater whole of national defense instead of pushing away and separating missions with which it logically should be integrated. Instead of waiting for effects-based commands to swallow AFSPC missions, we all need to work together to ensure we're providing the best, most effective support to our warriors in the field. Proactive AFSPC actions will allow more input to the inevitable fusing of missions producing related effects and will help determine whether the combination will be a merger or a hostile takeover.

It is imperative for the cause of national defense that we integrate our C4ISR effects to move more effectively toward the goal of a seamless picture of the battlespace and significantly improved command and control. Completely coordinated intelligence is every bit as important as a properly coordinated attack. The first step toward realization of that goal is revision of service and joint space doctrine to reflect the primacy of effect. As cyberspace doctrine is in its formative stage, consideration of these crucial points should be built in from the beginning. From these doctrinal changes will logically flow an integration of C4ISR effects producers.

By appropriately identifying support and combat troops, a new command solely devoted to C4ISR effects production will emerge; combat functions formerly residing in this new sup-

port command, cyber and space warriors, will simultaneously be moved to organizations that will allow their effects to be better utilized. Finally, the training of all of our support troops needs to include close contact with warriors so support troops have a better understanding of why their support is so important and how it is actually used in the field. There will never be a 100-percent-clean break between combat effects and combat support effects. However, separating functions on the basis of effects as much as possible can lead to significant efficiencies in training for and prosecuting military actions in support of national objectives.

While not previously brought together under one heading, as has hopefully been done in this paper, the conclusions presented here are not those of the author alone. In fact, in the very speech cited above which set providing "space effects" as a goal for AFSPC, General Chilton also demonstrated that he thoroughly understood the fundamental problem: "It's about delivering effects. It's not about just flying satellites."[63] AFSPC is currently sitting on a cusp of history. Along one path lies the potential to become perhaps one of the most important enabling commands in the entire DOD. Another path leads to marginalization and mediocrity. The decisions that will tip the balance toward greatness or dissolution will soon be made.

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List of Acronyms

ACC	Air Combat Command
AF	Air Force
AFC4ISRC	Air Force Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance Command
AFDD	Air Force Doctrine Document
AFISRA	Air Force Intelligence, Surveillance, and Reconnaissance Agency
AFISRC	Air Force Intelligence, Surveillance, and Reconnaissance Command
AFSPC	Air Force Space Command
C4	command, control, communications, and computers
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CADRE	College of Aerospace Doctrine, Research and Education
CAOC	combined air operations center
CNA	computer network attack
CND	computer network defense
CNE	computer network exploitation
CSAF	chief of staff of the Air Force
DCS	defensive counterspace
DOD	Department of Defense
F2T2EA	find, fix, track, target, engage, and assess
FM	Field Manual
IC	intelligence community
ICBM	intercontinental ballistic missile
IO	information operations
ISR	intelligence, surveillance, and reconnaissance
JP	joint publication
LEO	low-earth orbit
MAJCOM	major command
NGA	National Geospatial-Intelligence Agency
NRO	National Reconnaissance Office
NSA	National Security Agency
OCS	offensive counterspace
OODA	observe, orient, decide, act

SMC	Space and Missile Systems Center
TENCAP	tactical exploitation of national capabilities
UAS	unmanned aerial system
UAV	unmanned aerial vehicle
USAFA	United States Air Force Academy
USSTRATCOM	United States Strategic Command

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