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The Future of Space Wargaming: Conflicting or Reasonable with What's Ahead?

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ABSTRACT

Space warfare has been a dream conquest for the few who are willing to fight and survive, since the early days of astronomy in the mid-16th to 17th centuries. Space is the most physically challenging of all the warfighting domains and operations in this domain are a strong contest between nations as well as others seeking to advance their interests spontaneously. The US Space Force was officially established by December 2019 to address these physical demands of the present age, also known as the Information or the Digital Age, for American defense against all odds of adversaries attempting to sabotage the way of life for all Americans. This research paper introduces the concept of space wargaming and how it can be applied for military applications of approaching or conducting space warfare through illustrative examples of definition, doctrine, principles of war, and rules of conduct and engagement across the board. The Space Force has been struggling to develop a consistent warfighting culture, in comparison of the other military branches across the board, so this paper also emphasizes on implementing joint-operations driven missions that are training or preparing to

approach space warfare against the powerful odds of their adversaries, such as Russia and China. Next, this paper explains major principles both the DoD and the Armed Forces should abide by, in response to high senior officials and top ranked leaders from the national defense boards have declared space as a warfighting domain. It describes the major components of space wargaming, within the context of the following areas: mission planning and architecture, leadership and vision of the squadron space forces, economic support through relations with public-private institutions, joint command operations through various models or state of their architecture and historical context of wargaming in applications for modern society, especially the civilians (non-combatants of space warfare). A detailed analysis from both the military and civilian perspectives of space wargaming for a future space conflict is included throughout the paper to establish a non-bias, well-balanced approach of understanding and thoughts regarding the topic selection.

Keywords: Information Age, Strategy, Spacepower, Geopolitics, Strategic Restraint, National Interests, Multi-Domain Operations, Doctrine, Wargaming, Space Security, Techniques for Great Power, Theory and Analogies, Purpose, Warfighting Domain

El futuro de los juegos de guerra espaciales: ¿Conflictivo o razonable con lo que está por venir?

RESUMEN

La guerra espacial ha sido una conquista soñada para los pocos que están dispuestos a luchar y sobrevivir, desde los primeros días de la astronomía, a mediados del siglo XVI al XVII. El espacio es el más desafiante físicamente de todos los dominios bélicos y las operaciones en este dominio son una fuerte competencia entre naciones y otras que buscan promover sus intereses de manera espontánea. La Fuerza Espacial de EE. UU. se estableció oficialmente en diciembre de 2019 para abordar estas demandas físicas de la era actual, también conocida como Era de la Información o Digital, para la defensa estadounidense contra todas las probabilidades de adversarios que intenten sabotear la forma de vida de todos los estadounidenses. Este trabajo de investigación presenta el concepto de juegos de guerra espaciales y cómo se puede aplicar a aplicaciones militares de aproximación o realización de guerra espacial a través de ejemplos ilustrativos de definición, doctrina, principios

de guerra y reglas de conducta y compromiso en todos los ámbitos. La Fuerza Espacial ha estado luchando por desarrollar una cultura de guerra consistente, en comparación con otras ramas militares en todos los ámbitos, por lo que este documento también enfatiza la implementación de misiones impulsadas por operaciones conjuntas que entrenan o se preparan para abordar la guerra espacial contra las poderosas probabilidades de sus adversarios, como Rusia y China. A continuación, este documento explica los principios fundamentales que tanto el Departamento de Defensa como las Fuerzas Armadas deben respetar, en respuesta a que altos funcionarios y líderes de alto rango de las juntas de defensa nacional han declarado el espacio como un dominio de guerra. Describe los principales componentes del wargaming espacial, en el contexto de las siguientes áreas: planificación y arquitectura de la misión, liderazgo y visión de las fuerzas espaciales del escuadrón, apoyo económico a través de relaciones con instituciones público-privadas, operaciones de mando conjunto a través de diversos modelos o estado de su arquitectura y contexto histórico de los juegos de guerra en aplicaciones para la sociedad moderna, especialmente los civiles (no combatientes de la guerra espacial). A lo largo del documento se incluye un análisis detallado desde las perspectivas militar y civil de los juegos de guerra espaciales para un futuro conflicto espacial para establecer un enfoque imparcial y bien equilibrado de comprensión y pensamientos con respecto a la selección del tema.

Palabras clave: era de la información, estrategia, poder espacial, geopolítica, moderación estratégica, intereses nacionales, operaciones multidominio, doctrina, juegos de guerra, seguridad espacial, técnicas para grandes potencias, teoría y analogías, propósito, dominio de guerra

太空战争的未来：与未来相冲突还是合理？

摘要

自16世纪中叶至17世纪的天文学早期以来，太空战一直是少数愿意战斗和生存的人梦寐以求的征服。太空是所有作战领域中最具物理挑战性的领域，该领域的操作是国家之间以及寻求自发推进其利益的其他实体之间的激烈竞争。美国太空军于2019年12月正式成立，旨在应对当今时代（也称为信息时代或数字时代）美国防御的这些物理需求，以抵御试图破坏所有美国人生活方式的一切对手。本研究论文通过定义、

理论、战争原则以及全面行为和接触规则等说明性示例，介绍了太空战争的概念及其如何能用于一系列军事应用，以期应对或进行太空战争。与其他军种相比，太空军一直在努力发展一致的作战文化，因此，本文还强调实施联合作战驱动任务，即训练或准备在太空战中对抗俄罗斯和中国等对手的强大优势。接下来，本文解释了国防部和武装部队应遵守的主要原则，以回应“高级官员和国防委员会高层领导人宣布太空为作战领域”这一情况。本文描述了太空作战的主要组成部分，包括以下领域：任务规划和架构、中队太空军的领导力和愿景、通过与公私机构的关系提供经济支持、通过不同模型或架构状态开展联合指挥行动，以及作战的历史情境对现代社会的应用，特别是平民（太空战中的非战斗人员）。本文从军事和平民两个视角对未来太空冲突的太空战争进行了详细分析，以期在主题选择方面建立一种无偏见、平衡的理解方法和思想。

关键词：信息时代，战略，太空力量，地缘政治，战略克制，国家利益，多域作战，教条，战争博弈，太空安全，大国技术，理论与类比，目的，作战领域

Introduction

Upon the establishment of the US Space Force in 2019, the first Chief of Space Operations (CSO) General Raymond captured the essence of this space military branch, when he said, “We are forging a warfighting Service that is always above. Our purpose is to promote security and assure our allies and partners. Further, we will deter aggressors by demonstrating the capability to deny their objectives and impose costs on them” (USSE, 2021). This bold statement makes the American people wonder what it would actually take for the United States to demonstrate that capability of enhanc-

ing security in outer space, but many Americans fail to realize that wargaming is one step toward preparing to depict that ability into existence. Think about this—when a medical student goes to senior year of their medical school residency, they tend to bury their mistakes by using simulated patients to learn what not to do with patients for real-time medical operations at operational theaters (OTs). Throughout much of global history, wargaming or war games have provided life savings advantages for military conquests and logistical solutions to the Armed Forces during battle assessments as well as outside the battlefield in applications, such as knowing when to stop an invasion

from infiltrating into the businesses that are strongly powering a local economy after warfare (the Iraq War).

Wargaming also provided fatal blunders that has prevented the Armed Forces from achieving their objectives during their conflicts against adversaries and even prevented them from neutralizing their adversaries or stopping enemies from acquisitioning their entails; crippling their competitive advantage on the table. Historical insights suggest that history happens for a reason and does not happen with simple coincidence, so wargaming can establish the connection between military applications for outer space defense or offense approaches and the eventual consequences from wargaming for a civilization (a series of societies across the globe). Despite the fact that war games have often failed to adapt to the evolution of the Information Age on a timely basis, detailed perspectives from both the military and the civilian leaders suggest that space wargaming is worth implementing across organizations for a sustainable future. This is mainly because it creates a reasonable assurance of security from endangerment of lives from adversaries, preserves the American way of life, freedom and the pursuit of happiness, and creates a strong assurance of benefits arising from joint coalition of all military branches of the US Armed Forces to achieve similar notable causes of saving lives from the outbreak of a space war or even pushing the adversaries away from American spheres of hegemony and control at greater costs.

The Concept of Wargaming and Applications for Space Warfare

According to the RAND Corporation (2021), wargaming is typically defined as the “analytical games that simulate aspects of warfare at the tactical, operational, or strategic level, which are used to examine warfighting concepts, train, educate commanders and analysts, explore scenarios, and assess how force planning and posture choices affect campaign outcomes.” In other words, wargaming is not just a tool, but rather the state of the architecture system designed to emulate best decisions from a team through choice selection over time. An effective, strategized military leadership and cordial deployment of armed forces into warfare is considered to be an important aspect for any occupying or defending force(s), and wargaming comes into play for this purpose. Through long-term execution and implementation of wargaming exercises across the Department of Defense (DoD), the United States has effectively neutralized Chinese threats from escalation or aggression in the East Coast of the United States and the rest of Canada, during a current geopolitical crisis with both Russia and China. Both US Air Force Airmen and US Space Force Guardians shot down the Chinese balloons entering the North American as well as Canadian airspaces during the early days of 2023, which would not have been possible to achieve without wargaming. In this context, the United States has observed the potential threats of Chinese aggression trying to interfere with cap-

turing signals of intelligence and other intel sources to accommodate their plans of attacking the Western Hemisphere with brutality as well as series of transgressions. Wargaming provides those possibilities at great hands to gain higher ground through the space domain, which is evident through the

2023 Chinese Balloon Incident. Thus, it is imperative that the United States continues to implement such wargaming capabilities to preserve the center of influence from corruption within the hemispheres of Latin America, Middle East, and the rest of the world.



Figure 1: A F-22 US Air Force Pilot hovers closer to take down the Chinese Surveillance Balloon within the coasts of South Carolina and the Central Continental United States (February 2023). Source: *The Military Times* and the Department of Defense (DoD).

In a much broader context, the United States Armed Forces and defense agencies have executed the recovery of space debris and collecting major space assets through acquisition processes within the airspaces beyond low Earth Orbit (LEO). Through wargaming exercises from the recent years of modern warfare, the United States has been successfully implementing the concept of wargaming for future space conflicts through partnering with other allied nations, such as the United Kingdom (UK), Australia, and New Zealand, for the sponsorship of regional-inspired Joint Operations Command gaming exercises to protect the space enterprise for citizens as well as military/commer-

cial entities from foreign destruction alike. Henceforth, the tracking processes of orbital satellites and the correspondence of strategic reconnaissance programs are both strong, relevant applications for space warfare from the concept of wargaming. The US Army, for instance, improvises decision-making in and out of the battlefields through Battle Damage Assessments (BMDs) to nurture transparent images of impact caused by war (either proxy or direct) to the appropriate military commands (Diehl & Sloan, 2005). Along with the other branches of the US Armed Forces, the tacit knowledge of wargaming situations has been frequently considered for the course of military cam-

paigns and events that occur within the context of these campaigns through the Decision Making Analysis Assessment Report (DMAAR) and other methods of recourse. Without that knowledge of wargaming, the United States would

have a challenging season to execute appropriate action(s) of authority and influence to win over warfare circumstances through planning, along with decision-making models.



Figure 2: U.S. Space Force and U.S. Navy releases close-up photo ops of Chinese surveillance balloon recovery off Myrtle Beach, South Carolina following the shooting incident. Source: ABC National News (February 07, 2023).

Applications of space warfare would also become largely beneficial through the contributions coming from private and commercial sectors, thus resembling another aspect of vitalizing success for the American military campaigns in the space domain. Contracts could be sent to small businesses for their brilliant ideas on orchestrating wargaming instruments through the process of vendoring as well as accepting requirements approved both by the DoD and other Small Business corporations across the United States. Both in and out of the battlefield, gamers and video game developers could also be hired to create new war games for the military personnel as well as trainees within the Department of the Defense (DoD) agencies or even in corporate

work environments to boost the talent of the future workforce associated with military, defense, and contracting sectors across America. The most powerful reminder one should consider from this paper would be the major components of success within the space wargaming world, or in other words, what it would take for any Armed Forces of a nation to succeed from their vigorous outer space campaigns with the assistance of space wargaming for the future. Mission planning and architecture is what drives the concept behind wargaming to ensure that the missions assigned to squadrons or organized units within the military are valuable or convenient to perform as well as achieve through effective comprehension of networks that connect the pieces together within

one blueprint. No military unit wants to go into a battle of a major war with lack of organization and understanding of what is out there through risk analysis assessments. Strong leadership among senior and enlisted personnel of the Space Forces is going to remain the pivotal element for the United States and Her allied nations for effective conduct of warfare in engagement as well as correspondence to adversary threats.

By boosting the talent of the workforce across the nation, the United States will be bringing forth a strong economic support for warfighting programs through coalitions with both public and private sectors of the defense industries. The ultimate objective is to expand networks of both national and foreign military forces that are conducting joint command operations across the globe for the space domain through state of the architect models, thus paving the way out to identify who is friendly and adversary toward the interest of the American agenda in the space spheres. Over time, the long-term vision of wargaming applications for space warfare is the popularity diffusion through intent of frequent use, within the scopes of the modern society here in America, to primarily improvise among its citizens for critical thinking, mental readiness, and active preparation skills to dominate a future war conflict in outer space. Overall, space wargaming should not be taken lightly by both military and defense authorities of the United States of America, at this time, because it can be a pivotal tool to succeed in future space warfare and save the world from utter chaos that can

otherwise make transitioning to outer space very challenging for humanity.

Historian Perspectives of Future Space War and Space Wargaming

As recently highlighted from the abstract section of this paper, the second of many objectives emphasize a detailed analysis of the civilian and military historian perspectives of space wargaming for a future space conflict, which will also be further discussed in this section. From the lens of an historian in recent times, the future space warfare would not be depicted with a complete picture without introducing the connectivity of the domain's relevance to land and sea/ naval power analogies. Geocentrism is the key element discovered within those analogies largely thanks to the contributions of American naval historian Alfred Thayer Mahan. This is because the sea power analogy emphasizes the powerful connection between commerce and the military in modern terms of the "military industrial complex" (Moltz, 2019). Furthermore, the notion of sea and air power implies the strong possibility of environmental control and the ability of leading countries to exclude other groups from occupying such control, but it is much challenging to exercise such control in the space domain mainly because it is not concise how orbital space would be controlled. Unlike Bowen (2020), Moltz actually suggests that geocentrism is not necessarily evident for connecting within the spheres of influence

for space domain control through the context of sea and naval power analogies for military campaigns, so that is something to keep in mind. Defenses are extremely costly from space, and weapons systems are highly transparent that require sufficient forces to be reckoned with through precision, thus serving as additional influence of political impact for international relations (IR). Indo-Pakistani wars and Soviet-American wars have thrived tremendously on maritime campaigns from the latter half of the 20th and early 21st centuries that has allowed them to take control over the oceans, ports, and even pieces of terrestrial lands as well as gain hegemony and their respective standings of the global economy, but applying such ambitions of might to the context of space war would be misleading or even confusing because of these reasons. As long as space laws and treaties exist for international space security as well as in effect, Moltz further specifies that maritime analogies centered on securing ownership of as well as access to colonies may not be totally relevant to space. Thus, Moltz's intake on anti-geocentrism suggests that space wargaming should not be implemented because the ideals of geocentric mindsets would not be relevant for the military's preparation of the space conflict, which can mess up the minds of the senior leaders involved in such conflicts in the future and provide misrepresentations of the actual scenarios in outer space, if geocentrism is implemented across their gaming exercises.

Enhancing space security requires significant time, resources, and

fiscal energy to legally bind in major measures, encountered through a non-profit firm perspective, because of the following aspects: 1) rapid concerns of weapons testing since the 1960s, 2) rendezvous and proximity operations (RPOs), 3) space arms control and binding security mechanisms, 4) disarmament conferences and key takeaways, 5) space equity and verification processing mechanisms, and 6) prioritization of taking baby steps for action as well as decision-making (Samson & Warden, 2022). Space wargaming exercises should ensure that the United States Armed Forces are approaching with both offensive and defensive space capabilities to neutralize threats from harming the shores of American hegemony in outer space as well as balance intent and deterrence together with no mix-ups. The warfighter mindset should keep the primary goal in mind—prevent warfare from reaching outer space through such exercises at all costs, but if all else fails, then approach space warfare with the lessons learned through wargaming into context with the appropriate ideals and reasoning.

Comparison between educational wargaming in the curriculum of advanced military studies and game-based wargaming in the curriculum of professional development programs is provoking contrasting effects in how military leadership are implementing these variant wargaming systems that has resulted in a gap from professional wargaming for decades (Bae & Kearney, 2021). The March 2021 RAND report highlights that wargames provide a dynamic environment to explore and ex-

amine a variety of challenges as well as concepts along the strategic, operational, and tactical levels. Furthermore, in order to prioritize game-based wargaming through video games or 3D gaming materials over traditional educational-based wargaming stations through books as well as curriculum instruction, it is imperative to recognize from the findings of the report that educational-based wargaming is not going to be instrumental or provoking enough for educating and training future service officers against the powerful odds of Chinese and Russian military supremacy, on the other side of the world, so systemic reform is the main way to eliminate such concerns. Both historians Bae and Kearney also emphasizes on the importance of expanding professional wargaming through the ties of

both tactics as well as strategic thinking in the center for professional military operations command, based on the sample illustrative examples of the 1824 Prussian *Kriegspiel* gaming demonstration (a great tactical skill that has helped Prussia conquer Northeastern Europe during the Prussian wars) and the 1880 American *Strategos* gaming blueprint utilized by the Union Armed Forces, during and after the American Civil War. Strategically, all it takes for successful wargames to occur is bold military leadership, sufficient access to resources and finite meaningful techniques to approach warfare planning, and eager partners from anywhere in the world, who are ready to formulate as well as play out the possibilities to achieve objectives both in war games as well as battles in reality.

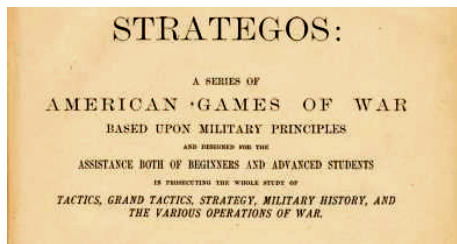


Figure 3. Sample Illustration of the 1880 American Strategos Gaming Blueprint.
Source: Playing at the World.

Comparatively, analyzing the prospects of enhancing strategic restraint for space security should be conducted with the following factors in mind: 1) emergency issues in international space management, 2) alternating scenarios for future space security relations, and 3) geopolitical/geocentric reconstruction of space nationalism, technological determinism backed up

by the Social Darwinist Theory analogies, and global institutionalism (Moltz, 2019). To break down into additional pieces of these factors, one can discuss more boldly about handling the emergency issues of international space management through the following protocol measures in context: 1) space “traffic control” and debris control, 2) space situational awareness (SSA), and

3) radio frequency crowding and GEO slot allocations. The alternative futures for space security improvises based on these existing management problems that provoke significant attention, which was not witnessed during much of the Cold War, but is there now simply due to an increase of the number of space-faring nations becoming involved in the space domain (Moltz, 2019). Communication is the main concern that all space-faring ventures franchises upon for such success in their operations on a daily basis, so if communications are interrupted or cut off from all ends, then managing international space security would become much of a havoc down the road. In this context, space wargaming and its effective planning from such exercises could provide control to the nations on managing that space security with meaningful objectives in mind. Research from the US Air Force Academy suggests that controlling space traffic maneuvers and collision avoidance involving

active space assets as well as spacecrafts in motion can be a problem as it would result in an enormous amount of debris dispersion out into the clouds of the orbital space. Space wargames can help avoid such control problems by implementing enhanced communication modes and operational procedures in planning stages among a variety of players (military personnel) to improve updates, transparency of such systems, and accuracy of such time-sensitive tracking data for signal relays. The possible use of nuclear reactors can also become a traffic issue as there is a considerable consensus for nuclear reactors to provide propulsion of space systems for operations, which can complicate space wargames because the state of the art technologies would not always provide a strong adaptability methods for players who are planning their missions to deploy to outer space ahead of the future war conflict, as geocentric political competitiveness takes over shape for the most part. Thus, it is highly sug-



Figure 4. Sample Space Traffic Management Depiction through Workshop (Possible Application of Organized Wargames in Context). Source: Aerospace Lectures.

gested that current space wargames for space warfare should improvise more on getting prepared with simple, safer architectural elements rather than complex ones that can trigger much more violation of international space treaties due to negligence, regardless of whether they are intentional or unintentional decisions.

Space wargaming has also become useful for space situational awareness (SSA) to address the challenges behind the development of space surveillance systems capable of combining and distributing information on orbital spacecraft as well as debris. Currently, only the United States has an effective system in place to monitor such data in outer space, but Washington has been working with other nations to promote safe practices through aerospace aviation as well as reducing chances of collision accidents through simulation ex-

ercises or set of protocols to follow and increase their spatial awareness while in orbit. Wargames can be pivotal for cases, such as the US Space Surveillance Network unable to provide recipient nations with maximum autonomy to achieve timely communications in exchange between signals received from Ground Earth to outer space and vice versa since 2009, thus indicating that they will be establishing such surveillance networks on their own accord. The goal of space wargames, in this context, must be to collectively bring awareness for the personnel involved in the mission through simulated training exercises, and private companies such as the startup company LeoLabs are implementing such gaming exercises to ensure that chances both for collision avoidance as well as catching nations not adhering to space laws related to debris or orbital hazards (Moltz, 2019).

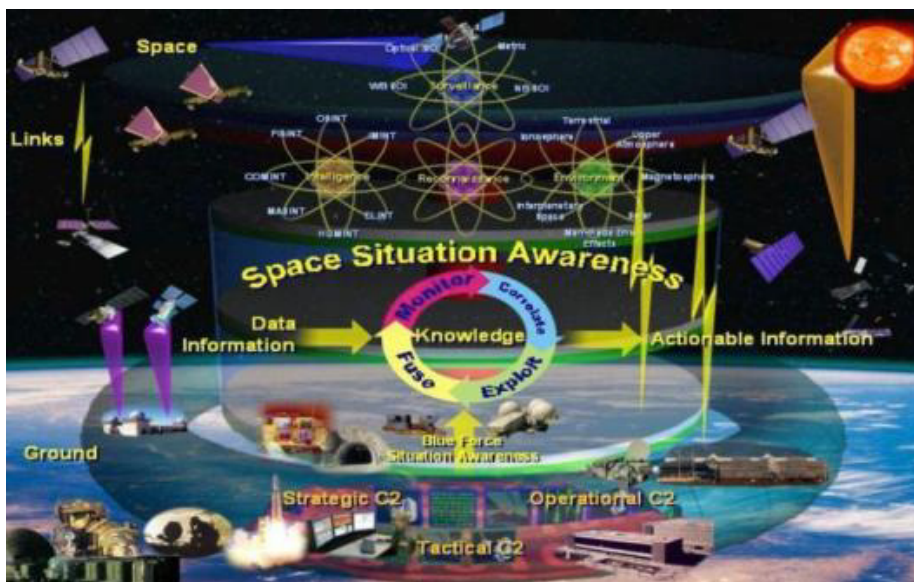


Figure 5. Strong Exchange of Correlation between Space Wargaming and Space Situational Awareness (SSA). Source: Asia-Pacific Research.

Space wargaming would also be influential for addressing the reduced availability of useful radio frequencies for space communications and the correspondingly limited availability of spots in GEO for communications satellites (Moltz, 2019). The 2003 invasion of Iraq effectively highlighted the strength of working with commercial entities to gather GEO satellites for reconnaissance and drone surveillance during intense war periods, which is a huge deal for American military operations because receivers gather a stronger ability to achieve quest for more tracking data without interference largely thanks to the gaming exercises. Laster communications can be another way to gather large amounts of information from spectrum crowding, even if technical gaps can influence such ability at some point in time. Military pressures in space would face the biggest struggle of all time: determining the necessary requirements for bandwidths or frequencies to gather intel and track satellite data during space operations due to rapid fluctuations of orbital speeds at any location within the space domain. Exploring such scenarios would not be resolved immediately upon deployment to such missions in outer space and without effective transparency of radio communications from these satellites means the interference of a space mission vital for national security interests.

The space doctrine of seven superpower propositions propagates that in order to achieve command of space, space warfare is the most meaningful way to achieve it, thus indicating an-

other purpose toward implementing as well as executing space wargaming exercises to achieve proper objectives from their plans or incentives leading up to the space conflict (Bowen, 2020). Proposition I's command of space refers to who has the authority to command or deny access to space infrastructure networks, especially satellites during wartime from various angles, with certain motives in mind politically, geographically, or economically. Otherwise, the rule of engagement for space command is useless for the Armed Forces. Proposition II's concept of spacepower for relevance to Earth-like societies only cautions the audience about viewing outer space as a domain that provides infinite possibilities to conquer and rule the universe, as illustrated through the works across popular culture because space is much more of a dangerous place to wage war and a difficult place to achieve full-range objectives than one could imagine.

Proposition III's two principles of decisive battle as well as the dominance of space command during war actually prioritize more on achieving the higher ground with minimal destruction and maximum achievement of preserving the integrity of the space domain for future generations of mankind (Bowen, 2020). Proposition IV details the importance of executive space wargaming plans in a blueprint map by specifying which lines will be main modes of communication, checkpoints for a military space mission, blockades and desirable holding positions for the offensive as well as defensive armies in orbit to ensure that the military forc-

es do not go confused into the domain battlefields across the board. Propositions V and VI draws heavily on the continental seaport and naval theory, in correspondence with the major takeaways portrayed by historian James Clay Moltz earlier, in outer space conflict. To clarify things further, Proposition V states that the Earth orbit is a cosmic coastline suitable for strategic recon movements, such as the processes of deployment, use and management of satellites with their services as well as data, across seas or oceans as well as land surfaces of major planets that are involved in the space conflict (Bowen, 2020). Simultaneously, Proposition VI states that spacepower is dispersed and imposes dispersion on Earth only at this present time, which means that approaching space warfare will be largely geocentric and should remain so, in the context of how navies from Earth actually conduct operations across land-based strategic missions over time (Bowen, 2020). In the end, the wisdom of military strategy to outer space presents a strong compelling new vision of Earth orbit as a finite coastline, rather a vast ocean or a battlefield within the airspaces beyond low Earth orbit (LEO). Frankly speaking, spacepower influences modern warfare and the performance of human activities in the space domain strongly impact military as well as economic hegemony here on Earth, thus must continue going into the 22nd century for strong development of the space forces orchestrated by the world's space-faring nations.

Military and Senior Leadership Perspectives of Future Space War and Space Wargaming

At the same time, military and senior leadership perspectives of future space war will powerfully highlight that the US Space Force is not the only one to prioritize its commitment of defending the United States from foreign aggression in the space domain through examples highlighted by senior officials from the US Army, Marine Corps, and Air Force for this section.

Space Warfare Perspectives from the United States Army

Sun Tzu once said, "The skilfull leader subdues the enemy's troops without any fighting; he captures their cities without laying siege to them; he overthrows their kingdom without lengthy operations in the field." This 3000-year-old quote speaks in large volumes, especially when discussing more about the American perspective viewpoints on a future space war, because the United States is preparing for a war in the space domain, but not necessarily planning on targeting that objective first before other adversary nations. While the United States could hope that adversaries show restraint from trying to exploit its dependence on space warfighting capabilities, the chances of security restraint shown by adversaries, such as Russia and China, are slim to low, so Americans must lead the higher ground with peaceful ambitions in mind before the first shots. For instance, US Army

Captain Nicholas Descehnees (2019) shares a strong analysis on the inadequacy of current international space legislations toward armaments and destabilization of rapid, volatile weapons testing, solution to evolving threats due to decentralized and unorganized approaches taken by the military leadership of the DoD as well as the Pentagon. On the basis of encounters dealing with official space policy matters, dominating space integrates American military dominance into existence simply because its space capabilities protect the most valuable asset the global civilization can have—human life composed of a capable population pool here in America and the globe. The United States need to approach global space diplomacy with transparency in mind to reform the launch and space system payloads, deploying warfighter and wargamer personnel into work through multinational organizations along with the United Nations for greater boost to the initiation of conferences as well as workforce development, and introduce protocols to achieve maximum compliance to proposed space policies with reforms to decrease the escalation of Cold War-like tensions between the United States and other global superpowers (Descchenes, 2019). That way, American strategists can work with other influential leaders to formulate formidable rules of engagement that are just, fair, and congruent with the approaches of modern warfare, without disregarding the human life into shape for future space conflict. Preserving the integrity and sovereignty of outer space domains highly depends on philosophies from

ancient military leaders like Sun Tzu and the current diplomatic approaches made by the American military as the global world power in the space sector. Long story short, if the United States retains its reliable political strength and confidence to establish international space policy with concision, then it would be convenient for the national strategic leaders to assign higher military authorities with clear rules of engagement and objective mission benchmarks and lower-ranked tactical leaders (sergeants and non-commissioned officers) the opportunity to generate standard operating procedures from specified assignments or even dominate the battle stations from all grounds (lower and higher) when the first shots are fired (Deschenes, 2019). One must remember that the United States should take the war conflict to outer space as the last and final resort, if the adversaries target the space domain first through the “waiting before firing” doctrine. Based on this case study perspective, it is important that a subject matter expert (SME) shares the key solution with the expression as one can put out like this: *“DELEGATION OF AUTHORITIES AT THE RIGHT PLACE, AT THE RIGHT TIME.”*

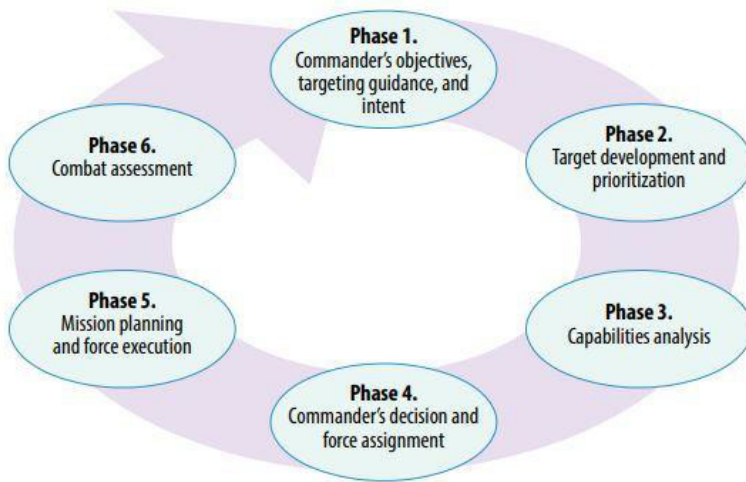
Moreover, US Army Major Kyle David Borne (2019) shares a strong reflection on targeting across multi-domain operations (MDOs) to involve the space domain through target deployment relationships, nonlethal objective targeting through the Joint Targeting Cycle and Objective Multi-Domain Task Force Task Organization (OMDTFTO) as effective

instruments to approach warfighting within the Armed Forces, not just in the Army. For example, the experiences of a small group of senior military advisers and planners executed four joint and command-post exercises (CPXs) and essentially achieve their primary focus of incorporating space, cyber, and electronic warfare (EW) effects into movement schemes terrestrially as well as with air and naval domains here on Earth (Borne, 2019). Indeed, these exercises can serve the military leadership both from the DoD and the Pentagon as a reminder to reconsider such joint exercises for implementation with different approaches of elementary space warfare for now to ensure that the US armed Forces will prepare for the future space conflict way ahead of the global league before it actually erupts into the space domain. Doctrine and policy decision-making will remain pivotal toward executive these tools into effect for work functions (Borne, 2019). Conclusively, the Multi-Domain Task Force (MDTF) brings forth together the traditional Army units with new units hailing from other branches and establish windows of rendezvous conventions (or meetups) across all five warfighting domains, especially the space domain, to enable joint operation maneuvers in contesting access/denial environments. The ultimate achievement for monumental success with joint-branch coalition commands is to develop the MDO doctrine with a presence of mind about how the MDTF translates joint targeting into tactical action and eventually polish any gaps among those processes before deployment into the battlefield

domains (Borne, 2019). With that being said, senior military commanders and staff members need to change their frames of thinking from exclusive lethal targeting through ammunitions as the primary method of engagement to also non-lethal means, which is very important to consider for space warfare because the last thing any nation would want is an outbreak of warfare breaking all security treaties or legislations already in effect. Targeting needs to be conducted in the joint environment based on the joint targeting cycle model at all times, not just during the conflict, to ensure that adversary threats are neutralized or even dispersed from the domain spaces over time.

Space Warfare Perspectives from the United States Marine Corps

It is astonishing that the Marine Corps could operate in the space domain as the Space Marines for the naval power exercised across the universe in future space conflicts, which makes it an article of conviction for the Space Force to recognize that it will have a warfighter branch to assist during their covert operations in deep outer space, whether on planetary surfaces and/or sea-based oceans within those planets in the future. For example, the US Marine Corps University launched the resident Wargaming Cloud that will serve as a universal access both to the Marines and other personnel from military branches across the DoD for the library of digital wargames composed of historical and future wargames, especially the cyber ones (Phillips, 2022). The new Wargaming Cloud now executes its ability



(Figure from Joint Publication 3-60, *Joint Targeting*, 28 September 2018)

Figure 2. Phases of the Joint Targeting Cycle

Figure 6. Phases of the Joint Targeting Cycle. Source: Major Kyle David Borne (US Army).

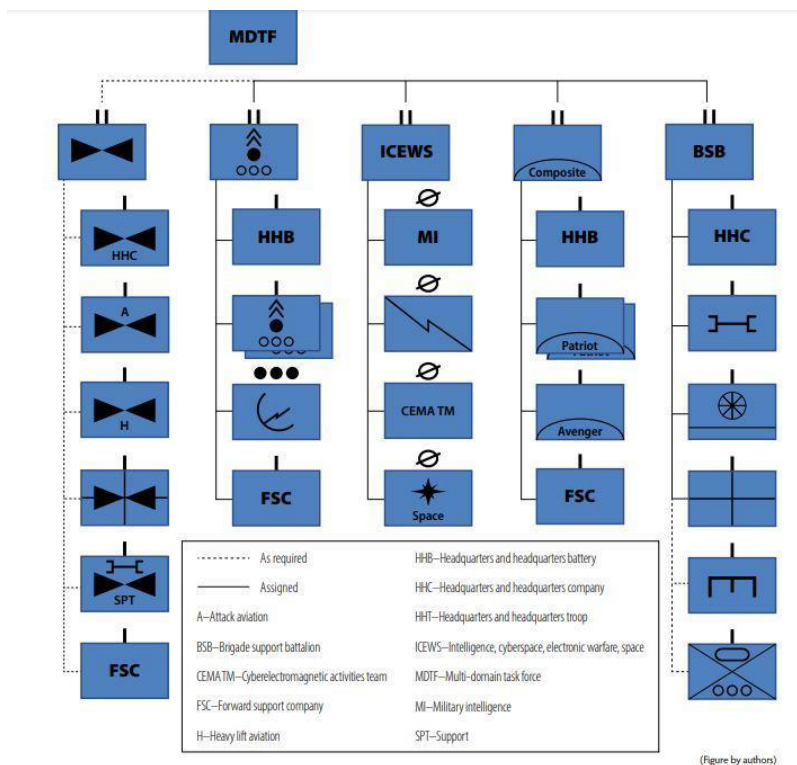


Figure 7. Sample Depiction of the Multi-Domain Task Force (MDTF) Wargaming Organization in Place for a Future Space War across Multiple Domains. Source: Kyle D. Borne (US Army).

to expand wargaming opportunities beyond the classroom and serve as a meaningful program for professional officer development during as well as after conflicts, which is something that can also be performed on personal devices with family or friends (Phillips, 2022). In the context of complexity and unique dynamics the modern battlefield presents, this wargaming project demonstrates that the US Marine Corps

is leading a strong public outreach to civilian and military populations with great hands, so they can challenge their decision-making skills at their own time, at their own pace. Indeed, there is no doubt in mind that this project will also become available for non-resident military students for effective work functions associated with wargames and strategic operations in the military.



Figure 8. Two junior marines playing a tournament-styled war game Memoir 44' to analyze individual Marines' decision-making aptitude on Camp Schwab, Okinawa, Japan. Source: Corporal Timothy Hernandez, 3rd Marine Division (US Marine Corps).

Memoir 44' serves as an instrumental wargame for junior marines hailing from the 4th Marine Regiment and 3rd Marine Division, based in Okinawa, Japan, as it provides them the chance to reveal themselves with the type of personalities and mental mind-sets they would bring forth if they were to be deployed into the battlefield (Hernandez, 2019). With the new Wargaming Cloud project coming into shape across the Marine Corps, it would be excellent to see these marines who are deployed to overseas get the access to that university and largely benefit from it with the following results: 1) less time

for instructors and commanders to spend time with these junior marines, especially if they have other mission assignments on their workload checklists, 2) more direction of focus to improvise on knowing what to improve strategically for their decision-making aptitudes over time. Regardless of whether the wargames focus on historical and future war situations or not, this example suggests that wargames, such as the Memoir 44', should be integrated with the Wargaming Cloud encyclopedia together to cut down the costs and the length of training for military personnel as well as boosting the chances to

deploy for major missions punctually (Hernandez, 2019). Saving money, providing mentorship with freedom of choice, and sound judgment of warfighting concepts from combat-based scenarios are also another huge set of benefits from the integration of certain wargames with bigger library projects dedicated to helping the Armed Forces with covert space operations in the near future. Thus, it is wise to conclude that the Marine Corps are on their game to achieve this objective, and the Space Force can be rest assured that they can also provide physical as well as tangible reinforcements in future space missions, both during conflict and peacetime periods.

Space Warfare Perspectives from the United States Air Force

Perspectives shared by officials from the Air Force suggests more on actually using simulations first before implementing exercises into reality, which is another valuable aspect of space wargaming one would witness across certain parts of the Department of Defense (DoD). From recent times, the relevance of wargames for military professionals can be corresponded along with illustrative examples of when student doctors are utilizing simulated patients or body mannequins to treat and diagnose medical procedures to learn from their mistakes before they treat actual patients at the Operation Theaters (OTs) (Caffrey, 2000). Chronological history of events leading up to modern wargaming and conventional exercise approaches is a testament to that relevance. However, the example of spend-

ing and innovating more into space wargames going into the new millennium did not always provoke strong results for the United States, with the disastrous failures from its participation in the Kosovo and Bosnia wars that dealt with NATO's air campaigns across the skies of Eastern Europe (Caffrey, 2000). Nonetheless, the awareness of commercial space wargaming became evident throughout the recent military campaigns of the 1990–91 Operation Desert Storm, the 2003 Iraq invasions, and the ongoing War on Terror, as both commercial and military corporations are working hands-on collectively to provide the best space technologies to enhance powerful effectiveness in and out of the battle stations beyond duty. Moving from the late 1990s, the historical case study suggests that wargaming will be going global on a consistent basis to mechanize the best of planning options for military advisers and formulate a series of rendezvous operations to promote national security interests with greater hands. Indeed, this holistic presentation on history-based doctrine for wargaming with the Air Force Warfighting Development Centers and beyond suggests that the United States will now have to aim on formalizing the main objectives of rules of engagement as well as center of influence that can greatly impact its' odds of success in the future space war.

In accordance with the Sun Tzu's philosophy of making the most military impact with fewer destruction and utter chaos from war, it is suggested that the United States Air Force leads by example for other military branches



Figure 9. Air Force Colonel Caffrey's Wargaming Presentation in Short Lens.
Source: Air Force Warfighting Development Center.

to conduct space warfare, based on the following elements: 1) satellite posture, 2) space situational awareness (SSA), 3) doctrine and will, 4) maneuver, 5) unusual orbits, 6) pre-conflict holding position stances, & 7) defining the concept of winning the war (Szymanski, 2019). To condense down even further, it is imperative that the United States should exercise wargaming operations with the enlisted and senior personnel based on the following principles of space warfare: 1) dominating and survivable pre-conflict satellite positioning and extensive satellite on-board maneuvering fuel is utmost important to hold higher ground, 2) conceived notions for strong Space Situational Awareness (SSA) and pivoted Predictable Battlespace Awareness (PBA) will provide convenience for deployment of space domain forces into existence within orbit, & 3) effective doctrine and political motives behind major space campaigns is a must for boosting morale to counter adversary military actions in the space envi-

ronments for longer periods (Szymanski, 2019). To keep things in mind, space wargaming should focus on these principles to ensure that the Armed Forces and space-faring corporations working with the military should directly aim to neutralize threats and authorize direct or indirect military actions with a strong conviction of preserving the integrity of the ecosystems humanity has the privilege to explore in peace as well as protecting the American way of life. Discussing more about the specific strategies of space warfare in the context of various levels or approaches will require another article of its own, but the future of space wargaming is reasonable and relevant within the Air and Space Forces because of these three main principles highlighted earlier.

Space Wargaming Perspectives from the Senior Corporate Leadership

The theory and purpose behind the importance of wargaming exercises in

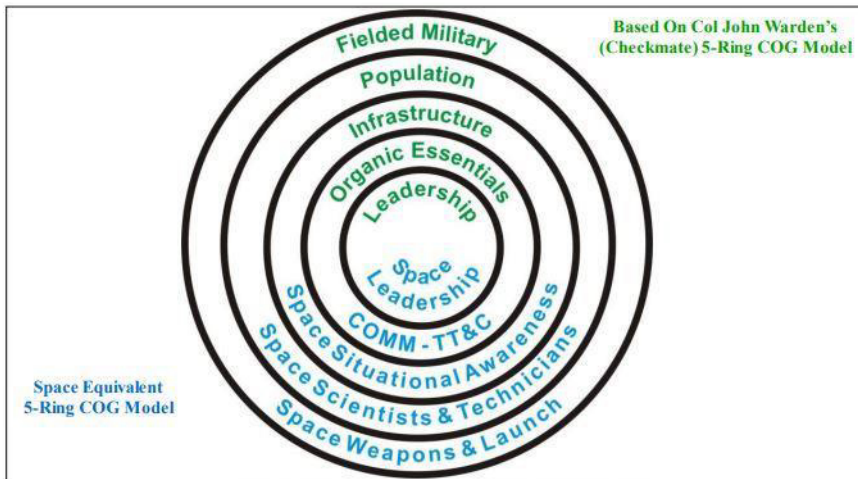


Figure 10. Space Centers of Gravity Model that Influences Three Principles of Space Warfare. Source: Winter 2019 Strategic Studies Review (US Air Force).

the current-day information age came into the context of how modern wars were approached by the leaders of both military and corporate worlds. With the rapid advancements of human ergonomics, society, welfare, and warfare within the previous twenty years, modules, simulations, models, and gaming systems have merged into one with each other, which means that the certainty of certain games actually provides human beings the chance to reflect on critical questions beneficial to their success of valuable missions in the long haul (Bracken & Shubik, 2001). In short, the gold ties in human thought-assisted by modern communication and computers, not distracted by them. For over three decades, transforming business environments with credit cards and e-commerce for Americans around the globe suggests that as long as personnel can wrestle their skills away from technicians and developers, then they can achieve what they set forth to getting into, which is a great way to approach

space wargaming in the long run. Wargaming became a pivotal source for theoretical decision-making because it became a tool that humans can use for purposes, such as operations research, artificial intelligence (AI), game theory, simulation, and formal organizational theory (Bracken & Shubik, 2001). Wargames based on paths and routing destinations from selection of certain paths need to be placed with utmost emphasis because strategic decisions are made chronologically over an extended period of time to prepare for long-term consequences rather than short-term crises with one set of gaming scenarios, such as nuclear weapons testing, arsenal power testing, etc. (Bracken & Shubik, 2001). Thus, it is imperative that the United States would have to begin considering long-term results from wargame scenarios, such as economic damage-exchange ratio of a contracted defense missile competition, going into the future. As explained earlier in the paper, wargaming had a distinctive past

and should have an important, formidable future by complementing strategy (method of execution) and computer gaming systems (tool), similar to how IT corporate companies are functioning across the globe. The biggest lesson to learn from this case study perspective is that the more strategic the problem, the more difficult it is to obtain funding to examine it, yet military history, political science, and social psychology factors can make space wargaming much more relevant for a reasonable future with an increasing demand for computer systems to enhance weaponry as well as military or national workforce strength.

Meanwhile, wargaming is considered a craft worth mastering across both business and military worlds for decision-making. Not only do games cost thousands of dollars, long hours, and energy, but such results can influence important operational as well as strategic decisions. War games are only useful if game design, execution, and analysis are conducted with both discipline as well as rigorous principles (Rubel, 2006). Those who believe in the value of war games must now link up and work toward the goal of professional wargaming (Rubel, 2006). At the end of the day, both military and corporate organizations should aim to provide opportunities with fixing and controlling possible routes of gaming scenarios beyond classroom instruction in modern times for maximum success. Any gap(s) of these wargames would be detrimental and catastrophic for players involved to get a mission done. Corporate leadership achieves good and worthwhile from wargames that provoke meaning-

ful effects beyond operations, as they also play a pivotal role to defend the American way of life here at home and abroad.

Conclusion

What is the future of space wargaming? Where is space wargaming heading toward the end? As US Air Force Retired General Lance W. Ford explains, "The bottom line is our space capabilities save lives and minimize destruction." This paper illustrates that the US Space Force may have been lacking the warfighting culture it typically needs out of necessity due to being the youngest service branch out of all the other branches, but many other branches of the United States Armed Forces are also stepping out with their enlisted as well as senior leadership to approach the problems of the warfighting domain through war gaming environments on a regular basis across classrooms, training rooms, and briefing rooms. Developing the warfighting culture now does not just rest on the shoulders of the Air and Space Forces, but also on the rest of the military and the Department of Defense (DoD). Processes suggest that the likelihood of collateral damage as well as civilian populations dying from adversary attacks here at home is far low when joint-branch coalitions take on the responsibilities together with proper leadership as well as guidance, so there is no doubt that space wargaming can instruct military personnel the concept of working together to achieve valuable objectives that can save bil-

lions of people from having to wake up with another apocalypse or a group of terrorists and hackers invading their digital networks. The power of the Information Age and its evolution suggest that despite the challenges of operating systems needing to keep up with system updates at a rapid pace, these system updates will be worth it at the end, so data can be extracted and fetched quickly to determine or neutralize threats from offshoring the coasts of the United States. War games provide military leaders a chance to lead by example in taking down elements that put people and troops in harm's way, which saves the lives of everyone involved in space missions, not just civilian populations.

War games cost a tremendous amount of money; every update digital simulated environments are mandated, but the cost-benefit analysis provokes an interesting outlook of how updating such systems of gaming environments can actually benefit warfighting in the long run. Civilians are even implementing these concepts of war games even in corporate offices across the United States, as they are designating roles within their companies of individuals as entities who are either coming to the

operations with an open hand to help or take for their personal gain, as an example. Garnering political strength and establishing international space policy will ensure that what the military does through war game simulation environments can be followed through rules of engagement and accountability of conduct in actual space warfare, in order to effectively dominate the battlefield when the first shots are fired for an outbreak of war. Being the protectors of all fundamental assets essential for space operations is the best of all roles rather than being the aggressors disliked by other space-faring nations is the best optimal choice any nation can make, and the United States now has that chance to make this choice. In the end, the goal is to not just save lives, but ensure that the integrity and self-sovereignty of the United States is preserved the way it has been since 9/11 at all costs, and the space domain is just another opportunity America needs to prove its military worth through wargaming. Without wargaming, the value of learning as well as discipline built from learning will be vanquished across the military and beyond the military sector over time.

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APPENDIX

CSO	Chief of Space Operations
USSF	United States Space Force
DoD	Department of Defense
OT	Operational Theater
LEO	Low Earth Orbit
UK	United Kingdom
BMD	Battle Damage Assessment
DMAAR	Decision Making Analysis Assessment Report
IR	International Relations
RPO	Rendezvous and Proximity Operation
SSA	Space Situational Awareness
GEO	Geocentric
SME	Subject Matter Expert
MDO	Multi-Domain Operation
OMDTFTO	Objective Multi-Domain Task Force Task Organization
CPX	Command-Post Exercise
EW	Electronic Warfare
MDTF	Multi-Domain Task Force
PBA	Predictable Battlespace Awareness