Research Report

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Supporting Coast Guard Readiness with Strategic Gaming

HSOAC
HOMELAND SECURITY
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About This Report

Gaming is a research methodology that explores human decisionmaking played out in a synthetic environment. Strategic gaming for the United States Coast Guard (USCG) is a new initiative, with the first bespoke USCG game report, *Paratus Futurum Strategic Gaming*, published in 2024. This research builds on that, aiming to provide the USCG with a detailed analysis of the opportunities, challenges, benefits, risks, and needs associated with developing and sustaining gaming capabilities within the Service. The primary audience for this report includes USCG leadership and decisionmakers responsible for strategic planning and resource allocation, the U.S. Department of Homeland Security (DHS), and members of Congress. Leveraging prior RAND research, interviews, and a review of gaming practices in other military services, the methodology combines qualitative and comparative analysis to present a comprehensive overview and actionable recommendations.

This research was sponsored by the Office of Emerging Policy and Strategic Foresight and the U.S. Coast Guard and conducted in the Infrastructure, Immigration, and Security Operations Program of the RAND Homeland Security Research Division (HSRD), which operates the Homeland Security Operational Analysis Center (HSOAC).

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Summary and Key Findings

This RAND report identifies opportunities, benefits, challenges, risks, and needs associated with building and sustaining gaming capabilities within the United States Coast Guard (USCG). It also presents analysis that may enable USCG leadership, the Department of Homeland Security (DHS), and members of Congress to make informed decisions on the future of gaming within the Service. Key findings from this analysis include:

- Games are valuable for generating insights into human decisionmaking, exploring new, complex, or uncertain problems, evaluating strategic plans, and training future leaders.
- The uniqueness of USCG missions and authorities shapes the USCG's strategic gaming needs, including interorganizational engagement and bespoke game design.
- USCG senior leaders should establish a clear direction and vision for the role of gaming, including awareness of the risks and benefits, to ensure credibility and confidence among stakeholders.
- In the near-term, the USCG should establish a coordinating function to maintain awareness of USCG gaming activities (internal and external), share results, and manage a documentation repository.
- The USCG should mitigate the limits and potential misuse of gaming by establishing standards, managing expectations, and embedding analytical game results into the larger cycle of research.

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Chapter 1. Introduction

This RAND report aims to identify opportunities, benefits, challenges, risks, and needs associated with building and sustaining gaming capabilities within the United States Coast Guard (USCG). Strategic gaming is a new endeavor for the USCG. In 2022 and 2023, the USCG held a series of analytical games called *Paratus Futurum*, which produced insights that generated significant interest in continued gaming for the USCG. Nascent capabilities come with challenges and an unavoidable learning curve, while also providing opportunities to emulate established best practices and avoid certain traps and pitfalls. This report also presents an analysis that may enable USCG leadership to make informed decisions on the future of gaming within the Service. The project was guided by the following research questions:

- What are the benefits and risks of strategic gaming for the USCG?
- How should the USCG maintain its institutional memory and knowledge of gaming?
- What courses of action are available to the USCG to develop gaming capabilities, and what are the tradeoffs and benefits of each?
- Where in the organization should gaming capabilities reside?

This report is structured to provide an overview of the strategic use of gaming in military and non-military contexts and lay a foundation for readers in gaming typologies, purposes, value as a research methodology, and limits and misuse. We explore specific applications of gaming for the USCG, with key benefits and opportunities identified, as well as challenges and risks that the USCG would face in incorporating gaming as a credible decisionmaking tool. This report also presents a comprehensive framework for the development of gaming capabilities, which was used to evaluate a set of implementation plans and milestones for the USCG. The milestones are designed to be implementable in phases, each one building upon the previous. They progress in cost, complexity, and time to implement – ranging from a near-term program, emphasizing coordination and maintaining institutional knowledge, to a long-term full-fledged organic gaming capability.

We emphasize that the implementation milestones are not mutually exclusive – rather, they complement and build upon one another. They are designed for a phased approach to implementation, allowing the Service to build on its current efforts and achieve long-term success in integrating gaming into its strategic planning framework at a chosen level of effort. By presenting a thorough analysis and a range of actionable options, this research aims to support the USCG in maximizing the potential of gaming as a decisionmaking tool, ultimately contributing to the Service's readiness and effectiveness to address future challenges.

On Nomenclature

The subject of this report – gaming – is known by many names. Most often, it is called wargaming, even when used in non-war and non-military applications. Across the interviews conducted for this research, the issue of nomenclature came up numerous times, enough to warrant a short treatment here. There is a cultural resistance to the term "wargame" within the USCG. This resistance is merited by the argument that, although the USCG is counted amongst the defense services, it has a different orientation to its mission set than the military branches located under the Department of Defense (DoD). On the other hand, increased exposure through cross-pollination with DoD, other Department of Homeland Security (DHS) components, and partners using wargames (from the local to international level) may be shifting cultural resistance to the term. In published literature and in casual conversation, the gaming that is under discussion in this report is most often called "wargaming," but is also known as "gaming," "professional gaming," "serious gaming," "analytical gaming," "policy gaming," or the lengthy "gaming for national security policy analysis." The issue of nomenclature will likely continue to be something with which the USCG will wrestle; as a basic example, though "game" is a flexible term that is easily used as a shorthand for any of the synonyms listed, it is also easy to confuse with recreational activities. Case in point: "Coast Guard Gaming" is currently the name of recreational *e*gaming within the USCG.[1] However, because the term "wargame" has not been widely adopted in the Service, and might be misleading to unfamiliar readers, we use the term "gaming" most often for this report, with "strategic gaming" referring to the USCG's use of gaming for strategic purposes. Regardless of nomenclature, we are at all times referring to a single research methodology and do not mean to indicate any substantive differences in process, outcomes, or validity.

Methodology

We used qualitative methods to collect and synthesize information for this report. We reviewed open-source literature and engaged RAND's institutional subject matter expertise by drawing from published and unpublished RAND reports, coupled with interviews of experts on building and sustaining institutional capacity for gaming. In addition, we held discussions with members of the USCG, the DoD, and international military professional gaming subject matter experts (SMEs) for insight into gaming in general and into USCG gaming specifically. The semi-structured protocol used as a basis for these discussions is included in Appendix A.

We synthesized the information collected through these sources to develop a framework for developing gaming capabilities, which we then used to develop low, medium, and high resourced plans and milestones for the USCG. We did not perform an in-depth analysis of financial cost,

[1] U.S. Coast Guard, "Coast Guard Gaming," webpage, undated.

complexity, and time to implement; rather, these resourcing levels are notional and relative. The plans and milestones presented are intended for leadership to use as an aid in visualizing the form that capabilities might take and the tradeoffs of different levels of effort. The work presented here is a first step toward a more nuanced analysis of the scope, capacity, and placement of future gaming capabilities within the USCG.

Limitations of Methodology

Underpinning this research is the RAND professional network, who were consulted for interviews about the future of USCG gaming. This group is a subset of an already small community, which risks amplification of "common" knowledge that has not necessarily been validated. Relatedly, underdeveloped academic standards for gaming results in limited mechanisms for sharing and validating professional knowledge.[2] The open-source literature on gaming is largely focused on designing and implementing games, not necessarily building institutional capacity for gaming. Thus, this research draws heavily on published literature from 2022 to 2025 that used similar methodologies to this one, i.e., subject matter expert interviews resulting in frameworks for evaluating institutional approaches to gaming. These sources rely significantly on the defense professional gaming knowledge base. Lastly, gaming is constantly evolving and historically has experienced boom and bust cycles of popularity.[3] At the time of this report, gaming is experiencing a particularly active period, producing new practices and innovations, as well as new requirements for efficiency and scalability. Thus, it is likely that the sources and experts consulted will not capture all best practices in development.

Organization of This Report

In this report, we provide (1) a background of gaming, (2) a framework for developing institutional capability for gaming, and (3) a roadmap for the USCG's development of strategic gaming capabilities. In Chapter 2, we introduce the definition of a game, current uses of gaming, useful game typologies, and implementation standards. Chapter 2 also presents a treatment on the limits and misuse of games. We close Chapter 2 with a discussion of the applicability and uniqueness of gaming for the USCG.

Chapter 3 introduces a framework for the development of institutional gaming capabilities. This framework describes the activities and planning factors associated with coordinating,

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[2] Shawn Burns, ed., *War Gamers' Handbook: A Guide for Professional War Gamers*, Newport, Rhode Island: War Gaming Department, U.S. Naval War College, 2013; Professional wargaming as an academic subject is increasing; examples include wargaming courses at Georgetown University in the United States and King's College London in the United Kingdom (Travis Neddersen, "Interview: The JWC's Wargaming Design Capability," *The Three Swords*, No. 39, October 2023).

[3] Elizabeth M. Bartels, *Building Better Games for National Security Policy Analysis: Towards a Social Scientific Approach*, dissertation, Pardee RAND Graduate School, RAND Corporation, RGSD-437, 2020.

governing, and producing games. Chapter 4 draws from our interviews to discuss the placement of gaming capabilities within the USCG, using the framework from Chapter 3 to identify tradeoffs and key considerations. Chapter 5 presents a roadmap for USCG gaming, with milestones described in terms of the responsibilities and capabilities that would need to be in place to develop progressive levels of organic capability.

The body of this report is supplemented with the semi-structured discussion protocol used for our interviews of USCG, DoD, and international military professional gaming SMEs, presented in Appendix A.

Chapter 2. Background of Gaming

Gaming, also known as wargaming, is used for a diversity of purposes and has been defined in a myriad of subtle ways. One common definition of a wargame is the "representation of conflict or competition in a synthetic environment, in which people make decisions and respond to the consequences of those decisions."[4] However, the presence of an adversarial component during gameplay is not essential to the nature of the methodology. Conflict within a game may result from the actions of a competitor or may come in the form of a challenging environment, such as a natural disaster or a pandemic. Thus, we define a game as having the following characteristics: human players, faced with a challenge in an artificial environment, making decisions governed by rules, experiencing outcomes determined by adjudication models.[5] Games differ from exercises in that they occur in simulated, safe-to-fail environments; they differ from modeling and simulation (M&S) in that they involve human agency expressed through dynamic decisionmaking; and they differ from seminars, workshops, and tabletop exercises (TTX) in that game participants experience modeled consequences of their decisions.[6] This section describes the value – and risks – of gaming that result from the characteristics that set it apart from other research methodologies.

The Current Environment for Strategic Gaming

The USCG – as a multi-mission service – can leverage gaming to support a multitude of strategic decisions across the landscape of their military (Title 10), intelligence (Title 50), law enforcement (Title 14), regulatory (Title 46), and safety and security (Title 33) authorities. This section highlights current users, applications, and trends in gaming that are relevant to the USCG's many and varied strategic planning needs.

Non-military games are as varied and diverse as the organizations that sponsor them. Games have been used for policy decisionmaking, training, and experiential learning by the Federal Emergency Management Agency (FEMA), the Cybersecurity and Infrastructure Security Agency (CISA), the Federal Reserve, and the American Red Cross. These agencies use games "in diverse

[4] Joint Chiefs of Staff, Joint Publication 5-0, *Joint Planning,* 2017.

[5] Adapted from Yuna Huh Wong, Sebastian Joon Bae, Elizabeth M. Bartels, and Benjamin Michael Smith, *Next-Generation Wargaming for the U.S. Marine Corps: Recommended Courses of Action*, RAND Corporation, RR-2227-USMC, 2019.

[6] Shawn Burns, ed., *War Gamers' Handbook: A Guide for Professional War Gamers*, Newport, Rhode Island: War Gaming Department, U.S. Naval War College, 2013; Edward A. Parson, "What Can You Learn From a Game?," in Richard J. Zeckhauser, Ralph L. Keeney, and James K. Sebenius, eds., *Wise Choices: Decisions, Games, and Negotiations*, Harvard Business School Press, 1996; Bartels, 2020.

thematic contexts, such as pandemic response and other infectious-disease outbreaks, emergency preparedness, humanitarian response, peacekeeping, critical infrastructure security, maritime security, threat analysis (e.g., a nonstate actor's use of drones), and even monetary policy."[7] CISA and FEMA were cited in our interviews as two components of DHS who are actively using gaming or exercises and are likely to seek USCG participation in their strategic planning simulations.[8] Additionally, gaming is increasingly being adopted in international relations research because it is well suited to the study of rare events and high-level decisionmakers with unique experiences and worldviews.[9]

The value of gaming for national security and defense is not always about fighting war, even for military organizations. Matthew Caffrey of the Naval War College identifies an emerging trend towards games that he classifies as "peace games," in which "peace is one plausible path to victory."[10] Military use of professional gaming generally occurs for one of two purposes: games for education and training, and games for analysis and decision support.[11] In 2015, the Deputy Secretary of Defense issued memoranda directing the services to increase gaming practice and innovation and to integrate results into planning and budgetary cycles.[12] DoD has since established a wargaming incentive fund (WIF), an alignment group, and an information repository.[13]

There is no single entity responsible for oversight or management of games across the U.S. government or DoD. Moreover, there is a lack of consistency in management and governance approaches to wargaming across organizations.[14] Each of the armed services, the Missile Defense Agency (MDA), U.S. Combatant Commands (CCMD), the Joint Staff, and allied military institutions such as the NATO Joint Warfare Centre (JWC) conduct wargames with variations in the extent of organic capabilities, the extent to which games are used for education

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[7] Abbie Tingstad, Yuna Huh Wong, and Scott Savitz, *How Can the Coast Guard Use Gaming?* Homeland Security Operational Analysis Center operated by the RAND Corporation, PE-A148-1, September 2020, p. 2.

[8] Interview J, October 24, 2024; Interview O, December 6, 2024

[9] Lin-Greenberg, Erik, Reid B.C. Pauly, and Jacquelyn G. Schneider, "Wargaming for International Relations Research," *European Journal of International Relations* 28, no. 1: 83-109, 2021.

[10] Matthew B. Caffrey, *On Wargaming: How Wargames Have Shaped History and How They May Shape the Future*, Newport Papers, Newport, Rhode Island: Naval War College Press, 2019, p. 264.

[11] Chairman of the Joint Chiefs of Staff, *Officer Professional Military Education Policy*, Joint Chiefs of Staff, April 14, 2024; Tom Longland, *Red Teaming and Course of Action Wargaming*, Development, Concepts, and Doctrine Centre, UK Ministry of Defence, undated.

[12] Deputy Secretary of Defense, *Wargaming and Innovation*, memorandum, February 9, 2015.

[13] U.S. Government Accountability Office (GAO), *Defense Analysis: Additional Actions Could Enhance DoD's Wargaming Efforts,* Report to the Committee on Armed Services, House of Representatives, GAO-23-105351, April 2023; The repository is managed by J8 (Interview N, December 4, 2024).

[14] GAO, 2023; Thomas W. Simms, *Advancing Games, Exercising, Modeling, and Simulation (GEMS) Capabilities*, briefing slides, Under Secretary of Defense for Research and Engineering, U.S. Department of Defense, October 1, 2022.

versus analysis, and the degree to which games are integrated within a larger research cycle.[15] Common across organizations is higher demand than capacity. Furthermore, military gaming is exhibiting "a drive toward systemization: Whether in game design, facilitation, data collection, or analysis, centers are paying more attention to methodical, transparent approaches to gaming in the hope of generating more credible insights."[16]

The Value of Games for Decision Support

Games are useful for exploration and understanding when dealing with complex problems or emerging needs. Future planning can benefit from exploring alternate future scenarios. Existing plans can be stress-tested against challenging scenarios. Decisionmakers can grapple with uncertainty and experience the pressure of making decisions with imperfect knowledge. Red teaming, or challenging player assumptions, can break individuals out of groupthink and tap into creative thinking potential, unlocking innovation.[17]

Games are immersive, narrative-driven experiences. When participants representing a range of roles and experiences are selected, these experiences not only make scenarios more "real," but put participants in a situation that can bridge differences in rank, perspective, and experience. For example, the researchers who designed the USCG game *Paratus Futurum* found that "bringing diverse players and perspectives into the room proved valuable for USCG leadership analyzing the game—and for players because such discussions across specialties and geographic regions rarely take place."[18] Additionally, including partners can result in interorganizational engagement and exchange. For example, the U.S. Space Force identified their Schriever Wargame series as a "key mechanism for building partnerships with international participants" and educating outsiders on space issues.[19] Interorganizational exchange has been an important feature of homeland security gaming, with opportunities for state and federal agencies to clarify procedures and understand processes external to their own organizations.[20] The USCG, with its broad array of stakeholders and partners, may find one opportunity of gaming to be the edification of outsiders on the USCG's unique strengths and challenges.

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[15] Simms, 2022; Wong et al., 2019; Interviews from unpublished RAND research, 2022.

[16] Wong et al., 2022, p. 41.

[17] U.S. Army Training and Doctrine Command, G-2, Operational Environment Enterprise, *The Red Team Handbook: The Army's Guide to Making Better Decisions, Version 9.0*, Fort Leavenworth, Kansas: University of Foreign Military and Cultural Studies, undated.

[18] Michelle D. Ziegler, Bryan Rooney, Aaron C. Davenport, Michael E. Linick, Susan A. Resetar, Emily Yoder, Abbie Tingstad, Lev Navarre Chao, and Melissa Bauman, *Paratus Futurum Strategic Gaming: Priming the U.S. Coast Guard for the Future*, Homeland Security Operational Analysis Center operated by the RAND Corporation, RR-A2992-2, 2024, p. vii.

[19] GAO, 2023, p. 13.

[20] Robert C. Rubel, "The Epistemology of War Gaming," *Naval War College Review 59*, no. 2: 108-128, 2006, p. 113.

Games also provide opportunities for players to make and take responsibility for their decisions in safe-to-fail environments. The value for decisionmakers themselves includes the experience of, and mental tools developed in response to, making decisions and "living with" the consequences. Additionally, social identities and dynamics of collective decisionmaking can emerge in games, sometimes reinforcing existing social hierarchies, but sometimes allowing individuals to transcend perceived roles and boundaries. The value for analysis can be in simulating the conditions of real decisionmaking or in selectively bypassing them – but in either case, the safe-to-fail environment provides for experiences and observations that can provide valuable insights into people, processes, and organizations.[21]

Games for Education and Training

Gaming for education and training have as their primary objective knowledge transmission or experiential learning. This use contrasts with games intended for analytical purposes, which can generate learning and increase understanding, but whose primary purpose is as an aid to decision making.[22] The value of educational games as a teaching methodology for the USCG is beyond the scope of this research, but several interviewees emphasized the value of gaming as an effective leadership training tool for the Service.[23] The USCG's recent strategic planning game *Paratus Futurum* found that "more-junior players said they felt they had a better understanding of the types of decisions that senior leadership faces and a better understanding of the service as a whole."[24] The educational value of gaming should certainly be considered by the Service when evaluating implementation plans and the potential location(s) of gaming capabilities within the organization. However, in this report, we focus on identifying links between gaming for education and training and gaming for decision support.

Educational games do not only facilitate training and learning; they also facilitate familiarity with gaming itself. The USCG is an example of an organization with limited historical exposure to wargaming and a cultural reticence toward the methodology as a result of its unfamiliarity.[25] Senior officer participants of *Paratus Futurum* "repeatedly mentioned that exposure to this type of thinking and gaming should start much earlier in the career progression because often those who are making trade-off decisions are confronting that sort of strategic thinking for the first

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[21] Peter P. Perla and Ed McGrady, "Why Wargaming Works," *Naval War College Review 64*, no. 3: 111-130, 2011, p. 113.

[22] Bartels, 2020.

[23] Interview K, October 31, 2024; Interview D, September 30, 2024.

[24] Ziegler et al., 2024, p. 89.

[25] David A. Smith, "Origins of using Wargaming in the Office of Emerging Policy," research summary, USCG Office of Emerging Policy, undated.

time."[26] Military wargaming centers, such as the U.S. Naval War College's War Gaming Department (NWC-WGD), expose Naval personnel to wargames at various stages in their careers, such that the talent pipeline for game production is integrated into training in an informal, holistic way.[27] However, we note that the Government Accountability Office (GAO) found that, "No service has developed a standard educational curriculum or program to teach wargaming skills and develop wargaming competency," but that elective courses exist or are in development across the services.[28] Some wargaming centers, like NWC-WGD or JWC, develop games for both education and training and analytical research, in tandem and in alignment with enterprise objectives.[29]

Because of the uniqueness of the USCG mission set and authorities, bespoke analytical games are also good candidates for transition into USCG training games. A recent example is *Paratus Futurum*, which has been adapted from a game designed to evaluate strategic plans into a game used for leadership training.[30] Though *Paratus Futurum* was not designed for educational objectives, it has been able to be used as a training game in part because of thorough documentation of the game design by the design team, allowing replicability beyond the original implementation. Additionally, as a strategic planning game, it translates well to leadership training. In the long run, as the Service considers whether to develop bespoke training games at tactical, operational, and/or strategic levels, they will need to consider that the intended purpose of a game as a training instrument or a research tool is highly relevant, because gaming methodologies used for training purposes are different from those used for analysis.[31] At the same time, though game design and implementation processes differ for different game objectives, each new game developed for the Service will increase overall familiarity and competency with USCG gaming, suggesting a need for a coordinated approach to gaming for education and training within the overall umbrella of USCG gaming.

Organizing Games: Typologies

Games are organized along many lines, and in practice are often thought of in combination. This report, for the most part, separates gaming into two main buckets: 1) gaming for analysis and decision support, and 2) educational and training gaming. However, there are many ways of sorting and categorizing games. Typologies are used by game designers to tailor games to the

[26] Ziegler et al., 2024, p. 84

[27] GAO, 2023; Burns, 2013.

[28] GAO, 2023.

[29] Neddersen, 2023; Burns, 2013.

[30] Interview D, September 30, 2024

[31] Burns, 2013, p. 15.

needs of sponsor, by sponsors to communicate their needs to designers, and by organizations to decide upon institutional gaming courses of action.

Table 2.1 displays several typologies that are relevant for USCG leadership to consider at this stage, examples of each typology, and the relevance of organizing games by these typologies. These typologies contribute to the framework for developing gaming capabilities presented in later sections, and the tradeoffs associated with different implementation plans.

Table 2.1. Game Typologies

Typologies	Examples	Relevance to USCG Planning
Level of analysis	Strategic, Operational, Tactical	Impacts technology requirements, game design and production, and participant selection.
Research objective (Bartels' archetypes)[a]	System Exploration (understanding and learning), Innovation (ideation), Alternative Conditions (identifying patterns), Evaluation (testing plans)	Impacts credibility and value of gaming.
Organizational objective	Concept development, Capability analysis and development, Strategic discussion and senior leader engagement, Operational and interagency coordination, International and diplomatic exchange, Training and education	Impacts organizational structure, oversight, resource allocation, and integration of results.
Participant type or quantity	Large multi-player, Senior leader, International, Partners and interested parties	Impacts facility, technology, and personnel requirements, and roles and responsibilities.
Event type	Seminar, Workshop, Iterative, Classified, Experiential, Teaching	Impacts facility, technology, and personnel requirements, and roles and responsibilities.

SOURCES: Features information from Elizabeth M. Bartels, *Building Better Games for National Security Policy Analysis: Towards a Social Scientific Approach*, dissertation, Pardee RAND Graduate School, RAND Corporation, RGSD-437, 2020; Shawn Burns, ed., *War Gamers' Handbook: A Guide for Professional War Gamers*, Newport, Rhode Island: War Gaming Department, U.S. Naval War College, 2013; Abbie Tingstad, Yuna Huh Wong, and Scott Savitz, *How Can the Coast Guard Use Gaming?* Homeland Security Operational Analysis Center operated by the RAND Corporation, PE-A148-1, September 2020.
[a] Bartels' archetypes are grounded in social science research and provide a framework for evaluating the credibility and value of national security gaming.

For example, the USCG might consider aligning gaming capabilities with a level of analysis. Strategic-level games focus on long-term planning and resource allocation, helping senior leaders to develop and test overarching strategies. They challenge players to think critically about long-term planning and the consequences of their decisions, making them a valuable tool for both analytical and training purposes. Operational-level games address the execution of strategies within specific geographies and shorter time horizons, emphasizing coordination and logistics. Tactical-level games concentrate on immediate, short-term actions, requiring quick

decision-making and adaptability. Each of these game types has benefits and applicability for the USCG and could be applied to diverse mission sets such as maritime security, disaster response, and environmental protection.

There are multiple dimensions to consider when selecting priorities for gaming capabilities, based on the typologies in Table 2.1. For example, when deciding on a locus for organic capabilities, there is a tradeoff between the efficiency of a one-stop shop and the expertise possible with decentralized shops focused on specific subtypes of gaming. Defense game shops do sometimes organize their efforts by the type of game performed; for example, in 2021 AFRICOM was establishing "operational-level matrix-style"[32] gaming capability within its J3 branch; in contrast, Joint Staff J8 specializes in strategic seminar-style games focused on senior decision makers with limited time to participate in games.[33] Additionally, tactical and operational games require a larger staff footprint to maintain M&S technology. Classified gaming requires significantly more resources; on the other hand, security concerns for classified games result in a preference toward manual non-computerized gameplay.[34] As the USCG develops its gaming capability, considering these typical ways of typing games will assist in defining roles and responsibilities, needs, and resourcing.

Implementing Games: Roles, Processes, and Tasks

Quality gaming includes standards for the roles and responsibilities associated with gaming. In general, published literature tends to focus on standards for sponsors and designers. Some wargaming centers have formal guidelines for sponsor-designer interactions, such as the Naval War College's "Roles and Responsibilities Agreement between Sponsor and WGD [War Gaming Department]."[35] In defense professional gaming, there are also standards for red cell (representation of the adversary), including the use of SMEs and guidance such as "Red plays to win, is aggressive and uses deception."[36] Some frameworks ensure red cell quality by staffing with operations experts, while others use intelligence analysts. Typical gaming roles are displayed below.

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[32] Matrix-style refers to a type of adjudication. Adjudication style can be way of typing games, but is more relevant for game design than institutional planning.

[33] Interview N, December 4, 2024.

[34] Wong et al., 2019, p. 39; Interviews from unpublished RAND research, 2022.

[35] Burns, 2013, p. 83

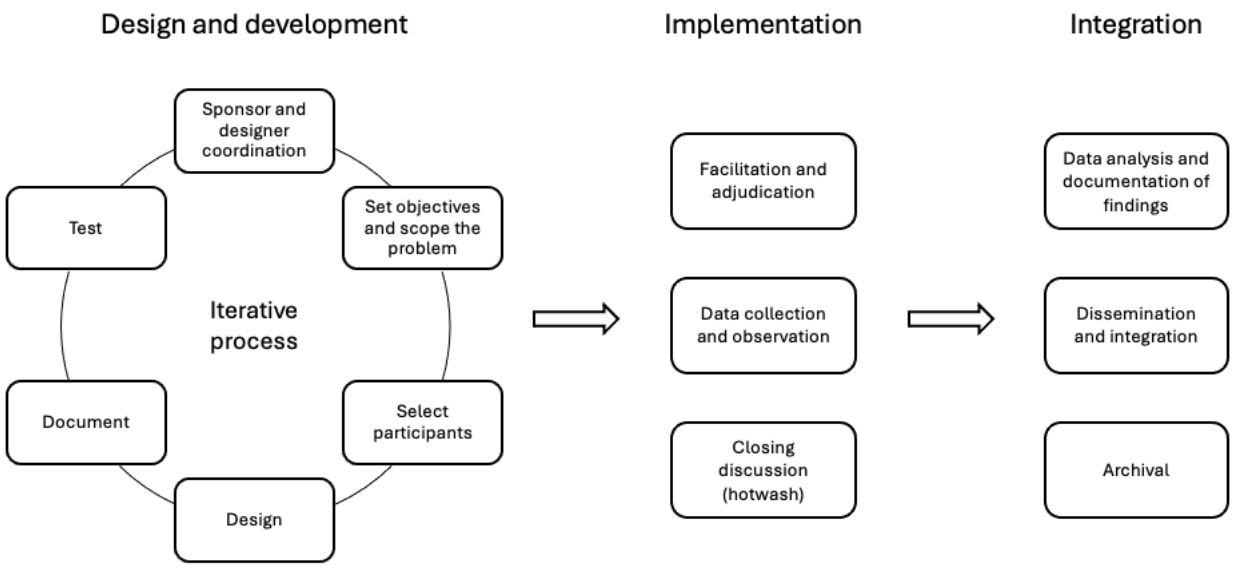
[36] The "actors" in a game are often split into color-coded cells. A typical coding is Blue (the central actor, whose decisions are of primary interest), Green (allied forces), Red (adversary), and White (the control cell, composed of game facilitators and adjudicators, who as the "white cell" may play the role of axillary actors in the game). Standards for red cell are described in Longland, undated; GAO, 2023.

Typical Gaming Roles

Adjudicator
Analyst
Coordinator
Designer
Facilitator
Notetaker
Observer
Player
Red cell
Subject Matter Experts
Sponsor

Processes and tasks associated with gaming also have quality standards, both informal and formal, and are associated with different roles, responsibilities, and expertise. Broadly, gaming from start to finish occurs in three phases: design and development, implementation, and integration. Figure 2.1 displays these phases in sequence, though they should not be interpreted rigidly. The whole research process, especially design and development, is highly iterative. For example, cyclical games for very complex or poorly understood problems can iterate between multiple design and development and implementation cycles.

Figure 2.1. Game Production Processes and Tasks



During design and development, sponsors and designers coordinate to set objectives and scope the problem. Decisions are made on the focus on the game, the types of participants and expertise required, scenario design, rules, and adjudication models. Documentation standards vary by institution, but most have some form of design document that is produced during this

phase. Playtesting occurs toward the end of this phase and is an essential step in game development. The design and development cycle represented in Figure 2.1 is nondirectional and nonhierarchical because these steps are not rigid and are typically iterative.

Implementation occurs when participants gather for gameplay. Facilitation, adjudication, and data collection occur during this phase. Subject matter experts may be engaged for observation, facilitation, adjudication, red teaming, or playing the red cell.[37] Player experience is a dynamic process highly influenced by game design and player selection, unfolding over gameplay and a key component of the decisionmaking that occurs in gaming.[38] A hotwash or closing discussion of sponsor and player experience, decisions, and lessons learned is a key component of game implementation.

Integration is the final stage of gaming and begins with data analysis and documentation of findings. The final documentation may be a quicklook or short report, intended for rapid dissemination, in addition to or in lieu of a lengthier report documenting details of the game design, adjudication framework, data collection and analysis methods, etc. After game findings have been released to the sponsor and other interested parties, archival and posting of game reports and materials to a central repository is considered a best practice but is less common than several of our interviewees would prefer. In part, this is because sponsors do not have as much use for repositories as gaming practitioners, so the documentation that best serves the needs of a sponsor (it might be a 2-page quicklook) is much less suitable for archival than, say, game design documents, which take significant time and resources to develop. Despite this, practitioners acknowledge the need for repositories and DoD officials familiar with the DoD-wide Wargame Repository managed by the Joint Staff J8 have similar concerns about its utilization.[39] We note that the professional gaming community increasingly sees dissemination and integration as a critical process for gaming. Without embedding findings into a larger cycle of research, insights from games risk getting lost, or worse, becoming the sole source for decisions. This brings us to limits and misuse of gaming.

[37] "Red team" and "red cell" are defined differently in different wargaming communities. The first definition is players in a game representing adversary forces (defense community calls this "red cell"; intelligence community calls this "red team"). The second definition is an independent group that challenges and offers alternatives to standard processes and assumptions (defense community calls this "red team"; intelligence community calls this "red cell"). This report uses defense community definitions.

[38] One interviewee had used screaming sounds to increase stress during training games (Interview K, October 31, 2024).

[39] Interview N, December 4, 2024; GAO, 2023, p. 25.

Gaming Limits and Misuse

One of the great values of gaming is immersion in artificial experience, a tool that "enables defense professionals to break out of the stories we have locked ourselves into."[40] Yet, the same characteristic that makes gaming so valuable comes with risk. Artificial experience can be very persuasive, potentially leading to overconfidence in results arising from the "rich narrative experience of a simulation."[41] The professional gaming community generally agrees that "without systematic approaches to game design, facilitation, adjudication, data collection, and analysis, immersion could create wargames that persuasively produce questionable results."[42] Games may not always change mental models – they can also reinforce existing belief systems, acting as an echo chamber for preconceived ideas. Furthermore, bias can be introduced by internal providers who may not have sufficient chain of command independence from sponsors to contradict senior leaders' agendas;[43] on the other hand, external providers such as contractors can introduce bias due to the financial incentive to please sponsors.[44] Bias may not always be intentional; it "can arise in the simulation's design or structure, in suggestions participants may unintentionally be given about how to act, or in the basic specification of what is relevant and important that is essential to simulation design"[45] Outright fraud, too, is not unheard of. The Millennium Challenge controversy is an example of this: players accused game staff of manipulating results to keep the massively expensive game funded.[46] In another example, an aerospace contractor was suspected by one CCMD of designing a "wargame to suggest the procurement of systems it was also selling."[47]

Game results can sometimes be misleading or misused. When designing games, striking a balance between complexity and simplicity is tricky, and "it is very easy to add complexity to a wargame, but any more than is necessary will confuse players, bog down the game and disrupt the players' immersion experience."[48] Additionally, games that try to do too much, answer too many research questions, can miss the mark, "since the optimal design to answer one question is

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[40] Ed McGrady, "Getting the Story Right About Wargaming," *War on the Rocks*, November 8, 2019.

[41] Edward A. Parson, "What Can You Learn From a Game?," in Richard J. Zeckhauser, Ralph L. Keeney, and James K. Sebenius, eds., *Wise Choices: Decisions, Games, and Negotiations*, Harvard Business School Press, 1996, p. 246.

[42] Wong et al., 2019, p. 42.

[43] Stephen Downes-Martin, "Your Boss, Players, and Sponsor: The Three Witches of Wargaming," *Naval War College Review* 67, no. 1: 31-40, 2014.

[44] GAO, 2023, p. 18-19.

[45] Parson, 1996, p. 246.

[46] Micha Zenko, "Millennium Challenge: The Real Story of a Corrupted Military Exercise and Its Legacy," *War on the Rocks*, November 5, 2015.

[47] GAO, 2023, p. 19.

[48] Neddersen, 2023, p. 65.

unlikely to be the same for a different research question"[49] Even with well-designed, well-scoped, and well-executed games, there are risks of misuse. The first risk comes from viewing or acting on results in isolation from broader research and planning cycles. For example:

> Officials across DoD and its external wargaming partners uniformly described the role and proper use of wargames as part of a cycle of research or a campaign of learning…wargames should ideally be run in series and in concert with other analytical methods like live exercises, modeling and simulation, or other experiments. Officials emphasized that a single wargame should not be used as a justification for any major decision.[50]

The second risk is using games to predict or prescribe the future. The gaming community will quickly correct any suggestion that games are predictive, insisting that "they do not tell decision makers what or how many weapons to buy, nor should they be solely used to prove or disprove operational concepts."[51]

Recognizing the limits and misuse of games does not detract from their effectiveness as decisionmaking support. As Ed McGrady argues, "Wargames are *not* experiments unless they have been specifically, and painstakingly, designed as such. They are events: unrepeatable, chaotic, vague, and messy events… But if you think that means you can't learn anything from them, you might as well stop trying to understand real-world conflicts"[52] The risks of gaming should be carefully considered, and the USCG should establish standards for quality gaming, explored in a later section, to mitigate against the misuses described here.

Unique Characteristics of USCG Gaming

In *How Can the Coast Guard Use Gaming*, Tingstad, Wong, and Savitz argue that gaming supports the USCG's ongoing need for readiness in the light of new and rapidly emerging challenges. Gaming can address a diversity of USCG strategic planning considerations, including: cyberspace, uncrewed systems, artificial intelligence, space, interagency collaboration, recruitment and retention, the Arctic, illegal, unreported and unregulated (IUU) fishing, and freedom of navigation, to name only a few. Furthermore, formalizing USCG gaming may open doors to resources within the wider gaming community. The benefits of gaming identified by Tingstad et al., included concept development, capability analysis, strategic discussion, senior leader engagement, operational and interagency coordination, international and diplomatic exchange, and training and education.

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[49] Bartels, 2020, p. 178.

[50] GAO, 2023, p. 9.

[51] GAO, 2023, p. 10.

[52] McGrady, 2019.

Historically, most members of the USCG have low to no exposure to professional gaming. This is changing, however. Emergency managers are exposed to gaming in Homeland Security Emergency Exercises curriculum.[53] Within the Coast Guard Academy, the Leadership Development Center (LDC) uses a team building civilian game for rainy day training. *Paratus Futurum*, the USCG's first custom strategic game, is being implemented at LDC for officer training. Several interviewees felt that the USCG was undergoing a cultural shift in familiarity with wargaming for decisionmaking support.[54] Coast Guard members in the future may see value in professional gaming and have a stronger grasp of the risks and benefits, as well.

The USCG is a unique organization, and USCG gaming must take that into consideration. Attempting to duplicate or ride along on DoD games, for example, runs the risk of missing the mark on the characteristics that make the USCG unique. *Paratus Futurum* was scoped to include all 11 statutory missions, two additional non-statutory missions deemed relevant to the game's objectives, and geographic regions of CONUS Pacific, CONUS Atlantic, the Arctic, Latin America and the Caribbean, the Middle East and Africa, and the Indo-Pacific.[55] This is not to say that all USCG games would or should be as expansive. Rather, consideration must be afforded to the distinctiveness of USCG missions, authorities, and resources, and that uniqueness is one reason why attending DoD games may be useful but not sufficient for USCG planning.

Our interviews revealed that a challenge for the Service, emerging even in the infancy of USCG gaming, is the maintenance of institutional knowledge of gaming. Due to the newly acquired nature of gaming capabilities, the USCG lacks institutional processes for the dissemination and integration of results. What processes that do exist are informal, related to sharing awareness of current and past efforts. Methodological insights specifically relevant to USCG strategic gaming – which are being discovered with each new USCG game – do not have many ways to percolate to interested parties within the USCG.

[53] Interview F, October 8, 2024.

[54] Interview D, September 30, 2024; Interview C, September 27, 2024; Interview B, September 24, 2024.

[55] Ziegler et al., 2024.

Chapter 3. Framework for Developing Gaming Capabilities

The framework presented in this section is a synthesis of practices revealed through interviews and literature. Broadly, this section places gaming activities into one of three categories, arranged by functional purpose: coordination, oversight, and production. Activities associated with each functional purpose might fall under the purview of a single billet, a single unit, or be distributed across multiple points in the Service.

Hallmarks of Successful Gaming: Coordination, Oversight, and Production

Coordination

Multiple sources identified that professional gaming should be accompanied by coordination activities that encompass awareness of the broader gaming community. This includes engaging in conferences and forums, especially because as of 2025, this is the primary way of sharing and validating professional knowledge in the gaming community.[56] Conferences available for the USCG to monitor and attend are hosted by private, U.S. government, and academic organizations. The Connections Wargaming Conference and Military Operations Research Society (MORS) host symposiums and special meetings.[57] DoD's Defense Wargaming Alignment Group (DWAG) run by the Joint Staff J8 has a monthly collateral-level conference call open to defense and national security gaming professionals.[58] In addition, conferences are becoming more frequent in academic institutions with gaming curricula, such as Georgetown University.[59] Core coordination activities for the development and maintenance of professional gaming capabilities are summarized in Table 3.1.

[56] Elizabeth M. Bartels, "Building a Pipeline of Wargaming Talent: A Two-Track Solution," *War on the Rocks*, November 14, 2018.

[57] For example, in 2016, the Defense Wargame Alignment Group coordinated with MORS to hold an event designed to cultivate the pool of wargamers in DoD. Attendance was open to all of U.S. government (Wong et al., 2019).

[58] Interview N, December 4, 2024; GAO, 2023.

[59] A recent example is Game On! Wargaming and the Operational Environment Conference, a gathering held in November 2024 that focused on operational gaming for unconventional problems and education. See Mad Scientist Laboratory, "Report from Game On! Wargaming & The Operational Environment Conference, 06-07 November 2024," U.S. Army, December 5, 2024.

Table 3.1. Coordination Activities and Considerations

Objective	Supporting Activities and Considerations
Engage with the broader gaming community	• Attend conferences • Participate in forums
Maintain common operating picture (COP)	• Maintain a calendar of events – Track and share internal games – Track external games which the USCG has been invited to participate – Track professional gaming community events (conferences, forums, etc.) • Establish mechanism for tracking invitations
Maintain awareness of the larger cycle of research	• Communicate major strategic initiatives • Provide senior leaders with a bird's-eye view of internal gaming efforts and results
Knowledge management and sharing	• Maintain a documentation repository – Classified information storage and sharing

Sources stressed the importance of a calendar to maintain a common operating picture (COP), allowing staff "to keep track of different events, to de-conflict their schedules, and to plan to participate in multiple games where their presence has been requested."[60] A COP would ideally track both internal and external gaming. For internal tracking, a COP would keep different gaming communities within the USCG up to date with enterprise-wide efforts, bridging structural divides (e.g., some gaming communities may find themselves siloed within the USCG due to differences in geography, hierarchy, mission, or function). Internal coordination could also promote resource sharing and provide a bird's-eye view of gaming across the enterprise to senior leaders. It would also help bridge gaming for education and training with more analytic purposes, especially with respect to transitioning custom analytical games into leadership training games, as was done with *Paratus Futurum.*

For external coordination, we found that maintaining a COP may reduce barriers to participation in games held by DHS, DoD, international organizations, and other partners, as well as increase those entities' participation in and awareness of Coast Guard gaming. At present, there is no lead organization to organize a master calendar across U.S. government agencies. As a partial solution to this, individual game shops maintain their own operating pictures.[61] In a similar way, a master calendar for the Service could be managed by a central coordinating body that would track external gaming events in which the USCG would want to participate. In taking a centralized approach, the Service should still consider the needs of different missions and geographies. For example, one interviewee from USCG District 14 said that external organizations do not always reach out to USCG to attend wargames that would be

[60] GAO, 2023, p. 27; Interview J, October 24, 2024; Interview B, September 24, 2024.

[61] GAO, 2023, p. 28.

very relevant to USCG operations in the Pacific, or the requests are informal and not tracked (one invitation came through a conversation with a next-door neighbor).[62] Another interviewee felt that large integrated wargames require USCG involvement, but that not every level of the Service needs to maintain awareness of these activities.[63] Thus, one coordinating feature might include engaging with external game shops and ensuring that time-sensitive information, such as invitations, get to the right people within the USCG in a timely manner.

Coordination also includes maintaining awareness of the broader research cycle. Sponsors have some responsibility here, in that they need to ensure that their games are useful as inputs into existing or planned research informing plans, programming, and budgets.[64] Sponsors are also responsible for ensuring that results are disseminated to the appropriate interested parties. Game designers and analysts, too, need to be aware of the larger cycle of research, sponsor objectives, and how game results fit into enterprise level questions and concerns. The coordinating function in this case would include awareness of major strategic initiatives within the USCG as well as tracking related gaming efforts across the USCG.

A major component of knowledge management, the final aspect of coordination, is the creation and maintenance of a repository to maintain and share game documentation. The evidence suggests that a repository is a highly desirable feature, but not a no-fail one – in the sense that gaming can, and often does, occur without the existence of a repository. However, in the long run, a lack of documentation or difficult-to-access past records can result in duplication of efforts and discontinuity resulting from staff turnover.[65] An easy-to-access, organized repository is a mechanism for sharing and reuse of game designs and methodologies across organizational seams, people, and time. Additionally, repository coordination can be accompanied by regularly communicated updates for interested parties within the Service, as well as internal forums for sharing games and methodological lessons learned.[66] In effect, coordinated knowledge preservation is a sign of a robust, efficient, and long-term program.[67]

Some key challenges are associated with game repositories. These include keeping contact information up-to-date, non-standardized game materials and documentation, and classification.[68] Furthermore, educational games are often designed to be repeatable, but

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[62] Interview O, December 6, 2024.

[63] Interview B, September 24, 2025.

[64] Wong et al., 2019, p. 41

[65] Interview F, October 8, 2024; Interview E, October 7, 2024; Interview N, December 4, 2024; Interview G, October 10, 2024.

[66] Garrett Heath and Oleg Svet, "Better Wargaming Is Helping the US Military Navigate a Turbulent Era," *Defense One*, August 19, 2018.

[67] For example, a long-standing wargaming center, NWC-WGD, has archival and repository processes standardized for all wargames.

[68] Interview N, December 4, 2024; Interview G, October 10, 2024.

analytical games can be difficult reproduce because they may require specific participants to be meaningful, or the facilitation might rely upon the subject matter expertise of the game design team. On the other hand, even basic repository standards could be established for certain game elements that would be most useful for the USCG to track, such as the scenarios used in games over time. Deciding the breadth and depth of the information that would be most important to document requires additional considerations, but a well-established gaming capability would include some standards for what type of information is *institutionally* relevant. This could include, at its most basic, the research question, the game scenario, the participant types (non-attributable), insights, and the designer's contact information.[69]

Knowledge management faces a tradeoff between security, accessibility, and resourcing, such as deciding if dual repositories will be maintained for unclassified and classified materials. On the other hand, for basic socializing of unclassified games, maintaining a folder on a SharePoint site might be enough to serve USCG needs.[70] There are efforts in DoD and elsewhere to develop guidelines for documentation to make repository content more accessible and relevant to users looking for past examples to inform current game design.[71] Another challenge is the differences in documentation needs between users. One interviewee pointed out that a perk of siloing is that documentation needs are very different for, say, educational gaming, compared to analytical researchers documenting a novel game design.[72]

Oversight

The development and implementation of standards are key aspects of mitigating risks associated with the limits and misuse of gaming. In DoD, for example, the Army, Navy, Marine Corps, Air Force, and MDA each have their own oversight for gaming, with "policy, standards, instructions, orders, steering committees, enterprise processes, etc., governing [gaming]."[73] Oversight can include guidelines for roles, processes and tasks associated with game production (such as those found in wargaming handbooks), sponsor responsibilities, post-game evaluations, sponsor trainings, designer trainings, and dissemination and integration processes. Interviewees identified dissemination and integration of analytical results as a particular challenge for the USCG analytical games that have occurred up to the writing of this report.[74]

Implicit governance occurs when organizations identify the locus for organic gaming capabilities, since independence from sponsors can mitigate bias. Additional measures can

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[69] Interview N, December 4, 2024.

[70] Interview G, October 10, 2024; Interview K, October 31, 2024; Interview N, December 4, 2024

[71] The Hoover Institution at Stanford University is developing a repository for unclassified wargames (Interview G, October 10, 2024).

[72] Interview K, October 31, 2024.

[73] Simms, 2022.

[74] Interview F, October 8, 2024.

reduce bias, such as partnering with federally funded research and development centers (FFRDCs) or contractors with safeguards to promote analytic independence. On an enterprise level, good governance includes ensuring that research questions and educational use of games focus on human decisionmaking, as these are the types of problems for which gaming is an appropriate methodology.[75] Finally, there is another implicit form of oversight that is essential for gaming: leadership buy-in and follow-up. Without senior leaders' clear direction and vision for the role of gaming, including awareness of the risks and benefits, any program will struggle to define aims, set boundaries, and deliver useful results.[76] Table 3.2 summarizes oversight activities.

Table 3.2. Oversight Activities and Considerations

Objective	Supporting Activities and Considerations
Minimize risk through standards for game production and implementation	• Develop standards and processes for: – Game production roles, processes, and tasks – Sponsor responsibilities – Post-game evaluations – Sponsor and designer trainings – Dissemination and integration processes
Minimize risk through chain of command independence	• Locate production capabilities separately or establish safeguards to ensure independence from sponsors
Minimize risk through culture	• Foster awareness of gaming benefits, risks, and limits – Scope gaming to problems focused on human decisionmaking • Encourage training and sharing of lessons learned

Production

Establishing a gaming capability necessarily requires consideration of game production – there are no results until players play the game! Production, which encompasses design and development, implementation, and integration (recall Figure 2.1), has several key inputs that determine both capability and capacity: technology, facilities, and staffing. These factors are highly relevant for planning considerations and have impacts on cost, complexity, and time to implement. Planning factors for each input are summarized in Table 3.3. We note that dedicated funding is implicitly an input to production, in the sense that resources are required to allocate and maintain production inputs. The level of resourcing required to sustain production inputs is determined by the planning factors, which themselves can be selected based on available resources. Whether the question is *what production capability is possible with a set amount of*

[75] Bartels, 2020.

[76] Interview E, October 7, 2024; Interview C, September 27, 2024; Interview O, December 6, 2024.

resources?, or, *what resources are needed to achieve a given production capability?*, Table 3.3 shows the planning factors that can be used to calculate an answer.[77]

Table 3.3. Production Inputs and Planning Factors

Input	Planning Factors
Technology	• Modeling and simulation (M&S) • Software acquisition and maintenance • Classification limits for commercial software
Facilities	• Flexibility and scalability • Capacity • Centrality • Access and availability • Classification
Staffing	• Expertise • Continuity • Attraction and retention • Talent pipeline

Tactical and operational games are associated with heavier software and M&S needs. Advanced defense wargaming centers utilize M&S support for wargaming and exercises. Nonetheless, even these advanced centers use manual games, because they are "considered to have significant pragmatic advantages... [including] cost, flexibility, adaptability, adjudication transparency, and the existence of large libraries of existing manual game mechanics that could serve as references."[78] Additionally, use of commercial software is challenged by classification issues, making manual games oftentimes more reliable. NATO's Joint Warfare Center is exploring "digital-hybrid simulation"[79] to increase data analytics of their gaming, but this approach requires careful consideration of the types of data that games are best suited to deliver. Any software-based gaming tool presents challenges in terms of upfront and ongoing information technology costs. If digital gaming is a capability that the USCG wishes to develop, especially in pursuit of tactical or operational gaming (including for training purposes), the technology costs will be significantly higher than those associated with capabilities geared toward strategic decisionmaking.

Facilities are a very important component of game production, yet vary widely between organizations. Of paramount importance, facilities should be flexible and scalable to accommodate different configurations and numbers of players. Availability of facilities is a

[77] Dedicated funding and a predetermined budget is an important consideration if the USCG decides to pursue organic gaming capabilities. (Interview F, October 8, 2024; Interview J, October 24, 2024)

[78] Wong et al., 2019, p. 39.

[79] Neddersen, 2023.

factor for planning, especially when there is competition for spaces. Centrality is important as well, especially for traveling participants. For the USCG, inclusion of fellow US military, DHS components, the interagency, State, Local, Territorial, Tribal officials, and international partners will likely be an important aspect of gaming, so some consideration should be made for access for external participants. One interviewee mentioned a desire for traveling games that could be deployed by Captains of the Port, likely modeled on USCG experience with exercises.[80] In this case, designing portable games would require consideration of the facilities of locations where the game would be played. Lastly, classification can be a determining factor for facility selection. An allied naval SME shared an analogous experience to the USCG of having personnel with security clearances but limited access to secure computing facilities. In this case, the lack of dedicated classified facilities has been an obstacle to institutionalizing gaming.[81]

Defense professional gaming often relies heavily upon civilian and contractor staff. There are several reasons for this. First, developing specialists is expensive, and institutions do not necessarily have resources to support a full-time game team.[82] Second, civilian continuity is a way to maintain institutional knowledge and expertise.[83] Turnover is one of the largest obstacles for knowledge management facing wargaming centers, and in addition, compensating highly-skilled individuals is expensive and they can be difficult to attract and retain.[84] Interviews of CCMDs found that standing up a professional gaming capability required at least one permanent or fixed position to coordinate staff and contractors.[85]

If the Service wishes to employ gaming long-term, the USCG talent pipeline needs to be evaluated. Training is needed to ensure the effectiveness of both sponsors and designers, though the depth of training required for good game design is much more extensive than for good game sponsorship.[86] There is increasingly accessible academic training for gaming expertise. This includes a certificate program by the Military Operations Research Society and wargaming classes offered at Pardee RAND Graduate School, King's College London, John Hopkins University School of Advanced International Studies, and McGill University.[87] At the same time, to the best of RAND's knowledge, no university or DoD organization has established a dedicated degree, educational track, code or identifier for wargaming.[88] The USCG may wish to consider standing up an elective course in gaming at the Coast Guard Academy as a long-term strategy for

[80] Interview C, September 27, 2024.

[81] Interview H, October 11, 2024.

[82] Bartels, 2018.

[83] Interview B, September 24, 2024; Interview J, October 24, 2024; Interview H, October 11, 2024.

[84] Interviews of U.S. and European wargaming SMEs, from unpublished RAND research, 2022.

[85] Interviews of CCMD wargaming SMEs, from unpublished RAND research, 2022.

[86] Bartels, 2018.

[87] Bartels, 2018.

[88] GAO, 2023, p. 28.

increasing competency within the USCG, especially if, down the line, a gaming billet is created. Additionally, a detached duty assignment to an established game shop in DoD may be a beneficial boost to the training pipeline that could be implementable in the near-term.

Engaging FFRDCs, contractors, or partner institutions for the entire game production process is an approach that can address resourcing limitations, but the tradeoff is building institutional expertise. Outside providers will not have the experience and knowledge of the USCG that an organic game shop would possess. Additionally, knowledge management and continuity are more challenging for institutions that use external providers for game development and execution. Coordination, the establishment of a USCG game repository, and governance standards could potentially mitigate some of these challenges. A middle-of-the-road approach to game production might establish a USCG billet to perform a leadership role coordinating contractors for game design, M&S, and supporting technology and facilities.[89] Alternatively, partnering with DHS, DoD, or other agencies to establish a common facility could fractionalize the cost of some of the more resource intensive aspects of game production, allowing the USCG to focus resources on developing expertise. Some potential challenges of this approach include coordinating across governmental seams, fluctuations in other agencies' priorities, and ensuring capabilities in alignment with USCG needs, not to mention the extended timeline possibly associated with implementing such a strategy.

[89] This approach is taken by multiple defense organizations (Interview C, September 27, 2024; Interviews from unpublished RAND research, 2022; Wong et al., 2019).

Chapter 4. Placement of Capabilities within the USCG

Any discussion of "where" in an organization a capability should live must weigh priorities and objectives. When grouping people and tasks around a common function, mission, geography, and other variables, the introduction of "seams" comes with risk that some activities will be enhanced by colocation, while others will be impeded by separation.[90] This section attempts to make explicit the factors that will result in tradeoffs for the Service to consider when determining where to place capabilities. We assume that the Service will want to consider the tradeoffs associated with all three aspects of gaming capabilities – coordination, governance, and production – with the caveat that in-house production might be farther down the line.

Our interviews revealed several key areas of concern for USCG strategic gaming. Are educational and training games as high of a priority as analytical games? If so, the Service should consider having multiple game shops with smaller footprints, allowing specialists to focus on different types of games. Does the Service want to pursue tactical and operational level games? If so, housing that capability requires resourcing for technology acquisition and maintenance. Regarding facilities: Where are facilities available? Are layouts flexible and adaptable for different configurations? Are they central and accessible? These are basic requirements for implementing games, but small strategic games can get by with smaller facilities, so once again program objectives are relevant here. Who are the most likely sponsors for games within the Service? Consider placing production outside of these organizations, or instituting safeguards, to ensure independence. Finally, who would be best positioned to coordinate for classified gaming – including managing the proposal process, documentation, and knowledge repository?

Setting up a single shop responsible for coordination, governance, and production is one possible path forward, but these functions do not necessarily have to be co-located. There are several key tradeoffs to consider when thinking about how to situate these functional components within the USCG's existing organizational structure. Oversight independence from production creates stronger accountability and may benefit from sitting at a higher echelon. However, this approach risks losing touch with activities on the ground. The keeping of a calendar or a repository could benefit from being independent of production, especially if there are multiple game shops throughout the Service or if the placement of a game shop requires a third entity to act as a bridge to leadership or sponsors. However, the risk of separation is that the functions of coordination and knowledge management may become deprioritized by game

[90] Don Snyder, Kristin F. Lynch, James A. Leftwich, Heidi Peters, and Brett Zakheim, *Considerations Regarding Changes to the Organizational Design of the U.S. Air Force: Toward a More Integrated Force Structure*, RAND Corporation, RR-A2899-1, 2024.

production teams, with siloing and discontinuity more likely to occur. The placement of functions outside of the USCG is a valid strategy as well. One interviewee suggested that game production might be best situated in DHS, but also noted that getting bespoke USCG focused games from a Departmental entity would be a challenge.[91]

Another factor to consider is whether the USCG should direct gaming efforts from the "top down," or solicit proposals from sponsors throughout the organization. In either case, the coordinating capability would be the enabling function, but the best location for this function may be quite different depending on the preferred approach.

Across our interviews, we were unable to find a clear and obvious consensus on locating capabilities within the Service. Discussion tended to focus on tradeoffs for situating a game shop in a particular place, with no clear winners. Several placement options were mentioned by name, including the Deputy Commandant for Operations (DCO), Deputy Commandant for Emerging Policy (DCO-X), Deputy Commandant for Mission Support (DCMS), Office of Emergency Management and Disaster Response (OEM), Office of Counterterrorism and Defense Operations Policy (ODO), Force Readiness Command (FORCECOM), the Leadership Development Center (LDL), and the Coast Guard Academy.

Staffing and resourcing and year-to-year consistency stood out as important, regardless of where capabilities were located. Interviewees were unaware of a USCG knowledge library in existence that could serve as a strong model for a game repository. The Lessons Learned archive is a possible avenue to explore, but one interviewee noted that Coast Guard exercises are documented in after action reports and generally exercise situation manuals and facilitation guides are not maintained in a common repository.[92] One interviewee identified a classified repository as a core need to enable 1) access to gaming results to use in planning and further research, 2) interoffice resource pooling and collaboration, and 3) knowledge continuity.[93]

Tradeoff considerations within the Service largely focused on resource constraints or the specific objectives of various departments, commands, and offices. Facilities and staffing were key factors for suggesting a particular location. However, there was a common concern that situating a shop within a given location based on practical considerations (facilities and staffing) could result in games being very focused on a select subset of USCG operations and concerns. For example, some programs are oriented to natural disasters and exercises, while others may be security-minded or future-focused, thus potentially excluding some of the USCG's missions. Ultimately, these concerns revealed that the most probable sponsors of games – those most likely to be interested in using games for strategic decision support – might not necessarily be the best locations for a game shop tasked with producing games for the wide array of potential sponsors

[91] Interview O, December 6, 2024.

[92] Interview J, October 24, 2024.

[93] Interview C, September 27, 2024.

and objectives within the Service. To resolve this conflict, at least for coordination and governance, finding a location higher up in headquarters was suggested, though it was noted that there may not be an intuitively obvious location to place gaming capabilities above DCO and DCMS.[94]

Geography and operational focus are important considerations, as well. The USCG Pacific Area is facing increasing demands for far flung activities and coordination with allies and partners. There would be significant benefits to developing operational gaming capabilities with these responsibilities in mind. Considering that organic game production is likely down the road, this suggests that any near-term coordinating body should be able to bridge the strategic and operational levels of the organization. Situating a shop in headquarters that brings in Area input was one suggested approach to this challenge.[95] For operational and tactical level games to explore the implementation of strategic plans, one interviewee suggested that the Service would want to include the Research and Development Center in some capacity.[96]

For educational and training games, these could continue to be implemented by the LDC. In addition, the LDC is well positioned as a central location with touchpoints to people throughout the Service.[97] However, the focus on training might not make this the best location for analytical gaming. Other organizations, such as the U.S. Navy, successfully co-locate gaming for education and analysis, but they are significantly more resourced than the USCG. Considering this, it is possible that coordination and governance could act as a bridge between the LDC and another location in the Service that might be better positioned to focus on analytical gaming. Long-term, with resources allocated appropriately, FORCECOM could be a candidate for the location of a one-stop game shop that is central within the organization, has independence from sponsors, and has mechanisms for engaging with the talent pipeline.[98]

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[94] Interview C, September 27, 2024; Interview E, October 7, 2024; Interview F, October 8, 2024.

[95] Interview A, September 23, 2024.

[96] Interview E, October 7, 2024.

[97] Interview D, September 30, 2024.

[98] Interview B, September 24, 2024; Interview D, September 30, 2024; Interview O, December 6, 2024; Interview F, October 8, 2024.

Chapter 5. Recommended Roadmap for USCG Gaming

The milestones presented here represent possible futures for USCG gaming capabilities. They are not mutually exclusive and are designed to be implementable in phases, such that each milestone advances USCG gaming capabilities by building upon the previous one. This phased approach would allow the USCG to gain familiarity and competence as gaming capabilities are developed. Additionally, the milestones progress sequentially in cost, complexity, and time to implement. Conceived as a roadmap, they describe potential end states at progressive levels of effort. At each stage, a heavy emphasis on M&S and digital gameplay will require more resources to implement and sustain. More resources are also required for classified gaming.

The implementation milestones are as follows:

- Milestone 1: Establish Coordination and Build a Repository
- Milestone 2: Establish Gaming Governance
- Milestone 3: Establish Full Organic Gaming Capability

These milestones represent focused development of coordination (Milestone 1), oversight (Milestone 2), and production (Milestone 3), as outlined in Chapter 3. Our intention is to provide readers with a vision of the concrete steps – including the roles, responsibilities, and capabilities – that would go into the realization of these essential gaming activities at increasing levels of effort. Though they could be pursued in time-sequenced steps, they could also be developed concurrently if a more aggressive course of action is desired.[99]

Table 5.1 displays the key responsibilities and capabilities needed to effectively pursue Milestone 1: Establish Coordination and Build a Repository. This option focuses on near-term efforts, such as the establishment of a calendar and COP. A basic repository would be created at this stage to support knowledge continuity and results dissemination. Coordination would include interfacing with the broader gaming community and awareness of the larger cycle of research within the USCG. Game development for Milestone 1 would be entirely outsourced to FFRDCs, contractors, and partner institutions. Gaming for education and training would continue on its current trajectory, with applicable USCG analytical games adapted for training, such as with what is now being done with *Paratus Futurum*. At the enterprise and leadership level, we suggest that this first milestone include leadership buy-in and follow-up on gaming efforts, as well as matching budgeting to desired capacity and capability.

[99] For example, if the USCG chose to pursue a full organic gaming capability from the start, these milestones could be pursued simultaneously. In other words, there is no requirement that a phased approach must be taken. However, given realistic understanding of resource constraints and the need to increase USCG familiarity with gaming, a phased approach is our recommended course of action.

Table 5.1. Responsibilities and Capabilities for Milestone 1: Establish Coordination and Build a Repository

Enterprise and leadership responsibilities	Coordinating responsibilities	Oversight responsibilities	Partnerships for gaming capabilities	USCG gaming capabilities
• Leadership buy-in and follow-up • Budget and sustain funding	• Coordination and COP of USCG gaming, internal and external (includes maintaining a calendar) • Awareness of broader gaming ecosystem across DHS, DoD, partners, etc. • Participation in gaming forums • Establish basic repository	• Maintain awareness of the larger cycle of research and planning	• Engage FFRDCs, contractors, and partner institutions for game development and execution	• Implement existing games in training/ learning environments

Milestone 2: Establish Gaming Governance focuses on developing oversight procedures and standards for USCG strategic gaming, including standards for embedding results into the larger cycle of research. Table 5.2 displays the essential responsibilities and capabilities that need to be developed for Milestone 2. A centralized coordinating function at this stage would solicit game proposals from sponsors, and an active repository would enable collaboration and avoid duplication of efforts. Game production would continue with contractors as needed, but at this stage the USCG would stand up some organic production capability – mostly focused on small, strategic games with low technology needs. To support this phase, a detached duty assignment at a DoD gaming center could provide USCG personnel with valuable exposure to gaming in military practice and contexts. At this stage, single billet might be created to coordinate and oversee civilian and contracted game staff, with continued reliance on FFRDCs, contractors, and partner institutions. Gaming would be more integrated into the cycle of learning to achieve this milestone, with oversight of analytical gaming extending to educational games as well.

Table 5.2. Responsibilities and Capabilities for Milestone 2: Establish Gaming Governance

Enterprise and leadership responsibilities	Coordinating responsibilities	Oversight responsibilities	Partnerships for gaming capabilities	USCG gaming capabilities
• Embed games in the larger cycle of research and planning	• Pursue additional funding sources • Establish processes for sponsors to submit proposals for games • Establish sharing and collaboration through repository	• Formalize gaming role in the larger cycle of research and planning • Establish game standards • Guidelines for dissemination of results and integration • Guidelines for use of repository	• Partner with FFRDCs, contractors, and partner institutions for support	• Develop small strategic games (low technology cost) • Small numbers of participants, limited by facilities and classification • Limited staff producing 1-2 games per year, reliance on contractors as needed • Incorporate gaming into the cycle of learning

Milestone 3: Establish an Organic Gaming Capability is the most ambitious and long-term option presented here. Resourcing for this option would be an undeniable challenge for the Service, but it represents a version of USCG professional gaming that prioritizes cohesion and continuity of institutional knowledge. It also maximizes the benefits of having USCG expertise involved at every level of game design and implementation. Table 5.3 displays the key responsibilities and capabilities for Milestone 3. This option is marked by investment in an institutional talent pipeline, dedicated gaming facilities, and expansion into more technologically expensive gaming. With a dedicated gaming center, the USCG may be able to pursue government-wide funding opportunities such as WIF funds. At this advanced stage, external providers would still provide a contracting role, but most game production would be internal. Civilian staff would be one method to maintain knowledge continuity, but in this option investment in training would improve the gaming competency of rotating billets. Training and standards would also include a short-course for sponsors, to improve the effectiveness of sponsor-designer collaboration throughout the organization.

Table 5.3. Responsibilities and Capabilities for Milestone 3: Establish an Organic Gaming Capability

Enterprise and leadership responsibilities	Coordinating responsibilities	Oversight responsibilities	Partnerships for gaming capabilities	USCG gaming capabilities
• Workforce analysis and career progression • Investment in talent pipeline	• Take a leadership role beyond the service, including partnering with DHS and other federal agencies for joint analytical gaming	• Sponsor standards and training • Establish standards for gaming program evaluation	• Minimal reliance on external partners for gaming	• Strategic, operational, and/or tactical games (high technology cost) • Dedicated gaming facility • Personnel: supplement with civilian staff to support target number of games per year and maintain institutional knowledge and memory • Develop gaming talent tracks

These plans and milestones do not represent divergent futures; rather, they are samples on an evolutionary continuum. Coordination and repository creation are achievable near-term, and given current USCG interest in gaming for strategic planning and decision support, could be implemented. Previous USCG games and experiences could be leveraged to implement Milestone 1 in the near-term; in the years since the USCG's first game was implemented, there are already several bespoke USCG games and a need for sharing across offices and preservation for future reference.

Within the USCG's existing organizational structure, the placement of a near-term gaming coordination shop and repository management may be a simpler decision than deciding where full-fledged production capability should live, and this is a good thing. Taking a phased approach allows the Service to refine its understanding and familiarity with games as an analytic tool, identify traps and pitfalls, and refine its needs and objectives with respect to gaming. Potential locations for gaming capabilities will very much be determined by the aims and objectives of the USCG's strategic intent with respect to gaming.

Furthermore, a long-term vision means that coordination would be implemented with an eye toward governance, assuming that as the scope of USCG gaming increases, oversight will need to grow as well. In the near-term, formal governance may not be the highest priority, but informal oversight would take the form of leadership engaging with efforts to ensure that results are disseminated and integrated into planning cycles and decisionmaking processes. As the

USCG becomes more and more familiar with gaming, a culture of gaming norms and habits will develop. It is incumbent on the Service to make those habits good ones.

Appendix A. Discussion Protocols

In this Appendix, we share the protocols used for the semi-structured discussions with members of the USCG, the DoD, and allied military professional gaming SMEs.

Before meeting, participants were provided (by email) the following background and objectives:

> We are researchers with RAND's Homeland Security Analysis and Operations Center, a non-profit Federally Funded R&D Center, under contract with the Department of Homeland Security. We are conducting a small study for DCO-X looking at the potential futures of gaming within the USCG. The task of identifying the opportunities, challenges, benefits, risks, and needs to build and sustain gaming capabilities within the service is a critical endeavor aimed at shaping its future strategic direction. This analysis is designed to uncover the potential future of gaming within the Service, focusing on how it can be integrated and sustained. By examining a range of options, this task will highlight the various opportunities that gaming capabilities can offer, such as enhanced training, improved strategic planning, and innovative problem-solving. It will also address the challenges that may arise, including technological integration, budgetary limitations, and the need for specialized expertise, and organizational constraints. This study, and the resulting short report, aim to provide Service leadership with the necessary insights to make well-informed decisions on the future of strategic gaming. This will enable them to leverage this methodology effectively, maintain positive momentum, and ensure that gaming capabilities are aligned with the Service's operational goals and requirements.

At the start of each discussion, RAND researchers read the following interview protocol to participants:

> Participation in discussions is entirely voluntary. If you do agree to participate, you are not required to answer every question. If at any time you do not want to answer a question or would like to stop the interview, please let us know. There are no penalties for doing so.
>
> All discussions and interviews are not for attribution. We will take notes during the interview to have a record of what was discussed. We will keep your information confidential, which means we will not cite participants by name, attribute select comments to individuals, or share your individual responses with anyone outside of the HSOAC research team. However, we will acknowledge that we spoke with categories of people. It is possible, though unlikely, that someone who reads the report could infer who provided a statement or quote.
>
> For participants in group interviews: Please do not discuss anyone else's comments after the discussion is over. Although we are asking everyone in the group to keep each other's answers confidential, we cannot guarantee that the other participants will do so. Please do not answer any questions that you do not feel comfortable sharing in front of the group. Instead, feel free to say "pass" to

those questions. You may also reach out to us to schedule an individual discussion.

If you have questions about your rights as a research participant or need to report a research- related concern, you can contact RAND's Human Subjects Protection Committee toll-free at (866) 697-5620 or by emailing hspcinfo@rand.org.

Discussion topics and questions were explored according to the subject matter expertise and equities of each participating organization, according to the following outlines.

For non-USCG participants

- What is your experience with serious games?
- Based on your experience, what value has gaming brought to your organization?
- Has your organization dealt with any risks associated with the use of gaming capabilities?
- What infrastructure or organizational structure investments have been made to support
- gaming capabilities in your organization?
- How is gaming aligned with the Service's broader strategic goals?
- Can you explain how institutional knowledge is maintained in your organization?
- Are there any benefits/issues with the institutional knowledge management of gaming in your organization?

For USCG participants

- Are you familiar with serious gaming? What is your experience with serious games?
- How do you see gaming as plugging into your office and the broader USCG?
- Do you see any challenges in integrating gaming capabilities within the Service?
- Do you see any opportunities in integrating gaming capabilities within the Service?

As this program begins to develop, the USCG needs to decide how to maintain the program and the institutional knowledge around the program.

- Are there any other USCG programs that are similar to gaming that you think have a good history of institutional knowledge? What are they/can we have contact information for the program?
- Do you have ideas for how this program should be situated within the service?

Abbreviations

AFRICOM	U.S. Africa Command
CCMD	U.S. Combatant Command
CISA	Cybersecurity and Infrastructure Security Agency
CONUS	continental United States
COP	common operating picture
DCMS	U.S. Coast Guard Deputy Commandant for Mission Support
DCO	U.S. Coast Guard Deputy Commandant for Operations
DCO-X	U.S. Coast Guard Deputy Commandant for Emerging Policy
DHS	Department of Homeland Security
DoD	Department of Defense
DWAG	Defense Wargaming Alignment Group
FEMA	Federal Emergency Management Agency
FFRDC	federally funded research and development center
FORCECOM	U.S. Coast Guard Force Readiness Command
GAO	Government Accountability Office
HQ	U.S. Coast Guard Headquarters
HSOAC	Homeland Security Operational Analysis Center
HSRD	Homeland Security Research Division
IUU	illegal, unreported and unregulated
JWC	Joint Warfare Centre
LDC	U.S. Coast Guard Leadership Development Center
M&S	modeling & simulation
MDA	Missile Defense Agency
MORS	Military Operations Research Society
NWC-WGD	U.S. Naval War College's War Gaming Department
ODO	U.S. Coast Guard Office of Counterterrorism and Defense Operations Policy
OEM	U.S. Coast Guard Office of Emergency Management and Disaster Response
SME	subject matter expert
TTX	tabletop exercise
USCG	United States Coast Guard
WIF	wargaming incentive fund

References

Bartels, Elizabeth M., "Building a Pipeline of Wargaming Talent: A Two-Track Solution," *War on the Rocks*, November 14, 2018.

Bartels, Elizabeth M., *Building Better Games for National Security Policy Analysis: Towards a Social Scientific Approach*, dissertation, Pardee RAND Graduate School, RAND Corporation, RGSD-437, 2020. As of January 1, 2025: https://www.rand.org/pubs/rgs_dissertations/RGSD437.html

Burns, Shawn, ed., *War Gamers' Handbook: A Guide for Professional War Gamers*, Newport, Rhode Island: War Gaming Department, U.S. Naval War College, 2013.

Caffrey, Matthew B., *On Wargaming: How Wargames Have Shaped History and How They May Shape the Future*, Newport Papers, Newport, Rhode Island: Naval War College Press, 2019.

Chairman of the Joint Chiefs of Staff, *Officer Professional Military Education Policy*, Joint Chiefs of Staff, April 14, 2024.

Deputy Secretary of Defense, *Wargaming and Innovation*, memorandum, February 9, 2015.

Downes-Martin, Stephen, "Your Boss, Players, and Sponsor: The Three Witches of Wargaming," *Naval War College Review* 67, no. 1: 31-40, 2014.

GAO – *See* U.S. Government Accountability Office

Heath, Garrett and Oleg Svet, "Better Wargaming Is Helping the US Military Navigate a Turbulent Era," *Defense One*, August 19, 2018.

Joint Chiefs of Staff, Joint Publication 5-0, *Joint Planning,* 2017.

Lin-Greenberg, Erik, Reid B.C. Pauly, and Jacquelyn G. Schneider, "Wargaming for International Relations Research," *European Journal of International Relations* 28, no. 1: 83-109, 2021.

Longland, Tom, *Red Teaming and Course of Action Wargaming*, Development, Concepts, and Doctrine Centre, UK Ministry of Defence, undated.

Mad Scientist Laboratory, "Report from Game On! Wargaming & The Operational Environment Conference, 06-07 November 2024," webpage, U.S. Army, December 5, 2024.

McGrady, Ed, "Getting the Story Right About Wargaming," *War on the Rocks*, November 8, 2019.

Neddersen, Travis, "Interview: The JWC's Wargaming Design Capability," *The Three Swords*, No. 39, October 2023.

Parson, Edward A., "What Can You Learn From a Game?," in Richard J. Zeckhauser, Ralph L. Keeney, and James K. Sebenius, eds., *Wise Choices: Decisions, Games, and Negotiations*, Harvard Business School Press, 1996.

Perla, Peter P., and Ed McGrady, "Why Wargaming Works," *Naval War College Review 64*, no. 3: 111-130, 2011.

Rubel, Robert C., "The Epistemology of War Gaming," *Naval War College Review 59*, no. 2: 108-128, 2006.

Simms, Thomas W., *Advancing Games, Exercising, Modeling, and Simulation (GEMS) Capabilities*, briefing slides, Under Secretary of Defense for Research and Engineering, U.S. Department of Defense, October 1, 2022.

Smith, David A., "Origins of using Wargaming in the Office of Emerging Policy," research summary, USCG Office of Emerging Policy, undated.

Snyder, Don, Kristin F. Lynch, James A. Leftwich, Heidi Peters, and Brett Zakheim, *Considerations Regarding Changes to the Organizational Design of the U.S. Air Force: Toward a More Integrated Force Structure*, RAND Corporation, RR-A2899-1, 2024. As of January 17, 2025: https://www.rand.org/pubs/research_reports/RRA2899-1.html

Tingstad, Abbie, Yuna Huh Wong, and Scott Savitz, *How Can the Coast Guard Use Gaming?* Homeland Security Operational Analysis Center operated by the RAND Corporation, PE-A148-1, September 2020. As of January 17, 2025: https://www.rand.org/pubs/perspectives/PEA148-1.html

U.S. Army Training and Doctrine Command, G-2, Operational Environment Enterprise, *The Red Team Handbook: The Army's Guide to Making Better Decisions, Version 9.0*, Fort Leavenworth, Kansas: University of Foreign Military and Cultural Studies, undated.

U.S. Coast Guard, *Creating and Sustaining Strategic Intent in the U.S. Coast Guard*, *Version 3.0,* September 2013.

U.S. Coast Guard, "Coast Guard Gaming," webpage, undated.

U.S. Government Accountability Office, *Defense Analysis: Additional Actions Could Enhance DoD's Wargaming Efforts,* Report to the Committee on Armed Services, House of Representatives, GAO-23-105351, April 2023.

Wong, Yuna Huh, Sebastian Joon Bae, Elizabeth M. Bartels, and Benjamin Michael Smith, *Next-Generation Wargaming for the U.S. Marine Corps: Recommended Courses of Action*, RAND Corporation, RR-2227-USMC, 2019. As of January 17, 2025: https://www.rand.org/pubs/research_reports/RR2227.html

Zenko, Micha, “Millennium Challenge: The Real Story of a Corrupted Military Exercise and Its Legacy,” *War on the Rocks*, November 5, 2015.

Ziegler, Michelle D., Bryan Rooney, Aaron C. Davenport, Michael E. Linick, Susan A. Resetar, Emily Yoder, Abbie Tingstad, Lev Navarre Chao, and Melissa Bauman, *Paratus Futurum Strategic Gaming: Priming the U.S. Coast Guard for the Future*, Homeland Security Operational Analysis Center operated by the RAND Corporation, RR-A2992-2, 2024. As of January 21, 2025: https://www.rand.org/pubs/research_reports/RRA2992-2.html