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COMMAND & CONTROL STRUCTURES FOR SPACE AND INFORMATION OPERATIONS IN A JOINT COMMAND

by

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Contents

Preface

Space operations and information operations, at least in the latter's more recent high tech form, are "hot" topics within the Defense community. JV2020, the recommendations of the Commission to Assess United States National Security Space Management and Organization, and Secretary Rumsfeld's discussions on transforming the Department of Defense all touch on the need for change in the space and information arenas. This research paper attempts to make some sense of the ongoing debate over the appropriate command and control structures for space operations and information operations within a joint command, that is, at the joint operational level and below. I hope the reader finds it informative and useful in their own study of the doctrine, concepts, and vocabulary that accompany these discussions.

I would like to acknowledge the assistance of my advisors, Maj Paul Guevin and Col Ed Strack for their guidance and patience throughout this research. Their connections within the space and intelligence communities and own interest in this subject area enabled me to accomplish far more than I could have on my own. I also want to thank my wife and three sons for support. I know they think I spent too much time in front of computer this year, particularly my oldest son, who frequently lobbies for his own time at the keyboard to play games.

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Abstract

This research develops two products for aiding a Joint Force Commander (JFC) tasked with developing command and control (C2) structures for space and information operation (IO) capabilities within a joint force. The first product is a decision matrix based upon two ideas essential to command and control. The first idea is that knowing the level of desired effect, that is, a strategic, operational, or tactical effect produced by space or IO functions is critical to the C2 structure. The second idea is that the JFC must determine which is more important, the integration of functional capabilities into a single mission oriented team or the preservation of functional identities due to high demand/low density resources, the need to preserve critical functional expertise, or other related reasons which drive functional organizations.

The second product of this research is a proposed core set of C2 structures across the three levels of command that can be adapted to the situation confronting a JFC. The core C2 structures lean toward the idea that space and IO be integrated with service capabilities in all Defense Departments rather than segregated into combatant commands or functional components independent from existing service organizations. The decision matrix and core C2 structures are based upon my analysis of service and joint doctrine and a case study I conducted on CENTCOMs employment of forces while conducting Operation Enduring Freedom in Afghanistan.

Chapter 1

The Unsettled World of Space and Information Operations Command and Control

Introduction

Space operations have been ongoing for 40 years. Aspects of information operations (IO), such as psychological operations and deception, are as old as the concept of war itself. One would think the command and control (C2) doctrine associated with space and IO would be somewhat developed. Instead, the early 21st century is starting out as a period of great change for space and IO C2 structures. One need look no further than the space and IO C2 structures set up for Operation Enduring Freedom (OEF) to see that this is true. The DoD and United States Central Command (CENTCOM) implemented C2 structures not found in service or joint doctrine, seeking to capitalize on the integration of space and IO functions. The unsettled nature of space and IO C2 is further shown by the recent and pending releases of new service and joint doctrine. Air Force Doctrine Document (AFDD) 2-2, Space Operations, was released on 27 November 2001 with a far greater emphasis on space command and control than in its earlier 23 August 1998 release.[1] AFDD 2-5, Information Operations, was released on 4 January 2002 and "introduces new warfighting organizational structures for information operations."[2] At the joint level, US Space Command and the Operational Plans and

Interoperability Directorate of the Joint Staff (J7) are working on the initial release of Joint Publication (JP) 3-14, Joint Doctrine for Space Operations. The current draft of JP 3-14 includes a chapter on C2 of space forces.[3]

The state of flux in space and IO C2 is further demonstrated by the fact the new doctrine documents are not consistent on issues such as how to command and control space assets in a joint force. The draft of JP 3-14 proposes a Joint Forces Space Operations Authority (JFSOA) for coordinating space operations, a role assigned to any component commander.[4] AFDD 2-2 recommends the JFSOA role and responsibilities always be assigned to the Joint Forces Air and Space Component Commander (JFASCC).[5] In fact, the concept of a JFASCC is so new, reference to a JFASCC cannot be found in other Air Force or Joint doctrine publications.

In addition to doctrinal changes, the words of General John P. Jumper provide additional food for thought regarding the unsettled nature of IO doctrine. While serving as the Commander, US Air Forces in Europe, he addressed the 1999 Defense Colloquium on Information Operations and noted a "lack of attention to Information Warfare at the operational and tactical level."[6].

With the unsettled nature of space and IO C2 firmly established, this research focuses on providing a Joint Force Commander (JFC) an initial decision tree to use when establishing C2 structures for space and IO within a joint force. This paper also proposes core space and IO C2 structures at the tactical, operational, and strategic levels of conflict that can be adapted to the situation encountered by a joint force. The decision tree and core C2 structures are developed using current and proposed doctrine as a guideline and information collected while conducting a case study on OEF space and IO C2 structures.

The next section of Chapter 1 discusses the methodology for using the doctrine and OEF data to develop the decision tree and core C2 structures.

Methodology

I conducted research for this paper in three phases. First, I reviewed and summarized the information found in joint and service publications regarding space and IO C2 structures. In addition, within phase 1, I augmented the doctrinal information with organizational theory developed outside the military.

Second, I collected facts and opinions on the space and IO C2 structures employed within CENTCOM during the conduct of OEF from September 2001, through March 2002. The OEF information was collected through on-line research and during interviews conducted over the telephone and in person. The interviews were conducted with individuals working within the space and IO C2 structures of OEF. As part of phase 2, I also collected a small amount of information regarding space and IO C2 structures outside of CENTCOM but directly tied to CENTCOM's conduct of OEF.

Third, I analyzed the space and IO C2 doctrine in light of the OEF data and used the results to define two products. The first product is a decision tree to assist a JFC establishing space and IO C2 structures within a joint force. The second product is a core space and IO C2 structure to be implemented at the tactical, operational, and strategic levels of conflict. The core C2 structure can be modified to suit a JFC's needs.

My analysis of the doctrine and organizational theory focused on identifying frequently occurring, important concepts found in the doctrine. Important concepts are broadly defined as those concepts discussed in detail, perhaps even noted as essential C2 concepts by the source document or publication. My analysis of OEF data included

examining when doctrine was followed; when alternatives to doctrine were introduced; and, in the opinion of interview subjects, what relationship, if any, existed between the use of doctrine or new ideas and OEF space and IO C2 structure efficiency. The resulting decision tree for determining the space and IO C2 structure consists of a series of questions for a JFC to ask himself to help guide the development of the C2 structure for a given mission.

A brief examination of the decision tree shows that it considers only two very simple variables. The first is the level of effect desired by the use of a space or IO function. The second is the balance struck between placing greater emphasis on the functional needs of a space or IO capability and the integrated team needs of a mission using several effects-producing functions. After running through the decision tree with several different scenarios, I believe a core set of C2 structures can handle or be adapted to the results. The examination of the decision tree results completed the final step in my analysis of the doctrine and OEF data.

Before going on it's important to note the author recognizes a formal process exists for accomplishing doctrinal change, a process that includes several steps and the heavy involvement of field experts in drafting proposed changes to doctrine. I hope that this paper provides some useful ideas for consideration during a period of anticipated change and growth in space and IO doctrine.

In the rest of this paper, Chapter 2 summarizes the doctrine matrices found in Appendix A, Chapter 3 summarizes the OEF case study, and Chapter 4 provides the analysis resulting in the decision tree and core C2 structures. A summary of conclusions and recommendations is presented in Chapter 5.

Notes

[1] Air Force Doctrine (AFDD) 2-2, *Space Operations*, 23 August 1998, 5-6 and AFDD 2-2, *Space Operations*, 27 November 2001, 17-26.

[2] AFDD 2-5, *Information Operations*, 4 January 2002, ii.

[3] Joint Publication 3-14, *Joint Doctrine for Space Operations*, Final Coordination 13 April 2001, III-1 to III-5.

[4] Ibid., III-4.

[5] AFDD 2-2, *Space Operations*, 27 November 2001, 23.

[6] Gen John P. Jumper, Commander, US Air Forces in Europe, USAF, "A Commander's View of Information Warfare", address to the Air Force Association and Eaker Institute for Aerospace Concepts Defense Colloquium on Information Operations, San Antonio, TX, 25 March 1999, n.p., *Aerospace Education Foundation Publications,* online, Internet, 10 February 2002, available from http://www.aef.org/symposia/jumper2.html.

Chapter 2

Joint and Service Doctrine & Organizational Theory

I reviewed doctrine and organizational theory on C2 with the intent of identifying C2 principles considered common among the services in the Department of Defense (DoD) and with the field of organizational study outside the DoD. These common principles support the development of the decision tree to be used by a JFC establishing space and IO C2 structures. This chapter discusses the specific sources I reviewed and the matrices I used to document the review. Next, this chapter summarizes concepts I found to be significant to C2 structures. Finally, this chapter provides a link between doctrine and the decision matrix proposed in my analysis in Chapter 4.

I reviewed joint and service space and IO doctrine with a focus on sections within these publications related to C2 structures. I also reviewed Joint Publication (JP) 0-2, Unified Action Armed Forces. Chapter III of JP 0-2 describes joint command and control concepts and theory that are applicable across the functional entities a commander must manage.[1] Finally, I reviewed Luther Gulick's "Notes on the Theory of Organization." Published in 1937 and included in Matteson and Ivancevich's *Management and Organizational Behavior Classics*, Gulick's work is, in the words of Matteson/Ivancevich's preface, one of the "writings that have had a demonstrated and continuing impact on the development of management thought."[2] I documented my

review of these publications in the three matrices that make up Appendix A. One matrix summarizes the space publications, one the IO publications, and one the publications generic to C2. The first column of each matrix contains questions or statements that are my own paraphrasing of a concept found in one or more of the reviewed documents. The row headers contain the names of the documents I reviewed. When it made sense, I tried to paraphrase a concept in the form of a question that a commander might ask himself when setting up space and IO C2 structures. I entered the page number on which I found a concept in a document into the appropriate row (the question) and column (the document) intersection.

Four ideas stood out after my doctrine review. The first is the idea that the desired level of effect from an employed capability is important to the C2 structure. Air Force Doctrine Document (AFDD) 2-5, Information Operations, Marine Corps Warfighting Publication (MCWP) 3-40.4, Information Operations (Draft), AFDD 2-2, Space Operations, Army Field Manual (FM) 100-18, Space Support to Army Operations, and JP 0-2 all discuss the importance of the relationship between the effect being produced by a capability and the C2 of that capability.[3]

The second idea is the idea that the level of integration desired among the functional capabilities is important to the C2 structure. For this idea, service doctrine understandably focuses on the integration of space and IO capabilities with other internal service functions, but the point is each service emphasizes the importance of functional integration. AFDD 2-5, MCWP 3-40.4, JP 3-13, Joint Doctrine for Information Operations, and AFDD 2-2 all discuss the integration of space and/or IO capabilities with other functions.[4]

The third idea emphasized across service doctrine is the concept of centralized control with decentralized execution. Related to the idea of centralized control is the concept of unity of command, which strives to achieve unity of effort. In one form or another, centralized control/decentralized execution, unity of command, and unity of effort are described in AFDD 2-5, JP 3-13, Marine Corps Doctrinal Publication (MCDP) 1-0, Marine Corps Operations, MCWP 3-40.4, AFDD 2-2 and JP 0-2.[5]

The fourth idea occurring frequently in doctrine is the concept of ensuring the person or unit assigned C2 responsibility has or will have access to the resources necessary to perform the C2 function. In this paper, I define resources as the people, training, and systems necessary to perform the C2 function. MCDP 1-0, AFDD 2-2, and JP 0-2 all discuss the importance of having the appropriate resources to perform C2.[6]

These four ideas, level of effect of an employed capability, depth of functional capability integration, centralized command and decentralized execution, and ability to perform assigned C2 functions, form the basis of the decision tree discussed in this paper. Each concept is phrased as a question and in Chapter 4, the questions are developed into a decision tree.

Notes

[1] Joint Publication (JP) 0-2, *Unified Action Armed Forces (UNAAF)*, 10 July 2001.
[2] Site editors quotes regarding article in question.
[3] AFDD 2-5, *Information Operations*, 4 January 2002,36, 37, 42.
Marine Corps Warfighting Publication (MCWP) 3-40.4, *Information Operations* (Draft), 10 December 2001, 6, 13.
AFDD 2-2, *Space Operations*, 27 November 2001, viii, 5, 17-18, 21, 22.
Army Field Manual (FM) 100-18, *Space Support to Army Operations*, 20 July 1995.
JP 0-2, III-14.
[4] AFDD 2-5, 3, 4.
MCWP 3-40.4, 6.
Joint Publication (JP) 3-13, *Joint Doctrine for Information Operations*, 9 October 1998, I-2.

Notes

AFDD 2-2, viii, 23, 27.
[5] AFDD 2-5, 8, 43.
JP 3-13, ix.
Marine Corps Doctrinal Publication (MCDP) 1-0, *Marine Corps Operations*, 27 September 2001, 4-23.
MCWP 3-40.4, 13.
AFDD 2-2, 7.
JP 0-2, III-14.
[6] MCDP 1-0, 4-23.
AFDD 2-2, 21, 22, 23, 26.
JP 0-2, III-18.

Chapter 3

Operation Enduring Freedom Space and IO C2

To provide an operational background to the recommendations of my research, I reviewed the C2 structure United States Central Command (USCENTCOM) put in place while conducting their part in Operation Enduring Freedom (OEF). My goal was to examine the realities of conducting space and IO activities within OEF to see if OEF participants followed doctrine closely or if they implemented alternatives to doctrine. Chapter 3 states how I reviewed OEF, provides a summary of the information collected, and summarizes important points that stood out in the data collection.

I collected data on CENTCOM's role in OEF using three tools. I accessed the classified military network known as SIPRNET. I accessed the unclassified INTERNET from both my home computer and my dot.mil based domain access at the Air Command & Staff College. In addition, I conducted interviews via telephone, e-mail and in-person with individuals directly involved in OEF C2 functions. The interview subjects included members of US Space Command (USSPACECOM), Air Combat Command (ACC), and CENTCOM. The scope of CENTCOM's support reviewed for my research was CENTCOM's support to OEF activities in the Afghanistan theater from 11 September 2001 through 28 February 2002. The following sections of Chapter 3 summarize the strategic, operational, and tactical C2 structures put in place within CENTCOM for OEF.

On a strategic level, two organizations that influenced CENTCOM space and IO the most are the Information Operations Task Force (IOTF) and USSPACECOM. The IOTF is managed by the J39, now the Deputy Director for Information Operations, on the Joint Staff. The J39 was put into the coordination loop for IO activity occurring for OEF and Operation Noble Eagle. Although by law the Joint Staff does not hold command authority over CENTCOM actions, the Secretary of Defense (SECDEF) and Chairman, Joint Chiefs of Staff (CJCS) can and have tasked staff elements to coordinate on combatant command actions. IO managers at CENTCOM coordinate with IOTF before briefing IO elements of a COA to the CINC for approval.[1] The SECDEF or CJCS chartered the IOTF to provide oversight to all Information Operation activities occurring within the Department of Defense.[2] In addition, the IOTF has proven to be a useful way of getting interagency, Office of the Secretary of Defense, and Joint Staff coordination on issues when required.[3]

The second organization influencing space and IO within CENTCOM for OEF is USSPACECOM. USSPACECOM support to CENTCOM has come via the Joint Task Force for Computer Network Operations (JTF-CNO), the Space and Information Operations Element (SIOE), the Joint Information Operations Center (JIOC), and Space Support Teams.[4]

The mission of the JTF-CNO is to, "coordinate and direct the defense of DOD computer systems and networks; coordinate and, when directed, conduct computer network attack in support of CINCs and national objectives."[5] For OEF, JTF-CNO sent one person to augment the IO cell at CENTCOM HQ in Tampa, FL.[6]

The SIOE, an integrated team of space and IO experts from USSPACECOM, is the most significant augmentation of the CENTCOM space and IO staff. I discuss the SIOE impacts on CENTCOM during the operational portion of this chapter. The JIOC, another element of USSPACECOM, is another entity I discuss further during the review of operational C2 structures.

The SIOE is an alternative structure to that proposed in doctrine for a joint force. The Unified Command Plan tasks USSPACECOM with managing computer network attack and defense activities, collectively known as computer network operations (CNO), one of the tasks included in IO.   In addition, for OEF, the SECDEF tasked USSPACECOM with the role of functioning as the supporting command for all IO support.[7]

The most noteworthy point to make about the strategic space and IO structures for OEF is the significance of integrating space and IO within SIOE. This was the first opportunity in a crisis situation for USSPACECOM to integrate the space support in it has always provided with its growing level of IO support. Every interview I conducted with individuals working directly with the SIOE unit at CENTCOM HQ noted that the SIOE space and IO members from the various supporting units functioned extremely well as a team. However, the verdict was split on the value added of integrating space and IO. The resident staff appreciated the additional labor regardless of what the individual showed up at HQ to do. One subject even noted that the augmentee support worked so well they began to carry the CENTCOM positions to the numerous meetings the resident CENTCOM staff could not always cover.[8] But why the DoD should integrate space and IO varied from some sense of the potential synergy to because the senior staff said so.

At the operational level, as previously discussed, the JTF CNO support for CENTCOM was to work a small subset of IO issues, mainly computer network attack and defense. However, the SIOE brought over 20 people to merge with the current eight IO Cell members. In addition, the JIOC team of nine people that mirrored the CENTCOM IO cell arrived to enable round the clock activity within the cell. Outside a core team of space and IO experts, the IO cell was augmented with several other players as noted in Joint Publication 3-13, Joint Doctrine for Information Operations. The CENTCOM joint staff elements and the component and service staff all assigned participants to the IO cell. The total number assigned to the integrated SIOE/IO Cell was around 55 people.[9]

Another operational level contribution from USSPACECOM is the Joint Space Support Team (JSST). The JSST is another concept contained in doctrine that was integrated into the SIOE. The 2-4 people brought in would normally work closely with the US Space Command Liaison Officer to address the space needs of the joint staff and service and components staffs if necessary. A formal request for a JSST went forward from CENTCOM to USSPACECOM. The JSST included two to four additional planners placed under the CENTCOM J3.[10] In addition, USSPACECOM provided 1-2 personnel under operational control (OPCON) to the Special Operations Component CENTCOM (SOCCENT) to create an organic space cell focused on assisting SOCCENT with blue force tracking capabilities from space.[11] Finally, the USSPACECOM Liaison Officer has been in place to facilitate much of the additional support throughout the command.[12]

Beyond the USSPACECOM support other space support worth noting includes the National Reconnaissance Office (NRO) Liaison Officer (LNO) and his Theater Support

Representatives (TSR's). These NRO personnel provide assistance to the command in planning for the use of NRO systems. NRO LNOs and TSRs also provide a link to current NRO products and services including how to get into the collection process for new requirements.

Regarding the operational C2 structures, the SIOE is again worth noting. SIOE carried strategic significance because of the commitment and involvement in it of strategic leaders at the CINC level and above. Here in the objective level of conflict, the SIOE concept is significant because it introduces brand new structures to the space and IO communities on the operational CENTCOM joint staff. In addition, the assignment of a flag officer to lead the SIOE brought space, and particularly IO, concerns into important meetings. A flag officer was also able to support the members of the SIOE, representing their positions in forums where that support is needed.[13]

At a tactical level, each service brought their organic IO assets with their service forces. For the Army and Navy, tactical and operational augmentation comes from the Land Information Warfare Agency and Fleet Information Warfare Center, respectively. For the Air Force, the 9th Information Warfare Flight is assigned to CENTAF, the Air Force component of CENTCOM. For space, the Army augmented ARCENT, their service component, with an Army Space Support Team (ASST).[14] The Air Force discontinued the use of SST's and now provides space support organically within wings, numbered Air Forces, or major command staffs which are then assigned directly to combatant commands or through air expeditionary forces.[15] The organic Air Force space support is often located in or near the air operations center. With a firm grasp of doctrine

and OEF space and IO C2 structures now in hand, it is appropriate to begin thinking

about how to build some useful tools from this data.

Notes

[1] Lt Col Andre Provoncha, US Air Force Air Combat Command (ACC/DOZ), interviewed by author via email, 5 February 2002.

[2] "Biography of Brig Gen Jack J. Catton, Jr,"Headquarters Air Force Biography, January 2002, n.p., on-line, Internet, 18 March 2002, available from http://www.hafdash1.hq.af.mil/url_frames.cfm?url=http://www.af.mil/lib/bio/index.shtml

[3] Brig Gen William L. Shelton, Director of Requirements, US Air Force Space Command and Acting Director, Space Integration and Operations Element, US Central Command, interviewed by author, 11 February 2002.

[4] Lt Col Andre Provoncha, "Information Operations for Joint Forces", lecture, Air Command and Staff College, Maxwell AFB, AL, 13 February 2002.

[5] "US Space Command JTF-CNO Fact Sheet," US Space Command home page, 14 December 2001, n.p., on-line, Internet, 18 March 2002, available from http://www.peterson.af.mil/usspacecom/jtf-cno.htm.

[6] Lt Col Al Bynum, US Air Force, US Central Command, Director, IO Cell, interviewed by author, 4 March 2002.

[7] Shelton interview.

[8] Bynum interview.

[9] Ibid.

[10] Col Ray Briscoe, US Air Force, US Space Command Liaison Officer to CENTCOM, interviewed by author, 7 February 2002

[11] Ibid.

[12] Ibid.

[13] Shelton interview.

[14] Briscoe interview.

[15] AFDD 2-2, *Space Operations*, 27 November 2001, 20.

Chapter 4

Analysis of Space and Information Operations C2 Structures

Revisiting the Purpose of the Research

When I began my research I was trying to provide some constructive input into what the space and IO C2 structure should look like within a JTF. On a more detailed level, I wanted to answer questions such as:

Should DoD create joint force space or IO components?

Should DoD create integrated joint force space and IO components?

Should the IO cell continue to be the focal point of JTF IO activity?

Should DoD integrate space and IO capabilities into one of the existing service or functional components?

After collecting data on doctrine and OEF, I began to realize these questions are too narrow in their structure. The reader might view answers as applicable to all or at least the majority of scenarios a JTF may encounter. This should not be the case with information and space operations. The answer to one of these C2 structure questions is dependent upon the context of a scenario confronting a joint force.

Based upon my research, I propose a simple set of questions to guide a JFC setting up a C2 structure for space and IO. I base these questions upon my review of doctrine and the experiences relayed to me during interviews with individuals supporting OEF.

At this point it starts to become apparent I may be recommending that the space and IO C2 structure should be different for every scenario a JFC encounters. This statement is only partially correct. A different structure for every situation may be useful when the only variables considered are the variables discussed in this research. I do not believe constant change is appropriate when considering variables such as the funding, training needs, or losses in efficiencies due to continual changes in space and IO C2 structures. Rather, I propose the establishment of a flexible C2 structure that contains a core set of elements that grow or shrink as dictated by the situation.

Revisiting the purpose of the research, my intent is to provide questions that help a JFC review important variables when considering a space and IO C2 structure. The answers to these questions help determine how a proposed existing core C2 structure within the combatant command can be adapted to serve the needs of the joint force. The development of these questions and the resulting core C2 structure is covered in the following sections.

Questions to Consider When Establishing Space and IO C2 Structures

I propose the first question a JFC ask when considering space and IO C2 structures is:

1) What level of conflict do I desire to effect with my space or IO capability?

This question finds its genesis in the idea that a leader should build his organization around its purpose. JP 0-2 states "The C2 structure is centered on the JFC's mission and concept of operations."[1] The question is also based on the first of four ideas summarized in doctrine and theory in Chapter 2 of this paper. Air Force, Army, and Marine

publications also noted the important impact the desired effect of an operation should have on C2 of the operation.

In the world of a JFC, I propose the question on effect be answered in one of three ways. The JFC desired level of effect will be tactical, operational, strategic or a combination of all three. Each of these levels of war is managed at a different level within the joint force. The JFC's desired level of effect for space and IO should guide him in determining at what level the space and IO C2 will need to be within the joint force. Individuals authorized to perform strategic duties should manage strategic effects. The same point applies as we work our way on down to the tactical activities.

The second question a JFC should ask is:

2) Which is more critical to my mission, strong functional units or tightly integrated total effect oriented units?

Related but more specific questions for question 2 include:

2a) Are there service space or IO role inefficiencies that are very important for me to correct or avoid?

2b) Do I have high demand/low density assets that require control at high levels of command?

2c) Is service role integration critical to mission success or is the mission carried out within the space or IO role community?

These questions drive toward the point of whether or not functional units need to be established such as a space or IO component, task force, or staff. Let me use the example of a homebuilder building three houses. At his disposal are several carpenters, electricians, plumbers and home security experts. The builder decides to allocate a

portion of each functional expert to each house and give each of his three foreman command and control of a house. On each team, the more senior carpenter, electrician and plumber are given C2 over his specialty within the house. Now I come to the home security team of which there are only three. Do I assign one to each team to create three housing teams or keep them functionally aligned under me and matrix them to work on the homes as necessary? Asking question 2a), if I only have one security expert and the other two are in training, I may want to keep them together for training and oversight by the expert. Asking question 2b), if I only have three and a job takes six of these specialists, I cannot afford to assign this low density/high demand asset to a single home. I will choose to leave the security team assigned to myself and allocate them when necessary. Asking question 2c) could result in a third scenario. If the job cannot be done properly without assigning the security team to work with the carpenters full time, then the teams must be integrated. But if the tasks the security team performs are relatively independent of the other laborers, then the security team will be better off staying functionally aligned as their own unit, moving from house to house to complete work.

With three answers for question 1) and two answers for question 2) (functional or mission integration) six possible C2 constructs can be identified. Figure 1 shows the decision tree resulting in these options.
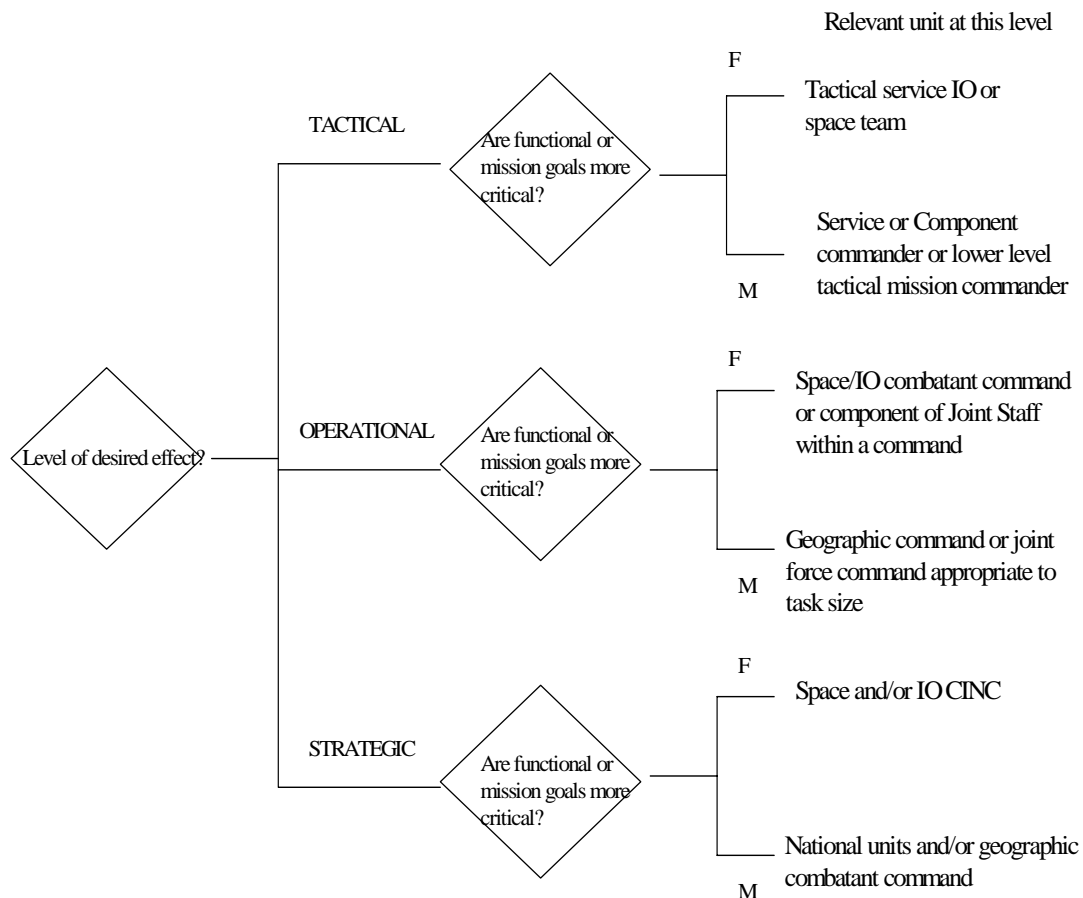
Relevant unit at this level

TACTICAL — Are functional or mission goals more critical?
- F → Tactical service IO or space team
- M → Service or Component commander or lower level tactical mission commander

OPERATIONAL — Are functional or mission goals more critical?
- F → Space/IO combatant command or component of Joint Staff within a command
- M → Geographic command or joint force command appropriate to task size

STRATEGIC — Are functional or mission goals more critical?
- F → Space and/or IO CINC
- M → National units and/or geographic combatant command

Level of desired effect?

Figure 1 - C2 Decision Tree

In essence, using the decision tree results in a recommendation for a functional or mission oriented C2 structure at each of the three levels of management associated with a desired effect. For example, a JFC may desire an operational effect using IO for a task that is primarily IO in nature, lacking the need for other systems that could produce an effect such as aircraft or ships. The CINC could choose to function as the operational leader but would probably require a strong coordinating unit at the operational level such as the IO cell already contained in Doctrine. Other leaders at the operational level include the component commanders so he could choose to designate an IO component

commander for this task and allocate support to him from among the existing component and service commands.

Another scenario is one where tactical units need tactical space effects such as navigation, weather or warning data being used to help plan a mission involving several different aircraft. In this scenario, the tactical effect, which is part of a larger integrated tactical mission, dictates the JFC delegate space C2 to the tactical level under the control of the commander leading the tactical mission. The amount of tactical control given to the tactical commander would be the maximum amount feasible, given the other taskings on the space assets from other commanders.

In addition to the two questions that form the basis of the decision tree, two other questions require answers to ensure adherence to other two principles found in doctrine and discussed in Chapter 2.

1) Does the C2 structure adhere to the principle of Unity of Command but allow for centralized control and decentralized execution?

2) Do the units assigned C2 roles have the resources (people, tools, training) or access to the resources to perform the C2 function for the assigned mission?

Centralized control and decentralized execution is one of the summary ideas I found throughout service publications (See Chapter 2). Army, Air Force and Marine publications all contained discussions on the importance of centralized control and decentralized execution.

Having the resources to perform the C2 is a point made frequently in Air Force doctrine. AFDD 2-2, Space Operation, points out that, at least for space, "the Air Force has the overwhelming majority of ... C2 experience, making it especially qualified to plan

for offensive and defensive space activities."[2] A theater-wide perspective is inherent in the conduct of Air Force missions.

Core C2 Structures for a Joint Force

The C2 decision tree is intended for use throughout the life cycle of a joint force but with emphasis during the initial formation of the C2 structures. My recommendation for its use is not intended to suggest that large swings in organizational structures should frequently occur, creating unreasonable costs associated with the stand up and stand down of units.

However, the reality is that the direct or enabling effects produced by IO and space operations will be desired at all levels of conflict and often simultaneously at all levels of conflict.[3] The global nature of space forces, and the ability of IO to produce effects against sensitive targets such as the civilian population and leadership of the opponent, makes space and IO multi-level effects-producing capabilities.

I propose that rather than stipulate a set C2 structure for space and IO, a core set of C2 capabilities be established at all three levels of command, strategic, operational, and tactical. This small core set of capabilities would be the basis of an adaptable C2 structure that emphasizes C2 at the strategic level for one mission but at the tactical level for another. In addition, the core capabilities could be integrated with other effects-producing structures such as a service or functional component within a joint force or left to stand alone when the decision tree leads you down a path that recognizes the need for a strong space or IO functional presence in the command.

The core C2 capabilities & concepts I propose are as follows:

1. Tactical IO and space C2 structures within the services

2. An officer at the O-6 or O-7 grade serving as the IO and/or space operations officer within the J-3 directorate of a unified command or task force with an IO and or space cell assigned to this office

3. An equivalent IO office on the Pentagon's Joint Staff (i.e. J-39)

4. Command or task force joint staff cells would form the basis of separate IO or space components at the national or operational level for a crisis when the JFC determines IO or space needs to be set up functionally rather than integrated with other capabilities and components.

This core structure would be a standing capability at the applicable levels of command. It recognizes the need to, as a minimum, have an advising capability on space and IO functions at all levels of decision making. The fact the core is of a staff nature above the tactical level reflects my belief that when using the C2 decision tree the most likely result will be a decision to integrate space and IO capabilities with other effects producing functions. The flip side of my proposal is that I do not recommend standing combatant commands or JTF components for IO or space for reasons related to the command and control elements discussed in this paper. I believe a significant factor related to the existence of any functional command, whether it be space or transportation, is driven by the low density/high demand aspect of the capability. In a world without budgetary constraints, I believe regional commands would have their own organic transportation and space capabilities. Commanders historically seek control of all resources impacting their mission. I base this upon my experiences working with the warfighter community while serving as a member of the National Reconnaissance Office and my observations of the arguments that have occurred when deciding where to assign a new airlift capability, USTRANSCOM or a service component.

Discussion of Integration of Space and IO

I have chosen not to address the subject of integrating space and IO capabilities. The matrices and core C2 structures I propose can be used for space and IO independently or with these functions integrated. As I noted in Chapter 3 while discussing OEF, the verdict was really out on whether or not the anticipated synergy would be there from integrating space and IO. In addition, the data I had on it from the interviews and web search I conducted was very sketchy. Integration of these two functions would be a potential area for future study.

Notes

[1] Joint Publication 0-2, *Unified Action Armed Forces*, 10 July 2001, III-17.
[2] Air Force Doctrine Document (AFDD) 2-2, Space Operations 27 November 2001, 26.
[3] AFDD 2-5, Information Operations, 4 January 2002, 35-38.

Chapter 5

Recommendations & Summary

Recommendations

I recommend a decision tree like the one I developed in Chapter 4 be considered as a starting point to help categorize the critical variables in play when establishing a C2 structure for space and IO capabilities.

I also recommend that the DoD put a core set of C2 structures in place that focuses implementation within the services and coordination at the operational and strategic level where the JFC makes C2 decisions. Senior IO and space elements should be established within joint staffs of any size with the IO cell and space assets such as space support teams reporting to the senior staff officer rather than directly to the J3. The joint staff space and IO teams, headed up by and O-6 or O-7 within the J3 Operations directorate, should be prepared to realign as component commands should the JFC determine, with the assistance of the decision tree, that this is an appropriate action.

Summary

My research included the summarization of doctrine related to C2 structures for space and IO forces. I then examined essential aspects of this doctrine in light of a case study on space and IO C2 structures established at the strategic, operational, and tactical

levels within CENTCOM for use in Operation Enduring Freedom. My analysis of the doctrine in light of OEF enabled me to develop a decision tree for use as a guide for JFCs or staffs tasked with establishing space and IO C2 structures within a joint force. Finally, I recommended some core space and IO C2 structures at the three levels of command which emphasize the idea of integrating space and IO into other effect-producing capabilities rather than segregating the functions into their own components. In recognition of the potential growth in the use of space and information operations capabilities independent of other military functions, I have also proposed we incorporate the ability to grow the space and IO cells or staffs into separate components at the operational and strategic level when the JFC feels this is the best course of action.

Appendix A1

Space C2 Doctrine Summary

	AFDD 2-2	Draft JP 3-14	Army FM 100-18
CONCEPTS			
Synergy w/ air and/or IO?	Ii, 1, 2-3, 28		V, 7
Command relationship determined by focus of benefit?	Viii, 5, 17-18, 21, 22		
COMAFFOR/JFASCC should hold key space posts	Viii, 18, 20-21, 22		
Integrate space into ops planning & execution processes?	Viii, 27		
Consistent w/ principles of war?	6	IV-3	
Centralized control and decentralized execution?	7		
Priority and balance enabled?	9, 41	IV-4	42
Counterspace should be integrated w/ counterair by leveraging IO	15		
Interface point for non-millitary space?	18		
Global force requirement for USSPACECOM leads to DIRLAUTH relationships	20, 32, 39	III-4	
Ability to plan & direct space assets?	21, 22		
Theater wide perspective?	23		
Ability to integrate space ops w/ other military activities?	23		
Coordinating Authority for space assigned?	23	III-4, IV-5	
Preponderance of forces & expertise from whom?	23, 26		
Command relationships determined by USCINCSPACE	25		

and geo CINC?			
Ability to develop, launch, operate, maintain and C2 space?	26		
Understanding of legal, treaty, policy issues of counterspace?:	26	I-7	
Addresses prevention of fratricid w/ air vehicles?	26		
Enhances unity of command and effort	26	X, IV-5	
Enhances battle rhythm synchronization between space force provider and theater?	39		
Space forces integrated under JFASCC and into AOC?	40		
Efficient communication?	41		
Efficient coordination of time sensitive requirements?	41		
Organized to support enabling land warfare dominace?			Entire pub focus
Capable of providing comm/weather/GPS support to Army troops			Entire pub focus
Enable Army state TMD mission?			15
Does USSPACECOM (or it's components) maintain COCOM of space forces?		X	
Does structure contribute to development of supportable, valid requirements in planning?		Xii	
Mass: space realted resources integrated & synchronized		IV-3	
Simplicity in chain of command and lines of coordination?		IV-7	
JFSOA exist for coordinating space support to JFC during space planning?		V-3	

Appendix A2

IO C2 Doctrine Summary

	AFDD 2-5	MCDP 1-0	MCWP 3-40.4 (Draft)	JP 3-13
CONCEPTS				
Enable synergy with space and air ops?	Viii			
IIW supports all air and space ops?	3			
IO functions integrated with air and space ops?	4			
Centralized control/decentralized execution?	8, 43			Ix
AF IO controlled by airmen?	8			
Strategic IW effects coordinated with appropriate Agencies, SECDEF, President, CINC IO cell etc?	36			
Operational IW effects coordinated with appropriate supported and supporting commands?	37, 42		6, 13	
IW flight set up?	42			
IWF integrated with AOC?	41			
Unity of effort?		4-23	13	
IO tool available at every level of command?		4-23		
IO functions integrated with MAGTF?			6	
IO cell included?	43			Ix
Structure flexible, accommodates a variety of planning and operational circumstances?				Ix

30

Offensive and defensive IO integrated?				I-2
Intelligence and IO activities integrated?				I-2
Activities leveraging friendly IO systems integrated				I-2

Appendix A3

C2 Doctrine Summary

	Gulick: Notes on the Theory of Organization	JP 0-2
CONCEPTS		
Division of work not beyond a reasonable limit (no one with < a full time job)?	16	
Division reasonable given technology & customer at a given time and place? (includes unity integrity in JP 0-2)	16	III-17
Has division of work passed beyond physical to organic?	16	
Has the central design, the operating relationship, been maintained?	17	
Span of control reasonable, given the diversification of unit function, space (location) of personnel overseen, and time to complete the task?	20	III-17
Is their unity of command?	21	III-14
Is their homogeneity of work, technology, and purpose (unity of effort) with DoD and non-DoD?	22	I-3
Clear objective for units?		I-6
Is the level of C2 reasonable in light of the nature of the task?		III-14
Is the level of C2 reasonable in light of the risk or priority of the task success:?		III-14
Is the level of C2 reasonable in light of the comfort level of the commander?		III-14
Is the chain of command uncomplicated		III-14, III-17
Does the structure lend itself toward interoperabiity thru tools such as liaisons?		III-17

Does the level/unit C2 is assigned to have the right people/tools/training to accomplish C2?		III-18

Glossary

ACC	Air Combat Command
ACSC	Air Command and Staff College
AFDD	Air Force Doctrine Document
ARCENT	Army Forces Central Command
ASST	Army Space Support Team
AU	Air University
AWC	Air War College
C2	Command and control
CAOC	Combined Air Operations Center
CENTAF	Air Forces Central Command
CENTCOM	United States Central Command
CINC	Commander-in-Chief
CNA	Computer Network Attack
CND	Computer Network Defense
CNO	Computer Network Operations
COCOMM	Combatant commander authority
COMAFFOR	Commander, Air Force Forces
DIRLAUTH	Direct Liaison Authority
DOD	Department of Defense
EW	Electronic Warfare
FIWC	Fleet Information Warfare Center
FM	Field Manual, United States Army
IO	Information Operations
IOTF	Information Operations Task Force
IIW	Information-in-Warfare
IW	Information Warfare
IWF	Information Warfare Flight
JFASCC	Joint Forces Air and Space Component Commander
JFC	Joint Force Commander
JFSOA	Joint Forces Space Operations Authority
JIOC	Joint Information Operations Center
JP	Joint Publication

JTF	Joint Task Force
JTF CNO	Joint Task Force Computer Network Operations
LIWA	Land Information Warfare Activity
LNO	Liaison Officer
MCDP	Marine Corps Doctrinal Publication
MCWP	Marine Corps Warfighting Publication
NRO	National Reconnaissance Office
OEF	Operation Enduring Freedom
OPCON	Operational Control
SECDEF	Secretary of Defense
SIOE	Space and Information Operations Element
SOCCENT	Special Operations Component United States Central Command
TACON	Tactical Control
TSR	Theater Support Representative (NRO)
USAF	United States Air Force
USCINCSPACE	Commander-in-Chief, United States Space Command
USSPACECOM	United States Space Command
USTRANSCOM	United States Transportation Command

Bibliography

Air Force Doctrine Document 2-2. *Space Operations*, 23 August 1998.

Air Force Doctrine Document 2-2. *Space Operations*, 27 November 2001.

Air Force Doctrine Document 2-5. *Information Operations*, 4 January 2002.

Army Field Manual 100-18. *Space Support to Army Operations*, 20 July 1995.

"Biography of Brig Gen Jack J. Catton, Jr." Headquarters Air Force Biography, January 2002, n.p. On-line. Internet, 18 March 2002. Available from http://www.hafdash1.hq.af.mil/url_frames.cfm?url=http://www.af.mil/lib/bio/index.shtml.

Doyne, Thomas A., Lt Col, USAF. "Space and the Theater Commander's War*." Joint Forces Quarterly*. Winter 2000-01. 77-82. On-line. Internet, 6 December 2001. Available from http://www.dtic.mil/doctrine/jel/jfq_pubs/win0001.thm

Gaines, CDR Robert J. "Future Information Operations in the Military: Is it Time for an IO CINC?". Maxwell AFB, Alabama, Air Command and Staff College, Air University, April 2000.

Issler, Gordon D., Maj, USAF. "Space Warfare Meets Information Warfare." Joint Forces Quarterly. Autumn 2000. 100-104. On-line. Internet, 6 December 2001. Available from http://www.dtic.mil/doctrine/jel/fjq_pubs?autumn00.htm.

Joint Publication 0-2. *Unified Action Armed Forces (UNAAF)*. Joint Chiefs of Staff, 10 July 2001.

Joint Publication 3-13. *Joint Doctrine for Information Operations*. Joint Chiefs of Staff, 9 October 1998.

Joint Publication 3-14. (Draft) *Joint Doctrine for Space Operations*, Final Coordination 13 April 2001.

Jumper, Gen John P., Commander, US Air Forces in Europe. "A Commander's View of Information Warfare." Address. Air Force Association and Eaker Institute for Aerospace Concetps Defense Colloquium on Information Operations, San Antonio,

TX., 25 March 1999, n.p. On-line. Internet, 10 February 2002. Available from http://www.aef.org/symposia/jumper2.html.

Kelly, Ricky B. "Centralized Control of Space: The Use of Space Forces by a Joint Force Commander", 22 September 1994. On-line. Internet, 6 December 2001. Available from http://www.dtic.mil/doctrine/jel/research_pubs/p187.pdf.

Lee, James G. "Counterspace Operations for Information Dominance." In *Beyond the Paths of Heaven: The Emergence of Space Power Thought*. Edited by Col Bruce M. DeBlois. Maxwell AFB, Alabama: Air University Press, September 1999.

Marine Corps Warfighting Publication 3-40.4. (Draft) *Information Operations*, 10 December 2001.

Marine Corps Doctrinal Publication 1-0. *Marine Corps Operations*, 27 September 2001.

Matteson, Michael T., and John M. Ivancevich, ed. *Management and Organizational Behavior Classics*. 5th ed. Boston, MA.: Irwin, INC, 1993.

Rumsfeld, Honorable Donald., Secretary of Defense. Memorandum. To Secretaries of the Military Departments et al. Subject: National Security Space Management and Organization, 18 October 2001.

"US Space Command JTF-CNO Fact Sheet." US Space Command home page, 14 December 2001, n.p. On-line. Internet, 18 March 2002. Available from http://www/peterson.af.mil/usspacecom/jtf-cno.htm.