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TRAINING CANNOT WAIT TEN YEARS—THE CRITICAL EXPERIENCE GAP IN USSF OFFICERS PLANNING AND EXECUTING OPERATIONAL SPACE C2

by

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A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

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Maxwell AFB, AL

March 2024

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ABSTRACT

This research paper discusses a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. This research seeks to determine whether short-term solutions to the aforementioned problem proposed in a 2023 white paper by Lt Col John Paek and Lt Col Steven Crews merit continued interest, consideration, and resource allocation from the USSF. This research paper asks, "Is the Space Warfare Planner certification solution presented in Lt Col John Paek and Lt Col Steven Crews' 2023 white paper adequate to address the insufficiencies in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers?" An evaluative framework and a mixed methods approach are used in this research effort.

First, this research examines a potential training gap leading to the identified problem—a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. A Comparison of Mission Essential Tasks from the lead operational-level space C2 center with curriculum from training entities proves that a training gap exists. Next, Paek and Crews' Space Warfare Certification is analyzed and evaluated against the training gap and identified problem. Ultimately, this research finds Paek and Crews' Space Warfare Planner certification insufficient to address the lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. This research recommends the development of a training course grounded in joint doctrine principles, further development of tactician programs, and exploration of currently existing training opportunities as interim solutions for space C2 organizations.

INTRODUCTION

> Our joint force must fully integrate space capabilities to optimize how we fight…Space advantage is essential to U.S. power; it enables our forces to see with greater clarity, sense in the darkest of nights, and apply judicial precise force when directed.[1]
>
> -Major General Gregory Gagnon

Overview of the Study

In the modern era of military operations, integrating space power into joint operations is unquestionably critical to success in conflict. Senior military leaders often remark on the importance of joint-minded warfighters and the criticality of the space domain to the joint force.[2] United States Space Force (USSF) planners must organize and execute command and control (C2) for their exquisite capabilities and integrate individual space effects with joint efforts. However, one of the most internally recognized problems in the USSF is a lack of joint planning and space C2 expertise in officers across all levels of warfare—tactical, operational, and strategic. As the USSF enters its fifth year of existence, excuses for why space planners struggle to integrate their effects into joint operations are increasingly unacceptable. While the USSF actively pursues updated training methods for its newest commissioned officers at the tactical level of warfare, it neglects training for current, mid-level USSF officers assigned to accomplish joint planning and operational C2 for space operations. The USSF must address its lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers before the US enters a conflict with a peer or near-peer adversary.[3]

The Nature of the Problem

The problem is a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. The difficulty of planning and executing operational space C2 and other constraints facing the USSF (limited end-strength service size and under-resourced

training capabilities) presents a complicated situation as the US prepares for great power competition. The nature of the USSF's lack of joint planning and C2 expertise stems from the historical structure, culture, and training mechanisms the USSF employs to train its officers. Before the formation of the USSF in 2019, the United States Air Force (USAF) was the primary provider of space officers and space capabilities. The USSF inherited most of its cultural aspects from the USAF. Before the USSF existed, as the USAF expanded its space footprint with new mission areas, resourcing constraints impacted the experience level of assigned personnel for operational-level space C2 centers. This same problem persists even as the USSF grows as a separate service. Compounding this problem is the design the USAF and USSF employ to develop officers.

A space officer spends the first 4-6 years of his or her career learning and operating a single space system or mission area. The USAF trains its officer operators similarly. This training creates tactical-level experts in a singular system. USSF and USAF operators are often well into or past their company grade officer time before broadening their scope of understanding. Consequently, space officers are viewed as tech-focused, stove-piped in a system area, and inexperienced with overall joint war efforts. The Department of the Air Force (DAF) method of executing training and professional military education, combined with limited end-strength numbers of available and experienced personnel, has led to a severely limited population of USSF officers familiar with joint planning and space C2 concepts. While the space operations cultural mindset is changing as the space domain is increasingly recognized as a critical enabler for joint operations and as a warfighting domain, the transformation needs to accelerate in the face of great power competition. As General Hyten stated regarding space operations, "It's not space for space's sake... there's no such thing as war in space, there's just war."[4] While the

mindset of space operations has shifted toward a warfighting mentality, the training and employment for USSF members has not followed a joint-focused path in all areas, most notably, in how the USSF trains and employs its officers to become operational-level space C2 planners.

Beyond a brief introduction during Initial Skills Training (IST)—which officers usually accomplish as a second lieutenant—USSF officers do not attend deliberate, formal instruction on joint planning and operational-level C2 concepts in an academic or training setting before they are eligible to attend intermediate-level Professional Military Education (PME). Most officers in the DAF fulfill this PME requirement via USAF Intermediate Developmental Education (IDE) in the form of Air Command and Staff College-Distance Learning (ACSC-DL) as in-residence IDE opportunities, including the USSF's Intermediate-level Education (ILE), are competitively selected programs. The USSF has not yet developed a service-specific distance-learning option. US military officers typically accomplish IDE as a major. USAF and USSF officers can only enroll in ACSC-DL once they are a major-select (usually around eight years into military service). Consequently, when most USSF officers attend IDE or ILE, they may have already completed a staff or operational-level C2 assignment without receiving critical training on joint planning and operational C2 concepts aside from a brief introduction at the beginning of their military career.

Waiting until the 8-10-year mark in service to receive formal training on joint planning and operational C2 via ACSC-DL is too late for the USSF to develop and employ joint planning and space C2 expertise in its officers. Military scholars and operators have debated the various problems of training and employing space C2 experts throughout the past two decades; however, there has been little success in implementing lasting or successful solutions. This research paper evaluates if the Space Warfare Planner (SWP) certification solution articulated in Paek and

Crews' 2023 white paper adequately addresses the insufficiencies in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers.

Presently, whether officers assigned to any USSF space C2 entities have received prior exposure to joint planning (or any military planning) and operational C2 is at the mercy of the IST curriculum from the 533 Training Squadron (TRS), if they have attended IDE or a comparable program (either via distance learning or in residence), if they were fortunate enough to receive training courses provided by specialty units, or if they have learned planning skills in other assignments. There is no formal, deliberate, detailed exposure to joint planning and operational C2 for USSF officers upon assignment to an operational-level space C2 center. This training gap results in a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. Because of this expertise gap, USSF officers are ill-prepared to adapt and excel in an increasingly complicated space domain and wartime situation, which could impact military operations across all domains and phases of conflict.

General Raymond highlighted his vision for the USSF to develop "A new kind of Joint Warfighter" in his 2020 Chief of Space Operations (CSO) planning guidance.[5] From General Raymond's guidance and the 2022 Space Operations Command (SpOC) Commander's Strategic Plan, the USSF's Combat Training Squadrons (CTS) created the quarterly CTS Summit Series to discuss issues with training and readiness impacting the service. Discussion at these CTS Summits highlighted the critical training gap leading to a lack of joint planning and space C2 expertise in USSF officers. Discussions at the CTS Summits initiated efforts to capture recommended changes to USSF officer training and provide the recommendations to senior USSF leadership. Lt Col John Paek and Lt Col Steven Crews' 2023 white paper "Creating United

States Space Force (USSF) Planners" presented ideas from the CTS Summits to senior USSF leadership.[6]

Purpose of the Study

The purpose of this study is to evaluate whether Paek and Crews' SWP certification solution is adequate to address the insufficiencies in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. Paek and Crews' white paper prompted renewed attention by senior military leaders regarding training courses for space operators and whether the current training provided to USSF officers is satisfactory for the future needs of the USSF and the joint force. The USSF must carefully examine and evaluate Paek and Crews' SWP solution before implementation to avoid wasting valuable time, interest, considerations, and resource allocation if the SWP certification cannot address the problem. This research examines Paek and Crews' SWP certification compared to the current requirements at the lead integrating operational space C2 center. If Paek and Crews' SWP certification is insufficient to address the problem—a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers—recommendations will be needed to provide alternative short-term solutions for the USSF to correct the problem.

Research Question

US and allied dependence on space-enabled technology is increasing as a new era of great power competition dawns. General Saltzman, Chief of Space Operations, stated, "The establishment of the USSF was a response to the demands of great power competition in the space domain."[7] However, a gap in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers limits the US military's ability to defeat adversaries in

conflict. This expertise gap cannot remain unanswered by the USSF—space officers must be able to integrate their capabilities into joint military operations. This paper asks the research question, "Is the SWP certification adequate to address the insufficiencies in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers?"

Limitations and Assumptions

This study accepts two limitations and one assumption. First, this research is limited by continued changes impacting the USSF training enterprise. Efforts stemming from Paek and Crews' white paper are still active in the USSF—SpOC endorsed Paek and Crews' white paper for further effort and is examining its potential via a working group at the service headquarters level. Because of these ongoing efforts, details in the endorsed white paper may change as the concept evolves.

The second limitation of this research is the creation of a new Officer Training Course to replace Undergraduate Space Training (UST).[8] This new course will have long-term impacts on USSF training. Due to these limitations, this research examines the white paper and the status of the USSF up to February 2024. Addressing changes after February 2024 is beyond the scope of this research paper.

This research assumes a six-month implementation constraint for any solution presented as a possibility to satisfy the identified problem in this research. This six-month implementation limit is necessary as expertise in joint planning and C2 concepts for USSF officers assigned to operational space C2 centers is already needed. A longer timeline will not satisfy current operational requirements.

The Anticipated Significance of the Study

This research highlights the lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers as a problem for senior USSF leadership to address. This paper evaluates whether the SWP certification solution is a valid approach for senior USSF leaders to implement. Additionally, this research identifies a possible training deficiency leading to the previously stated problem. While space officers discussed this training deficiency prior to the USSF's establishment as a separate military service in 2019, little recorded work empirically proves the presence of the training gap compared to the current curriculum instructed at space training entities and related to the problem with USSF joint planning and space C2 expertise. After examining evidence of a possible training deficiency leading to the problem, this research analyzes the short-term SWP solution presented in Paek and Crews' white paper to advise whether the USSF should implement Paek and Crews' SWP solution to address the problem. If Paek and Crews' SWP certification solution sufficiently addresses the problem, this research will validate the white paper as a sound proposal for a short-term USSF Planner development model. If Paek and Crews' SWP certification cannot address the stated problem, alternative solutions are needed for future research efforts to evaluate potential training pathways to develop joint planning and C2 expertise in USSF officers.

Research Methodology

This research paper uses an evaluative framework to determine whether Paek and Crews' SWP certification for creating Guardian planners satisfies current requirements at the lead integrating operational-level space C2 center, the Combined Space Operations Center (CSpOC).

Specifically, this research evaluates Paek and Crews' 2023 white paper with a mixed methods approach, beginning with examining qualitative data sources detailing the problem.

The literature review discusses historical space C2 articles, reviews current doctrine, argues how recent organizational changes and uncertainty impact the space C2 community, and examines how resourcing and workforce limitations impact the USSF C2 community. Following the literature review, this research compares the curriculum from two USSF training entities against the unclassified Mission Essential Task (MET) requirements from the CSpOC, identifying the training gap for joint planning and C2 concepts at the USSF's lead integrating operational-level C2 center. This comparison provides a measure of quantitative analysis to evaluate Paek and Crews' SWP certification solution. Next, this research evaluates Paek and Crews' SWP certification solution against the training gap. Aligning results from this comparison examined against current operational requirements and assuming a six-month implementation assessment provides the basis to determine whether the SWP certification is a viable solution for the USSF. Following the analysis, this research recommends alternative training opportunities that meet the needs and timeline of the CSpOC. A brief conclusion discussion on talent management related to developing future officers and ensuring proper placement of joint planning and C2 expertise follows the recommendations section and can inspire future research efforts.

LITERATURE REVIEW

Historical Complications with Space Planning and Space C2

Paek and Crews wrote their paper for senior USSF leaders intimately familiar with the historical difficulties underpinning the challenges the paper seeks to address by the nature of

their positions and time in service. For this research, more historical background information relating to the challenges Paek and Crews identify is appropriate.

Paek and Crews note one of the challenges impacting the USSF as "...force packaging across a diversity of missions which span discretely deployable, traditionally tactical units, to squadrons committed in-place providing persistent strategic global effects."[9] Integrating "...space, cyber, and intel, and plan[ing] across multiple missions and Space Power Disciplines (SPDs) at the tactical and operational levels of war" is a challenging and complex endeavor, even with officers well-versed in the art and science of joint planning.[10] This complex problem set that the USSF faces is not new. In March of 2005, some of the best USAF space officers participated in a conference that discussed different perspectives and current complications in planning and integrating space capabilities, particularly deployable counterspace assets, into joint warfighting efforts. At the time, combat operations in Iraq and Afghanistan occupied the US military, and space capabilities increased the effectiveness of joint and combined combat forces. Although basic space capabilities were no longer nascent, their integration into joint operations was poorly defined and codified. These difficulties are evident in Brown's Space Power Integration, which features nine research papers by space weapons officers who participated in the 2005 conference.[11]

During the 2005 Space Weapons Officer Air and Space Integration Conference, space weapons officers presented and discussed their positions on C2 and planning actions for space systems. General Lord, then Air Force Space Command (AFSPC) commander, presided over the conference. At the time, and up to the creation of the USSF in 2019, AFSPC was the major command primarily responsible for the organization, training, and equipping of the preponderance of US space assets. At the conference, General Lord stated,

> We've got to get ready for what's going to happen next in the medium of space. When Space starts in a big way, and it will, we have to have the conventional war fighters who have the capabilities, who know the rules of engagement, who are familiar with the laws of armed conflict, who know how to work in this medium and are able to shape and influence and make the right kind of decisions and direct the operational application of space capabilities.[12]

While General Lord's comments are from 2005, during the main phase of the Global War on Terrorism, the urgency and narrative remain relevant nearly 20 years later as the US enters great power competition with adversaries such as China and Russia. General Raymond echoed General Lord's past comments on the criticality of the space domain during the 2019 establishment of US Space Command.

> We find ourselves at a strategic inflection point, where there is nothing we do as a joint force that isn't enabled by space. Yet, simultaneously, we can no longer have the luxury of assuming space superiority...This command will have much to do with the preservation of our nation's ability to preserve peace, assure our freedoms, and guarantee the sovereignty of the United States for future generations.[13]

Indeed, the most current National Security Strategy and National Defense Strategy reflect the importance of space as a warfighting domain and emphasize its criticality to the joint force.[14,15] There is little doubt that the space domain will remain a critical terrain during great power competition. However, while the US has recognized space as a warfighting domain supporting all other aspects of joint warfare operations, little is decisively written concerning effectively integrating these exquisite capabilities into joint planning efforts and joint operations managed at space C2 entities. As Paek and Crews detail, the issues discussed in the articles from the 2005 conference remain complications for modern space operators, particularly those involving operational-level planning and C2 of space assets.[16,17]

The already challenging space domain has become increasingly complex in the 20 years following the 2005 Space Weapons Officer Air and Space Integration Conference. The space

domain is increasingly congested, with rising amounts of active and defunct satellites and manufactured debris orbiting the Earth. Additionally, the space domain is less benign than 20 years ago. The US, its allies, and adversaries have militarized the space domain; space is now a warfighting domain. As the challenges of the space domain increase, further complicating how USSF officers accomplish C2 for space operations, the same complications impacting C2 of space capabilities which Lieutenant Colonel Saltzman and Lieutenant Colonel Liquori presented to General Lord in 2005 remain pressure points even as General Saltzman now commands the USSF in 2024. Saltzman and Liquori's 2005 paper states,

> …space professionals must endeavor to improve the C2 relationships and doctrine associated with counterspace systems. In particular, the complex relationship between planners in theater AOCs and those at the Fourteenth Air Force AOC provides many challenges. The complication of a functionally focused team directly supporting theater needs creates a strained working relationship between the two entities. The C2 seam that this creates is problematic for the optimal execution of counterspace effects in-theater.[18]

Although nearly 20 years have passed since the publication of Saltzman and Liquori's article, this same C2 seam remains a complicated issue for theater counterspace assets and the operational C2 centers planning and directing their action. Unfortunately, USSF training has failed to account for the difficulties identified in the 2005 discussions involving planning and C2 of space assets in joint warfighting operations. Additionally, while Saltzman and Liquori point to a then newly published doctrine document, AFDD 2-2.1, as a promising step forward for counterspace C2 relationships, the current USSF Doctrine does not adequately detail recommendations for how to accomplish C2 and planning for space assets.[19]

Doctrine Discussion

The Space Planning Process discussed in Space Doctrine Publication (SDP) 5-0: Planning is a high-level survey of the joint planning process. SDP 5-0 and the Space Planning

Process lack the fidelity of discussion on military planning present in Joint Publication 5-0: Joint Planning.[20,21] The survey of joint planning concepts provided via SDP 5-0 is suited for the tactical level of space operations but is not robust enough for operational-level space planning actions. Furthermore, the USSF has yet to publish a doctrinal document detailing current command control practices (notionally SDP 6-0).[22] AFDD 2-2.1, the doctrine document referenced by Saltzman and Liquori as a promising step forward for mending seams in space C2, states on its final page, “At the very heart of warfare lies doctrine.”[23] Doctrine intends to guide warfighters in planning and executing their actions based on observed and tested best practices—doctrine need not be prescriptive. However, if doctrine is the "heart of warfare," the USSF doctrine is insufficient to support warfighters.[24]

For space officers to become truly proficient in their craft, education on solid doctrinal principles for their unique domain and those of the joint environment is prudent. Unfortunately, not only is USSF doctrine minimal in its detail, but doctrine (be it joint or service) is not heavily emphasized in the USSF’s formal academic training environments, aside from a brief introduction during IST, until officers are selected for promotion to the rank of major. At this point, they become eligible for ACSC-DL. Space professionals often do not reference doctrine beyond a basic introduction until they arrive at an operational-level assignment. At this point, they must accomplish planning and C2 actions for assets above the tactical level of war, regardless of the training they may or may not have received. Even then, the exposure is not formal, deliberate, or official. For USSF officers to become joint warfighting professionals, effectively integrate into joint warfighting operations, and begin to repair the long-standing space C2 seams and cracks, training must be more deliberate and emphasize both service and joint doctrine-based planning and C2 concepts more frequently and at much earlier stages than is

currently occurring. While USSF doctrine insufficiently details planning best practices and C2 relationships, it aptly states, "The C2 of space operations depends on clearly defined authorities, roles, and relationships. Unambiguous delineation of the chain of command, support relationships between organizations, and levels of delegated control for assigned forces are prerequisites to decentralized execution of space operations."[25] Change is inevitable for a new military service, especially one operating in a dynamic domain such as space—doctrinal changes are natural for a new military service. However, the lack of continuity, defined command structures, and unclear authorities of the USSF reflected in its insufficient doctrine add complexity to operational planning and C2, which impacts joint operations. To further understand the extent of the challenges stemming from command organizations, relationships, and structures affecting the USSF and how they impact planning and C2 at the operational level of war, reviewing the current structure and missions of the organizations most affected by these complexities is necessary.

Organizational Background

The USSF recently activated a new component field command, Space Forces – Space (S4S). S4S is a service organization operating under the direction of the Space Forces – Space Commander (S4S/CC), who reports to the Chief of Space Operations and the Secretary of the Air Force. Figure 1 and Figure 2 depict the S4S organizational structure.

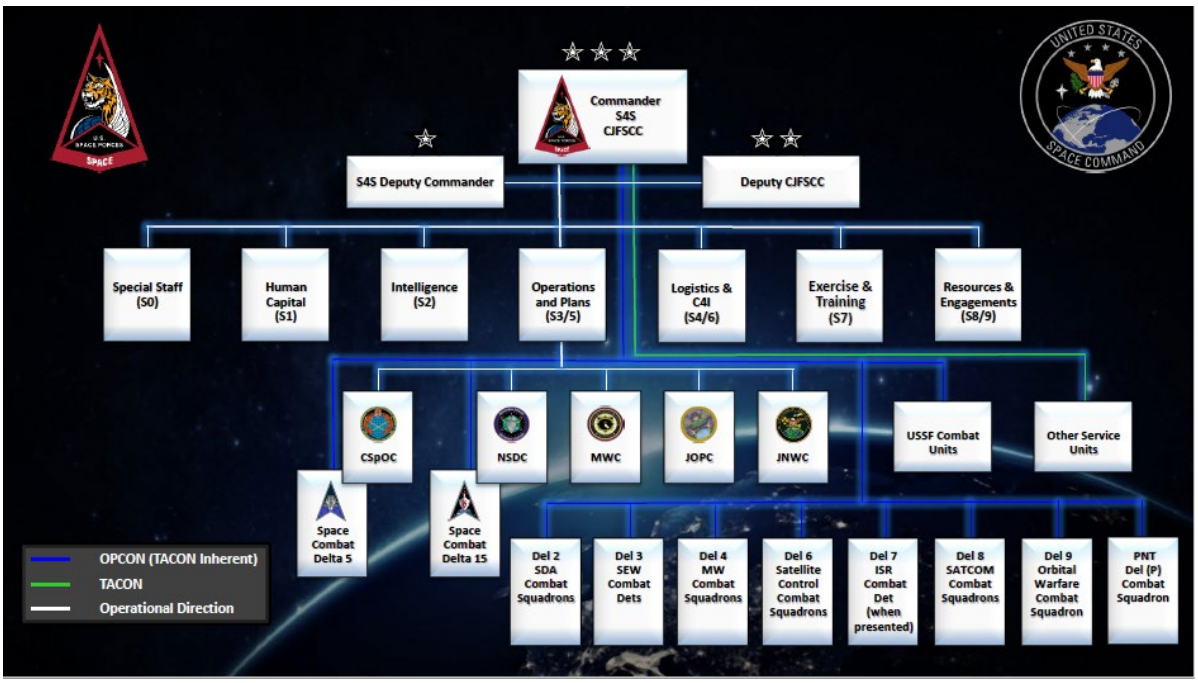

Figure 3 shows how S4S presents forces to US Space Command (USSC) under the direction and authority of the Combined Joint Force Space Component Commander (CJFSCC).[26,27] The

S4S/CC and the CJFSCC are the same person. S4S has two operational-level C2 Deltas (reference Figure 2), Space Delta 5 (Del 5) and Space Delta 15 (Del 15). Del 5 supports and presents forces to the CSpOC, and Del 15 supports the National Space Defense Center (NSDC). Both centers are force-presented to USSC in a joint capacity (Figure 3), and both centers direct separate elements of the space enterprise, often interfacing daily with each other and numerous external agencies for various operational activities.

The CSpOC, formerly called the Joint Space Operations Center (JSpOC), is modeled after the USAF Air Operations Center (AOC) framework—the only USSF unit organized as such— and focuses on space operations supporting USSC and other combatant commands "...to achieve theater and global objectives."[28] The NSDC primarily protects and defends operations involving on-orbit US, interagency, and partner assets. Specifically, the NSDC "...develops and improves US ability to rapidly detect, warn, characterize, attribute and defend against threats to

our nation's vital space systems."[29] Both space C2 centers require mid and senior-level space officers who understand joint planning and can integrate space systems and their effects into joint operations and efforts to accomplish the centers' assigned missions.

Mission Discussion

As previously discussed, the USSF organizes into different Field Commands and Component Field Commands, which can be further broken down into various Space Deltas or Directorates (depending on the field command). S4S retains the operational control (OPCON) of Del 5 and Del 15, along with other supporting organizations (Figure 2). Forces from Del 5 and Del 15, in the form of personnel and capabilities, are presented to USSC as the CSpOC and NSDC for employment in warfighting activities in all domains and phases of conflict (Figure 3). These forces also support joint forces, combatant commands, and allied or coalition partners when required and directed.[30,31] The CSpOC is the lead S4S integrating operations center, and it works closely with the other USSF operations centers to plan and conduct operational level planning and C2 of space forces for which it has tactical control (TACON).[32]

The mission of the CSpOC is to "Execute operational command and control of Space Forces to achieve theater and global objectives."[33] It is a 24/7 organization, "continuously coordinating, planning, integrating, synchronizing and executing space operations; providing tailored space effects on demand to support combatant commanders; and accomplishing national security objectives."[34] The CSpOC and Del 5 trace their heritage to the 614 AOC and are organized similarly to an Air Force AOC due to this legacy. The CSpOC/Del 5 is composed of four divisions and two squadrons: The Combat Operations Division, Strategy /Plans Division, Intelligence, Surveillance, and Reconnaissance Division, Satellite Communications Integrated Operations Division, 55th Combat Training Squadron (55 CTS), and 9th Combat Operations

Squadron (Figure 4).[35] Additionally, the CSpOC/Del 5 has other specialty teams necessary for accomplishing various mission activities.

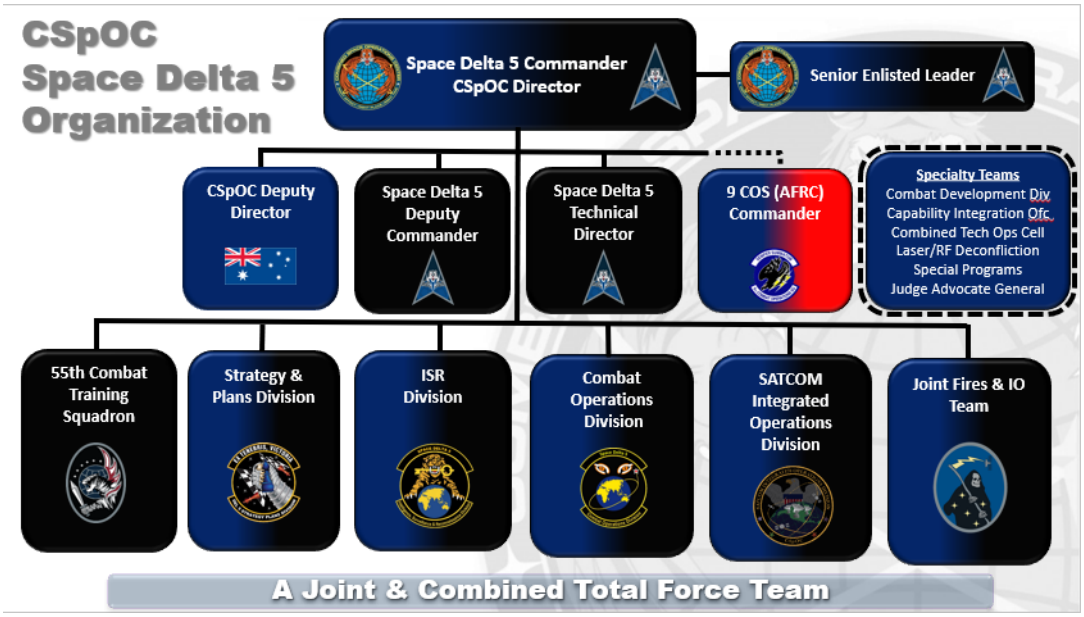

Figure 4. CSpOC/Space Delta 5 organization chart (Reprinted from briefing, CSpOC Mission Brief, Combined Space Operations Center, February 2024.)

The CSpOC typically ensures continued terrestrial space effects and space support in various theater environments. It often supports joint forces operating in combatant commands worldwide and engages with and supports coalition and allied partners. While the CSpOC and Del 5 have broad mission statements, neither unit has a current, approved Mission Directive. A defined Mission Directive is an important guiding document for any operational military unit as it details the specific mission(s) the unit must accomplish. "Mission creep," where a unit accepts new or poorly defined mission requirements without appropriate training and resourcing support, often occurs when a unit lacks an approved Mission Directive. Mission creep is a constant problem for the CSpOC/Del 5 that regularly impacts training operations. Even though the CSpOC/Del 5 lacks a Mission Directive to resource, plan, and organize efforts aimed at higher-

level guidance and intent, certain Mission Essential Tasks (METs) reflect the CSpOC's assigned mission. Efforts to rewrite the CSpOC METs are ongoing but remain pre-decisional.[36] The current accessible CSpOC METs are as follows:

1. CSpOC must act as the lead integration operations center to ensure standardization and integration.
2. Maintain situational awareness of Operation Olympic Defender Operational Environment and establish and exchange data necessary to distribute a Common Operating Picture.
3. Assess threats and hazards in the Operations Environment to inform, coordinate, and/or direct actions to preserve freedom of action for the space domain.
4. Plan, coordinate, direct and /or conduct Global Sensor Management to enable space surveillance, missile warning, missile defense, and nuclear detonation detection sensors in support of Operation Olympic Defender.
5. Plan, coordinate, deconflict and/or direct space operations.
6. Plan and conduct advanced target development in support of Operation Olympic Defender objectives.
7. Develop Operation Olympic Defender Commander's guidance and intent for Operation Olympic Defender assigned, attached forces and capabilities.[37]

As stated earlier, the CSpOC organizes and accomplishes its C2 mission similar to an AOC's methods primarily due to its heritage—the CSpOC is an evolution of the JSpOC/614 AOC. The 614 AOC adapted the AOC planning and execution cycle to fit the needs of space operations.[38] This C2 mechanism remains in place today, although it has increasingly adapted to fit the needs of USSC and the USSF. Currently, the CSpOC Strategy and Plans Division creates the Spaces Operations Directive, the Master Space Plan, the Combined Space Tasking Order (CSTO), any Special Instructions, and various tasking annexes used to C2 assigned and attached TACON forces. While no doctrine accurately reflects the current space planning environment wholly and correctly (as previously discussed), the best description is referenced in Joint Publication 3-14, Space Operations, Change 1, dated 26 October 2020. Neither SDP 3-0: *Operations* nor SDP 5-0: *Planning* provide any information regarding the planning or C2 products and mechanisms used to direct and conduct space operations.

Conducting C2 of space assets along with the CSpOC/Del 5 is the NSDC/Del 15. According to their 2022 Fact Sheet,

> The National Space Defense Center is a partnership organization, strongly supported by both the Department of Defense and Intelligence Community, that develops and improves U.S. ability to rapidly detect, warn, characterize, attribute and defend against threats to our nation's vital space systems. The NSDC directly supports space defense unity of effort and expands information sharing in space defense operations among the DoD, National Reconnaissance Office, and other interagency partners.[39]

A simple way to conceptualize the CSpOC and the NSDC is to consider the CSpOC responsible for space activities generating effects from the space domain to the Earth and to separate the NSDC as responsible for on-orbit protection and defense operations and activities. The NSDC originated from a specialty team in the JSpOC. While the CSpOC/Del 5 organizes with an adapted Air Force AOC framework, the NSDC/Del 15 is organized into three squadrons.

> The 15th Command and Control Squadron provides and operates C2 systems with operational crews for 24/7 NSDC mission areas, training and readiness certifications.
>
> The 15th Intelligence, Surveillance, and Reconnaissance Squadron (ISRS) synchronizes and integrates the planning and operation of ISR sensors, assets, processing, exploitation and dissemination systems in direct support of current and future operations.
>
> The 15th Cyber Squadron provides combat-ready forces trained and equipped to secure, monitor and defend the NSDC's cyberspace terrain and provide mission assurance fully integrated with other space and terrestrial operations.[40]

At times, the NSDC executes operations via the CSTO produced by the CSpOC, but it also executes operations directed via other C2 products originating from different organizations. Furthermore, the NSDC also disseminates tasking orders to units for which it maintains C2 authority. The NSDC/Del 15 also lacks a current Mission Directive. Overall, the C2 and planning for space forces and space operations is poorly defined and confusing, even for members who have spent upwards of 10 years of their careers working in the space planning and

C2 community. To further confuse the planning and C2 situation for space operations, every organization involved in the planning and C2 of space forces is currently undergoing organizational structure changes. These changes occur at unknown time intervals with vague assurances of completion schedules and with unknown organizational structure finality.

Impact of Organizational Uncertainty

As the USSF enters its fifth year of existence, its higher-level organizational structure and the structures of its associated units continue to change. Along with constantly changing operational structures and authorities, the USSF has activated new Deltas and Field Commands and absorbed organizations, capabilities, and units from other military services. Coupled with inadequate doctrine, this constant state of change is one of the factors causing C2 seams initially discussed in Saltzman and Liquori's 2005 paper. These seemingly insurmountable C2 seams continue complicating efforts between space officers and their joint and theater counterparts. Organizational changes also impact service-specific planning and C2 operations within the USSF and lead to training deficiencies in officers. CSpOC/Del 5 is awaiting more information following an April 2023 CSO-directed initiative to re-examine its organizational structure and deactivate its resident training squadron.[41] Del 5 leadership completed the reorganization mission analysis in November 2023 and presented recommendations to senior leaders. However, senior USSF leadership withheld their final decision while considering an entirely different organizational structure from what Del 5 leadership recommended. This new structure will likely impact the structure of NSDC/Del 15 and CSpOC/Del 5.

During this time, the USSF deactivated the Combined Force Space Component Command and activated an entirely new Component Field Command, S4S, which maintains OPCON over the CSpOC/Del 5 and NSDC/Del 15.[42] If the USSF's lead operational space C2

centers are unsure what their organizational structure and authorities will be one-to-six months in the future, it makes for a complicated planning and C2 picture for the entire service, its presented forces, and joint operations requiring space effects.

As of February 2024, the USSF has not announced an official decision concerning the organizational structure for CSpOC/Del 5 and NSDC/Del 15, nor has it provided an estimated time frame for a decision. As mentioned earlier, this uncertainty further complicates planning for space operations and integrating space capabilities into joint efforts. The complexities of command structures and constant organizational change only exacerbate the Space Force's planning problems. The USSF operates counter to doctrinal recommendations concerning command structure, planning, and C2.

As the USSF continues to grow and expand its footprint in the terrestrial environments of other combatant commands and in the space domain, defined C2 relationships and joint planning concepts have become increasingly important aspects of space officers' education, training, and development. As Paek and Crews aptly state regarding the USSF, "Lack of planning expertise across the service is one of the most significant challenges for the force."[43] Unless addressed, the same complexities that tainted space officers' interactions with their joint peers at various AOCs in Saltzman and Liquori's 2005 article will remain tension points for USSF officers interacting between space C2 centers and other C2 nodes (AOCs and other service/joint centers) well into the future. As the USSF fails to solidify its organizational structures, impacting its ability to plan and accomplish C2, it also faces resourcing constraints and experience degradation in its available officers. These factors all aggravate the problem of a lack of joint planning and C2 expertise in USSF officers assigned to operational space C2 centers.

Impacts of Personnel Resourcing Constraints

Increasingly, new USSF captains and lieutenants with little or no prior space experience comprise the CSpOC/Del 5 military personnel force. This trend began in 2014, when less-experienced space operators, often having completed only a single, four-year space operations assignment, were assigned to the JSpOC/614 AOC (now called the CSpOC/Del 5). Formerly, the CSpOC was assigned senior captains and majors with robust previous space operations experience.[44] This trend progressed following the creation of the NSDC, USSC, and the USSF; new missions require experienced members to establish operations.[45] Currently, first-term Guardians with no prior space experience fulfill roles at USSF C2 centers, including the CSpOC. These new officers are responsible for directing effects at the operational level of war.[46,47] This experience dilution in officers assigned to the CSpOC is a direct consequence of mission expansion in the USSF and the limits of a congressionally authorized maximum end-strength set at approximately 4,300 officers.[48] Mission creep, as discussed previously, also impacts the availability of experienced personnel to accomplish assigned missions, including training missions. The USSF is rapidly expanding its units, missions, and capabilities while maintaining the same personnel end strength limits and neglecting to provide specific Mission Directives substantiating the increased resourcing needs of its units. Not only are the personnel currently assigned to operational space C2 units typically younger and less experienced than their predecessors, but these space officers often perform missions outside the scope of their training, experience, or unit resourcing.

Currently, every USSF Guardian without prior military service experience attends IST. UST is a 100-day course that satisfies the USSF IST requirement. This course is a prerequisite for introductory SPD courses. Space operators accomplish SPD courses via distance learning in

unclassified environments.[49] Following these requirements, members assigned to accomplish space operations receive Initial Qualification Training (IQT) and Mission Qualification Training (MQT) at their first space operations assignment before certifying to perform space operations.[50]

The training organizations supporting IQT and MQT courses are severely understaffed and under-resourced. This resourcing problem limits the effectiveness of IQT and MQT new Guardians receive. Notably, the 55 CTS, responsible for all training, evaluation, weapons and tactics, exercises and experimentation, and system integration for the CSpOC/Del 5, is currently resourced at 33% of total authorized positions staffed by personnel.[51] The 55 CTS has not filled over 45% of its personnel billets in four years.[52] Furthermore, neither Space Systems Command nor its predecessor under the USAF, the Space and Missile Systems Center, have presented a simulator that adequately supports a realistic training environment to the 55 CTS or any previous training organizations supporting the CSpOC.[53] The 55 CTS simulator, the Standardized Space Trainer, only replicates a training version of the JSpOC Mission System. The JSpOC Mission System, a legacy defense acquisitions effort, was canceled in 2018 after failing to deliver required capabilities, bloating millions of dollars over budget, and lagging years behind schedule.[54,55] Due to these resourcing constraints, 55 CTS cannot develop an IQT course within six months. Consequently, 55 CTS does not currently conduct IQT. Recognizing this gap and its risk to their mission, leadership from Del 5, Del 15, and other C2 entities in the USSF requested from SpOC that Space Training and Readiness Command (STARCOM) create an appropriate C2 Fundamentals Course that meets USSF operational C2 centers' needs.[56] While space C2 leadership requested a C2 Fundamentals course in August of 2023, STARCOM has made no progress in developing a C2 Fundamentals course. The only guaranteed training 55 CTS currently provides is MQT.

While the CSpOC/Del 5 has a dedicated training unit, the NSDC/Del 15 does not have a dedicated organization providing training for its members; it relies on the 15th Command-and-Control Squadron to provide Core Academics and On-The-Job Training programs.[57] The members and instructors supporting operational space C2 centers with training activities cannot satisfy potential training gaps, leading to a lack of joint planning and space C2 expertise in members assigned to operational space C2 centers due to S4S' operational C2 center training organizations' limited workforce, unsatisfactory systems resourcing, and constant threats of mission creep mean. Without adequate training to address the problem of a lack of joint planning and space C2 expertise in USSF officers assigned to operational-level space C2 centers, the USSF will continue struggling to integrate and C2 its complicated systems in joint environments.

Examining Training Curricula

Before evaluating whether Paek and Crews' SWP certification addresses a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers, this research examines training curricula to identify a potential training gap contributing to the lack of joint planning and space C2 expertise in USSF officers assigned to operational level space C2 centers. Comparing the curriculum from two USSF formal training organizations against the mission requirements of the CSpOC proves that a training gap exists in joint planning and C2 concepts. The CSpOC/Del 5 mission requirements represent the data sample for an operational space C2 center as the CSpOC is the lead integrating S4S space C2 center. Additionally, the CSpOC/Del 5 has existed longer than any other space C2 center, and it is the only organization in the USSF C2 enterprise with a resident training unit (the 55 CTS) assigned to instruct newly assigned members. 533 TRS instruction represents the only guaranteed training source all Guardians attend. The 533 TRS and 55 CTS are the only two training units formally instructing

C2 and joint planning topics that USSF officers assigned to operational space C2 centers are guaranteed to attend.

533 TRS Curriculum

After commissioning or completing Basic Military Training, the 533 TRS provides IST for all new Guardians (both officer and enlisted). UST is the current version of IST for space officers. UST is a 100-day training course. The training days in UST align with different semesters, each running for approximately 30 days and including four courses.[58] USSF officers complete three semesters of training in UST.[59] The only course officers attend during UST covering planning and C2 concepts is the Space Battle Management course.[60] After UST, students complete a capstone event employing the joint planning model and basic C2 concepts against a fictional wartime scenario. UST covers service doctrine (discussed previously in this research effort) and a high-level introduction to joint doctrine and planning concepts. UST presents topics at an introductory level, as this is an officer's first formal exposure to space training.[61]

IST, including UST, is foundational learning, providing officers baseline knowledge of various topics. Further instruction in assigned space power disciplines and mission areas augments knowledge gained from UST. The 533 TRS only provides introductory C2 and joint planning knowledge. Furthermore, USSF IST and previous USAF space operations IST courses have changed numerous times throughout the past decade, and most space officers assigned to CSpOC/Del 5 or NSDC/Del 15 attended different legacy versions of UST, often three or more years prior to their current assignment at an operational space C2 center.[62] Changes to UST necessitate subsequent changes to curricula at follow-on training units. The culmination of

curriculum changes at various space training units complicates how training organizations track USSF officers' space knowledge standards and satisfy unmet training requirements.

55 CTS Curriculum

As previously discussed, the 55 CTS provides operators at the CSpOC and Del 5 with IQT and MQT. IQT intends to "...build upon the broader mission area foundations taught in IST."[63] Additionally, "IQT is a common Delta-level technical training program that enables MQT courses to build upon mission area fundamentals and focus on the weapon system application."[64] MQT aims to "...qualify spacecrew members in an assigned spacecrew position for a unit-level mission."[65] Certified instructors provide IQT and MQT instruction. Appendix A shows a data summary of the topics 55 CTS instructors train during MQT.[66]

CSpOC/Del 5 MQT occurs first in a classroom with a staff instructor and lasts approximately two weeks. Staff instructors are typically more experienced and senior members of the organization than their line instructor counterparts. Following this two-week instruction block, students transfer to a line instructor for on-the-job training using live, real-world systems (as mentioned earlier, 55 CTS lacks a simulator that can adequately support training).[67] Ideally, an adequate curriculum supports instruction throughout training. This supportive curriculum includes higher headquarters-approved lesson plans. An approved curriculum ensures less experienced instructors (such as line instructors) have appropriate training materials to augment their instruction.

Before the USSF formation in 2019, 14th Air Force (which maintained oversight of space training) did not mandate higher headquarters-approved lesson plans. As Table 1 reveals, all tasks covered during MQT at the CSpOC/Del 5 lack official, SpOC-approved lesson plans, and only 29 percent of tasks 55 CTS instructors train during MQT have Del 5-approved curriculum

materials. The disparity of tasks supported by a SpOC or Delta-approved lesson plan is due to a lack of 55 CTS instructors available to create the needed lesson plans. Not only is the 55 CTS understaffed, but its personnel often lack the requisite experience to research topics and create lessons suitable for SpOC approval. Presently, legacy PowerPoint documents and on-the-job training efforts from line instructors cover the lack of updated formal curriculum materials provided by the 55 CTS. Table 1 shows whether 55 CTS MQT supports CSpOC/Del 5 METs.[68]

MET Number	MET Description	MET Supported by MQT
1	CSpOC must act as the lead integration operations center to ensure standardization and integration.	Yes
2	Maintain situational awareness of Operation Olympic Defender Operational Environment and establish and exchange data necessary to distribute a Common Operating Picture.	Yes
3	Assess threats and hazards in the Operations Environment to inform, coordinate, and/or direct actions to preserve freedom of action for the space domain.	Yes
4	Plan, coordinate, direct and /or conduct Global Sensor Management to enable space surveillance, missile warning, missile defense, and nuclear detonation detection sensors in support of Operation Olympic Defender.	Yes
5	Plan, coordinate, deconflict and/or direct space operations.	No
6	Plan and conduct advanced target development in support of Operation Olympic Defender objectives.	Yes
7	Develop Operation Olympic Defender Commander's guidance and intent for Operation Olympic Defender assigned, attached forces and capabilities.	No

Table 1 – CSpOC/Del 5 METs Supported by 55 CTS MQT

The 55 CTS is required to provide IQT, MQT, Continuation Training, and Advanced Training. Due to workforce resourcing constraints, IQT, Continuation Training, and Advanced Training programs are not currently occurring at the CSpOC/Del 5. 55 CTS instructors devote the majority of their effort to maintaining and updating the MQT curriculum to best prepare new members for certification and crew operations. While MQT is the only guaranteed training

officers executing operational planning and C2 at the CSpOC receive, 55 CTS provides one other optional training opportunity.

Approximately three times per year, the 55 CTS offers the Tacticians (TAC) course. Notably, the CSpOC/Del 5 TAC course is one of the Tactician Certification Courses mentioned in Paek and Crews' white paper. This optional, two-week course covers advanced, threat-informed topics to develop critical thinking and planning skills in operators. All certified CSpOC/Del 5 operators can complete the TAC course upon leadership approval; however, course capacity is limited to 15 members maximum. Often, allied and coalition partners participate in the course, as the CSpOC/Del 5 operates in a combined environment. Appendix B references the 55 CTS TAC course Training Task List. Table 2 highlights whether the 55 CTS TAC course supports CSpOC/Del 5 METs.[69,70]

MET Number	MET Description	MET Supported by TAC Course
1	CSpOC must act as the lead integration operations center to ensure standardization and integration.	Yes
2	Maintain situational awareness of Operation Olympic Defender Operational Environment and establish and exchange data necessary to distribute a Common Operating Picture.	No
3	Assess threats and hazards in the Operations Environment to inform, coordinate, and/or direct actions to preserve freedom of action for the space domain.	Yes
4	Plan, coordinate, direct and /or conduct Global Sensor Management to enable space surveillance, missile warning, missile defense, and nuclear detonation detection sensors in support of Operation Olympic Defender.	Yes
5	Plan, coordinate, deconflict and/or direct space operations.	Yes
6	Plan and conduct advanced target development in support of Operation Olympic Defender objectives.	Yes
7	Develop Operation Olympic Defender Commander's guidance and intent for Operation Olympic Defender assigned, attached forces and capabilities.	Yes

Table 2 – CSpOC/Del 5 METs Supported by 55 CTS TAC Course

Aside from MQT and the TAC course, the 55 CTS does not currently offer any other training courses covering joint planning or C2 concepts or aligning to CSpOC MET accomplishment. The only training opportunities CSpOC/Del 5 members typically receive aside from MQT are exercise participation, attendance at a 319 CTS or NSSI-hosted course, or PME opportunities. Courses offered by DAF units aside from 55 CTS are detailed in Appendix C. While outside courses exist and cover topics such as joint planning and C2 concepts, these training opportunities are not guaranteed options for officers assigned to the CSpOC/Del 5. These additional training opportunities are subject to available resources, such as personnel coverage to satisfy mission requirements and course funding. Consequently, not all CSpOC/Del 5 members attend exercises or advanced courses offered by outside organizations.

Paek and Crews' Solutions

Lieutenant Colonel Paek and Lieutenant Colonel Crews' 2023 white paper offers four proposals for the USSF's issues regarding a lack of resident expertise in joint planning skills in its officer corps.

1. Strategically align SpOC and STARCOM officer training events towards planning expertise.
2. Build a Primarily Level Education (PLE) course for USSF Captains to train and apply the Space Planning Process (SPP) at the tactical and operational levels of war.
3. Develop a career developmental model for the first 10 years of USSF officers that progressively builds tactical and operational planning expertise.
4. Establish the Space Warfare Planner certification as a short-term solution to expedite the development of Guardian planners with tactical and operational-level planning expertise.[71]

For the first three proposals, Paek and Crews devote significant attention toward creating a long-term solution for implementation across the service, focusing on aligning STARCOM events with a long-term progression model offering increased emphasis on instructing younger officers on planning concepts at the tactical and operational levels of war. The authors investigate the

current PME offerings available for Company Grade Officers (CGOs) by other US military services (Army, Marine Corps, and Air Force) to build the case that USAF PME in the form of Squadron Officer School (SOS) provides insufficient training for USSF officers.[72]

Currently, USSF captains attend SOS as their Primary Leadership Education (PLE). SDP 1-0: Personnel states, "PME programs educate Guardians to leverage military power to achieve national security objectives;" however, the white paper concludes, "The primary focus of SOS is leadership development at the squadron level with no exposure to planning. Due to the length and focus of the course, there is no opportunity to build officer expertise in tactical or operational-level planning."[73,74] Resulting from their conclusions regarding SOS and its comparison against the CGO PME offerings of the Army and Marine Corps, Paek and Crews advocate for a new, separate USSF officer PLE program. Following the PLE discussion, the authors detail a 10-year progression model for USSF officers to "develop officers from tactical-level mission planners to operational-level Joint planners."[75] Together, these three proposals constitute a long-term effort addressing the USSF's lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers.

The final page of the white paper discusses the proposed short-term SWP certification solution by which Paek and Crews intend to solve the USSF's lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers.[76] The objectives of the SWP certification are:

- Train Guardians in the Space Planning Process (SPP) to meet USSF's tactical and operational planning requirements.
- Establish a force-wide certification to designate Guardians with tactical and operational planning training and experience.
- Build planners to man and lead MPCs in USSF's SPAFORGEN model.[77]

The authors also propose STARCOM and Delta CTS courses to bridge this training and

experience gap while their long-term solution builds planners with requisite planning and C2 expertise. Paek and Crews detail a Space Warfare Planning Course emphasizing the space planning process and USSF doctrine. They also describe a Tactician Certification Course "tailored to meet tactical-level mission planning needs for each Delta's [Space Power Discipline] and weapon system."[78]

ANALYSIS, CONCLUSIONS AND RECOMMENDATIONS

Analysis

Before evaluating Paek and Crews' SWP certification, this research analyses the curricula from the 533 TRS and 55 CTS discussed in the Literature Review to determine if a training gap exists in joint planning and space C2 concepts. As previously discussed, the 533 TRS only provides introductory C2 and joint planning knowledge. Because of its introductory nature, although the 533 TRS curriculum covers topics such as C2, joint doctrine, and joint planning, this research assesses that the 533 TRS instruction is insufficient to support the needs of officers assigned to conduct joint planning and C2 at operational level space C2 centers. Basic level instruction at the beginning of an officer's career does not establish the levels of expertise the USSF requires in its officers at operational-level space C2 centers.

As noted in the literature review, the 55 CTS suffers from numerous constraints, including limited personnel resourcing, constant organizational change in the space C2 enterprise, a lack of experienced instructors, and insufficient simulator capability. These constraints impact the squadron's ability to instruct joint planning and space C2 concepts at an advanced level and limit the 55 CTS's ability to develop its curricula further. As is evident in Table 3, which shows a comparison of CSpOC/Del 5 METs supported by 55 CTS curricula from

the TAC course and MQT, a training gap in joint planning and C2 concepts exists for USSF officers assigned to the CSpOC/Del 5.

MET Number	MET Description	55 CTS Course Supporting MET
1	CSpOC must act as the lead integration operations center to ensure standardization and integration.	TAC MQT
2	Maintain situational awareness of Operation Olympic Defender Operational Environment and establish and exchange data necessary to distribute a Common Operating Picture.	MQT
3	Assess threats and hazards in the Operations Environment to inform, coordinate, and/or direct actions to preserve freedom of action for the space domain.	TAC MQT
4	Plan, coordinate, direct and /or conduct Global Sensor Management to enable space surveillance, missile warning, missile defense, and nuclear detonation detection sensors in support of Operation Olympic Defender.	TAC MQT
5	Plan, coordinate, deconflict and/or direct space operations.	TAC
6	Plan and conduct advanced target development in support of Operation Olympic Defender objectives.	TAC MQT
7	Develop Operation Olympic Defender Commander's guidance and intent for Operation Olympic Defender assigned, attached forces and capabilities.	TAC

Table 3– CSpOC/Del 5 METs Supported by 55 CTS Course Curriculum

While every CSpOC/Del 5 MET is covered in aggregate by 55 CTS training, the TAC course is optional training and not a guaranteed opportunity for all members accomplishing operational level space C2 (including those not assigned to the CSpOC/Del 5). This training gap represents where USSF training guaranteed to members inbound to an operational C2 center is lacking and is one of the factors leading to the overall problem of a lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. While CSpOC/Del 5 members still accomplish their mission satisfactorily, a training gap clearly exists.

Additionally, as discussed in the Mission Discussion section of the Literature Review, members assigned to CSpOC/Del 5 do not receive the same training as those arriving at the NSDC/Del 15 or other USSF C2 units. Therefore, training provided at NSDC/Del 15 or other

space C2 units cannot cover gaps identified in CSpOC/Del 5 training, and vice versa. This gap must be accounted for in other training areas, whether via on-the-job instruction using live systems (CSpOC/Del 5 and other C2 entities lack sufficient simulator capacity) or courses from outside entities. Furthermore, as discussed in the literature review in Table 2, CSpOC/Del 5 lacks higher headquarters-approved lesson plans that support MQT instruction. Although training materials exist for many tasks covered via 55 CTS instruction, there is no formal oversight concerning the instruction's format, delivery, or accuracy—the quality check provided by the lesson plan approval process does not exist for CSpOC/Del 5 curricula.

55 CTS and CSpOC/Del 5 leadership are aware of current training limitations impacting assigned METs. When resources are available, 55 CTS seeks assistance from other units offering more tailored and advanced training courses. While these outside training entities can provide training for items such as joint planning and C2 concepts, sending officers to these courses occurs at the whim of resources—these are not guaranteed training opportunities consistently available for all assigned members.

Having proved that a training gap covering joint planning and space C2 concepts exists (reference in Table 3), this research evaluates Paek and Crews' SWP certification as a possible solution to the problem. The training gap for joint planning and space C2 concepts compared to the proposed short-term efforts from Paek and Crews' white paper evaluates whether Paek and Crews' solution meets CSpOC/Del 5 mission requirements and, ultimately, whether the SWP certification is adequate to address the current insufficiencies in joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. As discussed in the Assumption and Limitations section, this research assumes a six-month implementation

constraint for any solution presented as a possibility to satisfy the identified problem in this research. A longer timeline will not satisfy current operational requirements.

As detailed in the Literature Review, Paek and Crews address a three-part problem impacting operations in the USSF and recommend a framework for developing all USSF officers as planners. Their long-term solution targets officers during their formative years as younger CGOs preparing for their first PME offering. While Paek and Crews' white paper extensively details and proposes their long-term solution for USSF officer training, experience, and development, it only briefly describes a short-term solution addressing the problems currently impacting operational space C2 centers. The final page of Paek and Crews' white paper describes their interim solution "to expedite the creation of Guardian Planners," including two courses the authors detail as training possibilities.[79]

The Literature Review describes the Space Warfare Planning Course Paek and Crews recommend. This course emphasizes the space planning process. As previously detailed, for officers to effectively integrate with joint warfighters, they must understand and employ the joint planning process. The space planning process is a high-level survey of the joint planning process and does not prepare officers to integrate with their joint counterparts. As discussed in the Literature Review, the USSF's doctrine is not comprehensive or sufficient to support officers engaged in joint operations. Any course designed to train USSF officers to integrate into joint operations should focus on joint doctrine principles. Although Paek and Crews' proposed course is flawed based on its doctrinal foundations, it still has promising potential "to familiarize officers towards other space power disciplines."[80] Increased familiarization with other weapon systems and space power disciplines will increase an officer's ability to integrate disparate space capabilities into joint military operations. Additionally, Paek and Crews suggest tracking

members with a Special Experience Identifier (SEI) upon completing the Space Warfare Planning Course. A SEI will help track USSF officers with expertise in planning and C2 concepts so USSF talent managers can assign these members to units where their expertise is most needed.

While no syllabus or course outline for Paek and Crews' proposed Space Warfare Planning Course exists, this research accepts the course could satisfy training gaps leading to the lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers if STARCOM structures the course around joint doctrine and the joint planning process. However, although STARCOM could restructure the course successfully, it cannot create a course of this magnitude within the six-month implementation required by this research. As previously mentioned, in August of 2023, CSpOC/Del 5 and NSDC/Del 15 leadership requested on behalf of the entire USSF Space C2 Enterprise that STARCOM create a C2 Fundamentals course; however, as of February 2024, STARCOM has made no efforts to create a C2 Fundamentals course. STARCOM's failure to create a C2 Fundamentals course in six months indicates their ability to create a similar Space Warfare Planning Course in six months is doubtful.

Paek and Crews also detail a Tactician Certification Course as part of their SWP certification solution, as discussed in the Literature Review. Tactician certifications and tactician courses are not standardized across units, nor are they approved or endorsed by any higher headquarters—these courses are locally-developed solutions, often for Delta-specific problems. Only 3 of the 11 Deltas under SpOC and S4S currently host a tactician course. While the 55 CTS TAC course has produced promising results local to the CSpOC/Del 5 mission requirements, replication at all remaining Deltas within six months is not likely, as other CTSs are equally

resource-constrained as the 55 CTS. The proposed Tactician Certification Courses have the potential to be helpful training elements but require more resources than the USSF can provide to meet a six-month creation and implementation limit.

Conclusions

Following the analysis of information presented in the Literature Review, this research concludes that a training gap exists that results in a lack of joint planning and space C2 expertise among USSF officers assigned to operational space C2 centers. As detailed in the Literature Review and discussed in the Analysis section, current training courses offered via the 533 TRS or 55 CTS are insufficient for training joint planning or operational space C2 concepts. Furthermore, USSF doctrine does not adequately detail how to integrate space assets and effects into joint military operations, nor does it describe current space C2 processes or operational space C2 concepts. To fully integrate into joint military operations, the USSF must address this training gap. As previously discussed, Paek and Crews' 2023 white paper proposed long-term solutions and a short-term SWP certification to address this training gap and resulting expertise problem in USSF operators.

This research concludes that Paek and Crews' SWP certification proposal requires modification before further action. If the USSF aims to continue efforts based on Paek and Crews' white paper to address the identified lack of joint planning and space C2 expertise among USSF officers assigned to operational space C2 centers, Paek and Crews' SWP certification requires adjustment. As discussed in the Analysis, Paek and Crews only discuss two proposed courses for their SWP certification in their white paper. Paek and Crews' white paper does not detail presently available courses as potential solutions, nor does their paper compare available courses to specific mission requirements for the operational-level space C2 centers. Neither of

Paek and Crews' proposed courses currently exist, and STARCOM has proven limited in its ability to devote sufficient resources to new course development. The USSF and DAF offer select courses covering joint planning and C2 concepts, such as those offered by the Lemay Center and the National Security Space Institute.[81,82,83] A fully developed white paper aims to establish a vision, scope the size of the effort, and establish targets while developing a timeline, milestones, and project management process. If any element is underdeveloped, improvements are needed to manage risks and bolster the vision's success.[84] Paek and Crews' short-term SWP certification needs improvements before the USSF considers it further.

Ultimately, based on the information presented in the Literature Review and discussed in the Analysis section, this research concludes that Paek and Crews' SWP certification detailed in their 2023 white paper, "Creating United States Space Force (USSF) Planners," is not an adequate short-term solution addressing the lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. Where the US military should increasingly reference joint doctrine, USSF Doctrine comprises the foundation of Paek and Crews' SWP certification. Furthermore, as evidenced by previous efforts, STARCOM is unlikely to develop Paek and Crews' proposed course within six months. As discussed above, Paek and Crews do not discuss currently available alternative training courses that could satisfy the requirements of operational space C2 centers. Additionally, as discussed in the Analysis section, Paek and Crews' Tactician Certification Course element of the SWP certification requires modification and standardization before it could be a successful training avenue. While Paek and Crews propose a solid foundation for the long-term development of the future force, their long-term solution will take years to implement and even more time to yield success. The USSF cannot wait ten years for Paek and Crews' long-term plan to show progress, nor can it wait ten

years for officers to gain basic planning skills via ACSC-DL or other IDE/ILE programs. The US is already engaged in great power competition, requiring integrated military operations across all domains and military services. To properly support joint military operations with critical space effects, the USSF must address its lack of joint planning C2 expertise among its officers assigned to space C2 centers. The USSF requires a short-term solution for its lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers; however, Paek and Crews' short-term SWP certification is insufficient.

Recommendations

The first recommendation of this research effort is for STARCOM to develop a joint planning and space C2 course similar to what Paek and Crews propose in their SWP certification solution. As previously discussed, a purpose-built, USSF-specific course focused on teaching joint planning and C2 concepts at the operational level of war does not exist. As the Literature Review and Analysis detail, the 55 CTS lacks the personnel resources to build a course for the CSpOC/Del 5 (or any other USSF C2 entities) within the specified 6-month period, and STARCOM has not created the C2 Fundamentals course that the CSpOC/Del 5 and other USSF space C2 entities previously requested. With the expansion of the space C2 enterprise into other component field commands, a course designed to provide C2 and planning fundamentals to all USSF officers responsible for operational level planning and space C2, not only those assigned to the CSpOC/Del 5, is sensible. STARCOM is the only organization in the USSF capable of creating and managing a course of this magnitude.[85]

The second recommendation of this research is that any course developed by STARCOM teaching planning and C2 concepts at the operational level of war should emphasize joint doctrine. While Paek and Crews describe some details of a STARCOM-developed course, this

research differs from Paek and Crews' perspective on which primary planning method and doctrine the course should emphasize. Paek and Crews advocate for USSF doctrine and the Space Planning Process. As previously discussed in the Literature Review and Analysis, any course designed to instruct planning and space C2 concepts should use joint doctrine and the joint planning process. A STARCOM-built course must train USSF officers on the foundational concepts of joint planning and operational C2 with application across all domains of conflict. The proposed course can also instruct the space planning process; however, the joint planning process should be the primary planning framework instructed as Guardians must realize their role in joint planning, joint operations, and joint C2. The overall classification of this course should be Top Secret, releasable to Five-Eyes, as space operations increasingly occur in an allied/ coalition environment. The course should have built-in instruction blocks for higher classification levels that do not interfere with the overall progression and flow of the course.[86]

The third recommendation of this research is for S4S to begin consideration of the available courses listed in Appendix C to determine which options could immediately assist with the training gap observed at operational-level space C2 centers, particularly at the CSpOC/Del 5. While the USSF waits for STARCOM to create a course meeting the recommendations of this research paper, there are numerous courses in the DAF that the USSF could leverage to provide interim training for officers assigned to space C2 centers. These courses and their hosting organizations are detailed in Appendix C. Course consideration should include sending members of CSpOC/Del 5 and NSDC/Del 15 to each available course described in Appendix C to definitively determine which courses meet the needs of the space C2 community.[87-91]

A fourth recommendation of this research is for S4S to provide direction to the operational space C2 center Commanders concerning interim training topics and courses

required for officers assigned to accomplish space C2 and space planning actions. S4S direction should include a training plan for new members assigned to S4S space C2 organizations. Until STARCOM develops a purpose-built course (as described in the first recommendation), courses suggested in the second recommendation of this research paper should inform this training plan. This training plan must be adaptable to reflect the ideal path for members assigned to C2 entities across the USSF, as each C2 unit in the USSF organizes differently, and the CSpOC/Del 5 and NSDC/Del 15 may soon become a singular C2 Integrated Mission Delta.[92,93,94] Due to the integrated nature of operations between space C2 entities and the organizational uncertainty the space C2 enterprise faces, other organizations included in the Space C2 enterprise (outside of the S4S organization structure) should follow any S4S course consideration recommendations.

The fifth recommendation of this research is that all Deltas for which S4S maintains tasking authority must create a tactician course or tactician certification program aligning with Paek and Crews' 2023 white paper within six months. As discussed in the Analysis and Conclusion sections, some SpOC and S4S units offer their local members a tactician course or tactician program. These courses and programs are "tailored to meet tactical-level mission planning needs" for each hosting organization.[95] The tactician courses or programs should contain instruction on joint planning and space C2 concepts and be structured to account for an influx of more junior officers with less experience than their predecessors. As much as possible, tactician courses or programs should be standardized across different S4S organizations to ensure seamless integration planning and operations. The instructing units must also maintain a tracking mechanism, ensuring the Enterprise Talent Management Office and S4S staff can identify trained or experienced tacticians. These tacticians can fulfill planning and advisory roles should their skills be required by mission planning cells or operational C2 centers. As SpOC is the unit

responsible for organizing, training, and equipping S4S presented units, SpOC should be required to fulfill the resourcing requirement for this tracking mechanism.

The final recommendation of this research concerns talent management. As discussed throughout this research paper, the USSF lacks joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. While the USSF takes time to grow more officers familiar with joint planning and C2 concepts, it must adequately employ its few officers with joint planning and space C2 experience. As the USSF refines and implements Paek and Crews' long-term solutions, the Enterprise Talent Management Office (ETMO) should engage with USSF units to identify current members with the requisite skills, including training or experience, who can accomplish joint operational planning and C2. Once identified, these officers should be assigned an SEI. To assign joint planning and space C2 SEIs, ETMO should identify members who have attended courses listed in Appendix C, who have completed assignments at operational level C2 units (space or otherwise), or who have deployment experience to an AOC or joint location where they accomplished joint planning or joint operations. ETMO should use this identifier for future vectoring and assignments. S4S can use this SEI to employ operational planning teams in contingency situations. With such little joint planning and C2 expertise in the USSF officer cadre, ETMO must intentionally manage this critical skill set.

Summary

As the USSF continues expanding capabilities and operations supporting Combatant Commands worldwide, it requires joint-minded officers who can integrate their exquisite capabilities with joint military operations. This research effort outlined the current problem the USSF faces with a lack of joint planning and space C2 expertise in USSF officers assigned to

operational space C2 centers and identified a training gap leading to this problem. Following the discussion of the training gap, this research evaluated Lieutenant Colonel Paek and Lieutenant Colonel Crews' 2023 white paper to determine whether their SWP solution was sufficient to meet the short-term needs of operational space C2 centers. While Paek and Crews' 2023 paper offers promising solutions for the long-term development of USSF Guardian Planners, their SWP certification is insufficient to meet the short-term needs of operational-level space C2 centers.

After concluding that Paek and Crews' SWP certification is an insufficient short-term solution, this research recommends actions for the USSF to address its lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers. These recommendations prioritize USSF integration with a joint military force, as military operations are increasingly joint. As General Saltzman stated,

> The joint team's relationship with the Space Force must be consistent with the relationship it has with all other Services. The capabilities that each Service provides are seamlessly integrated together into a synchronized unity of effort. The Space Force can be no different. My vision, therefore, is to ensure the Space Force has the right organizational structures, operational concepts, equipment and training to seamlessly integrate into the Joint Force team.[96]

To meet General Saltzman's vision and adequately support joint military operations, the USSF must address its lack of joint planning and space C2 expertise in USSF officers assigned to operational space C2 centers before it enters a direct military conflict with great power adversaries.

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APPENDICES

Appendix A

Data summary of 55 CTS Master Task List

Task ID	Description	Lesson Type	MET Alignment	SpOC-Approved Lesson Plan? (Yes or No)	Delta-Approved Lesson? (Yes or No)
A00-01-00-00-00	Space Threats and Intelligence Products	Fundamental Topic Review	N/A	No	Yes
A00-02-00-00-00	Space Mission Planning Process	Fundamental Topic Review	N/A	No	No
A00-03-00-00-00	Fundamentals of SDA aand Sensor Network	Fundamental Topic Review	N/A	No	No
A00-04-00-00-00	Principles / Products of ITW/AA & NC3	Fundamental Topic Review	N/A	No	Yes
A00-05-00-00-00	SATCOM Fundamentals & Space Asset Protection	Fundamental Topic Review	N/A	No	No
A00-06-00-00-00	Space Negation	Fundamental Topic Review	N/A	No	No
A00-07-00-00-00	Space/ Terrestrial Weather	Fundamental Topic Review	N/A	No	Yes
A00-08-00-00-00	Debrief Process	Fundamental Topic Review	N/A	No	No
A00-09-00-00-00	Strategy and Guidance	Fundamental Topic Review	N/A	No	No
A00-10-00-00-00	Space Conditions	Fundamental Topic Review	N/A	No	No
A00-11-00-00-00	Emergency Procedures	Fundamental Topic Review	N/A	No	No
A00-12-00-00-00	CSpOC Relationships	Fundamental Topic Review	N/A	No	Yes
A00-13-00-00-00	Space Electromagnetic Warfare Concepts and Systems	Fundamental Topic Review	N/A	No	No
C00-01-00-00-00	HHQ Reporting / Information Management / Data Flow	MQT-Normal Operating Procedures	2	No	No
C00-02-00-00-00	HHQ Info Reporting	MQT-Normal Operating Procedures	2	No	No
C00-03-00-00-00	Missile Warning Sensor Management Operations	MQT-Normal Operating Procedures	2, 3	No	Yes
C00-04-00-00-00	Space Advisory Procedures	MQT-Normal Operating Procedures	2, 3	No	No
C00-05-00-00-00	Satellite Event Messages	MQT-Normal Operating Procedures	2, 3	No	No
C00-06-00-00-00	Lasing Procedures	MQT-Normal Operating Procedures	3	No	No
C00-07-00-00-00	Collection Management	MQT-Normal Operating Procedures	4	No	Yes
C00-08-00-00-00	Launch Response / Indications	MQT-Normal Operating Procedures	4	No	Yes
C00-09-00-00-00	Info Distribution Procedures	MQT-Normal Operating Procedures	4	No	Yes
C00-10-00-00-00	IR info Request Procedures	MQT-Normal Operating Procedures	4	No	Yes
C00-11-00-00-00	Readiness Level Changes	MQT-Normal Operating Procedures	2	No	No
C00-12-00-00-00	Theater Support Operations	MQT-Normal Operating Procedures	1,2	No	Yes
C00-13-00-00-00	NKDO Procedures	MQT-Normal Operating Procedures	6	No	No
C00-14-00-00-00	Asset Tasking	MQT-Normal Operating Procedures	6	No	No
D00-01-00-00-00	Respond to a Crew / Operations Floor Emergency	MQT/Local Emergency Procedures	N/A	No	No
E00-01-00-00-00	Respond to a System Malfunction	MQT/Local Malfunction Procedures	N/A	No	No
G00-01-00-00-00	Daily Shift Procedures	MQT/Crew Duties and Responsibilities	1	No	No
G00-02-00-00-00	SOD/MSP/CSTO/SPINS/Annex	MQT/Crew Duties and Responsibilities	4	No	No
G00-03-00-00-00	Mission Planning Process	MQT/Crew Duties and Responsibilities	1	No	No
G00-04-00-00-00	Debrief Process	MQT/Crew Duties and Responsibilities	1	No	No
H00-01-00-00-00	CSTO Change	MQT/Local and Miscellaneous Procedures	4	No	No
H00-02-00-00-00	Annex Change	MQT/Local and Miscellaneous Procedures	6	No	No
H00-03-00-00-00	Battle Cab Recall	MQT/Local and Miscellaneous Procedures	2, 3	No	No
H00-04-00-00-00	Ops and Intel Brief Procedures	MQT/Local and Miscellaneous Procedures	2, 3	No	No
H00-05-00-00-00	CSpOC / Daily Web Update	MQT/Local and Miscellaneous Procedures	2, 3	No	No
H00-06-00-00-00	SIDO Overnight	MQT/Local and Miscellaneous Procedures	2, 3	No	No
H00-07-00-00-00	CSpOC Relocation	MQT/Local and Miscellaneous Procedures	1	No	Yes
H00-08-00-00-00	Prime Sensor Manager C2 Transfer	MQT/Local and Miscellaneous Procedures	1, 2	No	Yes

Reprinted From: 55 CTS Master Task List

Appendix B

55 CTS Tactician Course Training Task List

Lesson	Task	Intent
CSpOC Divisions and Missions Lesson	Understand CSpOC COMREL	Understand relevant organizations, entities, and authorities IOT enable effect mission planning
	Understand COD responsibilities and capabilities	Effectively incorporate COD into mission planning process. Understand SSRs. Understand crew positions and how to utilize them.
	Understand ISRD responsibilities and capabilities	Effectively incorporate ISRD into mission planning process. Understand products and services provided, and how to obta n them.
	Understand SPD responsibilities and capabilities	Effectively incorporate SPD into mission planning process. Understand where and how guidance is processed, generated, and distributed.
	Understand SIOD responsibilities and capabilities	Effectively incorporate SIOD into mission planning process. Understand EMI resolution.
	Understand JFIOT responsibili ies and capabilities	-
Red CS Lesson	Understand threat spectrum	Utilize spectrum of conflict to inform phasing. Insight into when/where to apply reversible/non-reversible and attributable/non-attributable effects.
	Gain familiarity with DA-ASAT threats	Plan Blue actions to mitigate threats
	Gain familiarity with Co-orbital ASAT threats	Plan Blue actions to mitigate threats
	Gain familiarity with Electronic Warfare Threats	Plan Blue actions to mitigate threats
	Understand implications of space debris and congestion	Plan Blue actions to mitigate threats
	Understand potential I&W for adversary actions	Develop effective decision matrices and CIR/PIR
US Assets Lesson	Understand SSN capabilities	SSN planning feasible and acceptable

	Understand SSN vulnerabilities and limitations	
	Understand SCN capabilities	SCN planning feasible and acceptable
	Understand SCN vulnerabilities and limitations	
	Understand SIOD capabilities	SIOD planning feasible and acceptable
	Understand SIOD vulnerabilities and limitations	
JOPP & AOC Lesson	Understand connections and similarities between JOPP and SPP	Understand how SPP can be used to align and synergize with joint planning
	Understand connections and similarities between CSpOC and traditional AOCs	Understand how CSpOC processes and capabilities can be used to align and synergize with joint operations
Mission Planning Lesson	List and describe elements of ME3C-(PC)^2	Apply for tactical mission planning
	Understand common MPC roles	
	Understand common MPC tools	
	List and describe mission planning activities	Apply for tactical mission planning
Debrief Lesson	Listed and define key debrief terms	Enable effective debrief
	Understand reasons for implementing the debrief process	Students recognize situations meriting debrief without prompting
	Understand methods for documenting and disseminating debriefs	Prevent Lessons Observed
Risk and ALR Lesson	Define risk terminology	Gain familiarity with joint language
	Lift and define the major components of	Understand relation to JOPP and SPP

	Joint Risk Analysis Methodology	
	Describe the four types of risk management decisions	Apply for tactical mission planning
	Describe the Risk Hierarchy Framework	
	Describe the Tactical Risk Management process and how it is applied to mission planning	
	Describe ALR and how it applies to tactical mission planners	
	Describe minimum force and minimum effect	
Scenarios and Planning	Interpret and apply orders to the mission planning process	Understand application of OPORDS/PLANORDS/WARNORDS/EXORDS/FRAGORDS
	Preform mission analysis using ME3C-$(PC)^2$	Develop feasible and acceptable mission plans
	Present mission plans to appropriate authorities	Gain familiarity with SMEAC-style briefs to appropriate commanders/authorities

Reprinted From: 55 CTS Weapons and Tactics Training Task List

Appendix C

DAF Courses with Joint Planning and C2 applicability.

1. 319 CTS Courses

   The mission of 319 CTS is to "Train[s] space warfighters to prevail in a contested, degraded, and operationally-limited (CDO) environment through live, virtual, and constructive space training courses."[1] The 319 CTS offers 3 courses that can assist operational space C2 centers on the topics of C2 and joint planning.

   - Spacepower Discipline – Space Battle Management Online Course (SPD-SBM-OL)
     "The purpose of this course is to prepare Guardians transferring between SPDs or for their first assignment in a Space Battle Management billet."[2]

   - Space Warfighter Prep Course (SWPC)
     "SWPC is designed to prepare space professionals to effectively augment theater Air Operations Centers during exercise and real-world contingencies. This course provides both academic instruction and hands-on equipment training needed to prepare graduates to integrate air and space power in global support of theater commanders."[3]

   - Spacepower Discipline – Space Battle Management Missile Warning and Missile Defense Course (SPD2-SBM-MW/MD)
     "The course begins with the history of MW/MD and current US law, policy, and doctrine affecting the mission area. To achieve the CSO's goals for Space Force to use innovative thinking, balance risks, and make decisions at the lowest appropriate level, the course introduces creative thinking, problem solving, decision making, mission planning, and tactics, techniques, & procedures development processes. Students analyze MW/MD organizations, roles, relationships, tasking processes, and data flow. Finally, the course dives deep into space- and terrestrial-based MW/MD systems and architectures and how they work together to achieve the commander's intent."[4]

2. NSSI Courses

   "The National Security Space Institute (NSSI) is the Department of Defense's premier source for space continuing education."[5] Its mission is to provide "worldwide responsive and relevant space professional continuing education...to develop graduates with the intellectual capacity and agility to deter conflict, defend capabilities, and defeat aggression in the space domain."[6] The NSSI offers three courses that could support the disparity of training offered by CSpOC/Del 5 and other operational space C2 entities.

   - Maritime Space Operations Integration Course (MSOIC)

"The purpose of MSOIC is to prepare Navy Maritime Space Officers (MSO) for a career in integrating Joint and national space capabilities to support maritime operations and leveraging maritime capabilities to create space effects in support of Joint commanders. The secondary purpose of the course is to educate other Navy officers, and other military and civilian members of the U.S. Government who may directly or indirectly support space and maritime operations through their responsibilities in Joint commands."[7]

- Joint Space Planners Course (JSPC)
  "JSPC is a course designed for military and civilian members from the United States and select partner nations destined for, or currently filling, space planning billets. JSPC graduates will be able to apply the operational art and operational design model to the Joint planning process for the space warfighting domain. In addition, graduates will be able to construct an Operation Order (OPORD) from the course of action selected during the Joint planning process."[8]

- Joint Integrated Space Team Course (JISTC)
  "JISTC is a course that provides space education for U.S. personnel that are/will be assigned to USSPACECOM Joint Integrated Space Teams. The purpose of the course is to produce graduates who can assess, plan, and integrate space capabilities in support of Joint operations. The students will integrate space capabilities and equities within plans and operations at CCMDs, assess the strategic environment, and identify the actions and capabilities required to gain and maintain space superiority and provide space support to operations in all domains."[9]

3. 505 TRS Courses

The 505 TRS "...is designated as the Air Operations Center (AOC) Formal Training Unit (FTU) for the Department of Defense" and its "mission is to train joint and coalition warfighters on command and control (C2) processes and systems used to employ air, space, and cyber at the operational level of war for geographic AOCs and functional OCs."[10] The 505 TRS offers two courses which could potentially assist the USSF with training operational C2 and joint planning concepts.

- Air Operations Center (AOC) Training:
  "Fourteen initial qualification training (IQT) courses spanning the five divisions of the AOC and specialty teams"[11]

- Joint Air Operations C2 Course (JAOC2C):
  "C2 training for joint and coalition personnel, O-5 and below, requiring familiarization training in the execution of the air tasking cycle and basic weapon system operation; primary customers are service liaisons and AOC/OC specialty team members."[12]

The 505 TRS has historic ties to the space C2 and planning community. Prior to 2014, members selected for an assignment to the JSpOC or 614 AOC attended IQT at the 505 TRS as a temporary duty in-route to their assignment. In 2014, Air Education and Training Command assumed the requirement for JSpOC/614 AOC IQT from the 505 TRS. At this point, 505 TRS course attendance was no longer required but remained desirable as resources permitted.[13]

4. LeMay Center Courses

The LeMay Center is "...charged with educating warfighters through resident and distance learning courses."[14] The LeMay center offers two courses which could be of benefit to the USSF regarding instruction on joint planning and operational C2 concepts.

- Joint Air Operations Planning Course (JAOPC)
  "JAOPC is a nine-day course that produces skilled air planners with proficiency in the application of the joint planning process for air (JPPA) at the operational level of warfare, allowing them to apply this process to nearly any problem set in the future. Students are prepared to serve on a joint force air component staff and learn to develop a joint air operations plan (JAOP) that integrates into a joint/combined campaign plan. Graduates will understand the service and joint doctrine concepts that underpin successful execution of Agile Combat Employment, mission command, the formulation and use of mission-type orders, and the CFACC's roles, planning responsibilities, and fundamental concepts."[15]

- Joint Task Force Staff Basic Course (JTFSBC)
  "The Joint Task Force Staff Basic Course (JTFSBC) is a 10-day, joint accredited course that teaches the Joint Planning Process (JPP) thru academics and real-world practicums to produce joint-capable planners and warfighters to operate effectively across all staffs/services in joint, coalition, and interagency environments. In addition to learning the JPP, JTFSBC students will graduate with an understanding of Joint All-Domain Operations (JADO), command relationships, the joint functions, and the production of five-paragraph mission-type orders."[16]

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Appendix D

Acronyms and Abbreviations

533 TRS	533rd Training Squadron
55 CTS	55th Combat Training Squadron
614 AOC	614th Air Operation Center
9COS	9th Combat Operations Squadron
ACSC-DL	Air Command and Staff College - Distance Learning
AFSPC	Air Force Space Command
AOC	Air Operations Center
C2	Command and Control
CGO	Company Grade Officer
CJFSCC	Combined Joint Force Space Component Commander
COD	Combat Operations Division
CSO	Chief of Space Operations
CSpOC	Combined Space Operations Center
CSTO	Combined Space Tasking Order
CTS	Combat Training Squadron
DAF	Department of the Air Force
Del 15	Space Delta 15
Del 5	Space Delta 5
ETMO	Enterprise Talent Management Office
IDE	Intermediate Developmental Education
ILE	Intermediate Level Education

IQT	Initial Qualification Training
ISRD	Intelligence, Surveillance, and Recognizance Division
IST	Initial Skills Training
JSpOC	Joint Space Operations Center
MET	Mission Essential Task
MPC	Mission Planning Cells
MQT	Mission Qualification Training
NSDC	National Space Defense Center
OPCON	Operational Control
PLE	Primary Level Education
PME	Professional Military Education
S4S	Space Forces - Space
S4S/CC	Space Forces - Space Commander
SATCOM	Satellite Communications
SBM	Space Battle Management
SDP	Space Doctrine Publication
SEI	Special Experience Identifier
SIOD	SATCOM Integrated Operations Division
SPAFORGEN	Space Force Generation
SPD	Space Power Discipline
SPD	Strategy/Plans Division
SpOC	Space Operations Command
SPP	Space Planning Process

STARCOM	Space Training and Readiness Command
SWP	Space Warfare Planner
TAC	Tacticians Course
TACON	Tactical Control
TRS	Training Squadron
USAF	United States Air Force
USSC	United State Space Command
USSF	United Stated Space Force
UST	Undergraduate Space Training

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