Wargaming

Breaking the paradigm and LVC

by Luis E. Velazquez

This article will cover the Marine Corps' pursuit of a war game capability and the need to shift paradigm to include live, virtual, and constructive (LVC) simulations/simulators as enablers for wargaming. It will cover insights gained from meeting with one of the stakeholders from the Marine Corps Warfighting Laboratory, Wargaming Division (MCWL WGD), who conveyed the war game capability concept and helped initiate the requirements for the formalized Joint Capabilities Integration Development System (JCIDS) documents. I will also discuss how LVC simulations augment a war game capability as part of a tool kit of simulation capabilities to "better inform" decision makers, dependent on the type of war game being conducted.

On 12 December 2017, in Fredericksburg, VA, Col Ross Monta provided an overview to members of industry at the Wargaming Symposium. Industry partners with various levels of expertise in war games, simulations, and virtual training gathered for a question-and-answer session on the emergent Marine Corps war game capability. *(Photo by author.)*

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The Concept of a War Game Center

The Operations Analysis Division study lead, Mr. Bill Inserra, commissioned the RAND study "Recommendations for Marine Corps Wargaming—Final IPR" by Yuna Wong, Elizabeth Bartels, and Sebastian Bae in 2017. This study listed the following types of war games:

- Wargaming to support concept development.
- Wargaming to support combat development and analysis.
- Science and technology wargaming.
- Senior leader engagement and strategic discussion.
- Wargaming to support operational decisions and plans.
- Wargaming for education.

In August 2015, the Director, MCWL WGD, Col Richard Hall, met with senior leadership at the Pentagon on the affordability of a Marine Corps war game capability that could support each of the different types of war games listed above. This meeting started the process of identifying capabilities gaps, requirements, and costs to design, develop, build, and sustain a war game capability. Col Hall knew that the future of a war game capability facility depended on briefing the senior leadership with validated data to gain the advocacy necessary to jumpstart the JCIDS process.

Several key events led up to the start of the Wargaming Capability Program.

- In May 2015, Dr. William J. Lademan, Technical Director, MCWL WGD, briefed the CMC on the concept of a wargaming capability facility for the Northern Capital Region.
- MCWL WGD formulated the plan of experimentation with outside agencies such as Naval Warfare Centers and the Center for Naval Analyses to realize the "interim" wargaming center capability by fiscal year 2020 and thus lay the foundation that will better inform the acquisitions representatives and engineers.
- In 2017, the Marine Corps Modeling and Simulation Office conducted a week-long technology requirements working group comprised of members from Program and Requirements, Operations Analysis Directorate, C4 (Command, Control, Communications, and Computers) Directorate, WGD, Marine Corps Intelligence Activity, I MEF, III MEF, and Training & Education Command. The working group identified six categories of technology requirements needed for the future wargaming capability: wargaming, modeling, and simulation requirements; tools for post-game data ana-

lytics and assessments; data collection and visualization; collaboration tools; processes and methodologies; and network requirements. Follow-on meetings were conducted to form the basis of the initial capabilities document currently being reviewed by the Marine Requirements Oversight Council.

Why Have a Wargaming Center?

Wargaming is the most effective means available to consider cross-domain effects, surprise, catastrophe theory, and reflexive warfare in the conduct of operations. Wargaming involves "human in the loop" interactions to drive the model and conduct decision making, and it is not a pure analytical method. Addressing and managing these enablers in a controlled wargaming environment to stress the science and art of warfare requires a new wargaming philosophy and theory. Synthetically and virtually, within the walls of a war game facility, the full spectrum of warfare plays out.

War game capability attributes include but are not limited to:

- Future force design.
- Developing or enhancing future capabilities.
- Conducting force development.
- Operational plans development.
- Developing force generation practices.
- Representing current and future threats, replicating capabilities, and integrating functions.
- Flexibility to accommodate game design and support the synthesis of maritime, air, land, space, and cyber domains as operating environments across LVC domains.
- A library of standard government models with the capability to employ models like the Synthetic Theater Operations Research Model (STORM).
- Supporting twenty war game events per year (an increase from eleven per year).
- Supporting war games up to top secret/special compartmentalized information classification levels.
- Facility space to support war game staff and data storage requirements.
- Facility control for access to schedule usage while flexible, enduring, and upgradeable.
- Supporting the next-generation war game.
- Interoperable combatant command services (Chairman, Joint Chiefs of Staff; Office of the Secretary of Defense; and coalition forces)
- Supporting the development of future capabilities and force generation practices.
- Informing how the Marine Corps organizes, trains, and equips the MAGTF in order to meet the challenges of the future operating environment.

According to Dr. Lademan,[1]

> Simply adding new or existing technology alone will not capture the full spectrum of what a war game capability must be capable of supporting. There are numerous constraints to consider, including how a Marine Corps MILCON new start takes years of planning [and] can offset the introduction of emergent technologies needed now. Furthermore, building to an immediate need introduces risks—that the technology becomes obsolete by the time a war game capability facility is operational. Therefore, to counter building to obsolescence, a multitude of discussions involving subject-matter experts in almost every domain of the DOTMLPF must comprise the integrated product teams. Simultaneously, MCWL WGD division has been implementing a war game 'interim' capability to meet immediate needs for enhancing war games via automation. In short, the interim solution is an organic, resident analytical capability phased over a two-year period, to include operations research, systems analysis, researchers, and simulations visualization personnel. There are still tough questions about what are the basic mission-essential needs that form the foundation of a wargame capability matrix. Continuous analysis of studies, site surveys, and subsequent analysis of alternatives cover every course of action from improving existing facilities and spaces to the engineering of a dedicated facility while continuously conducting tradeoffs between costs, performance, and schedule meeting end state capabilities.

War game capability concepts are reviewed using a dual-pronged approach between MCWL WGD and the Program Management Office Wargaming Center (PM WGC). The MCWL WGD interim project is an ongoing effort, while the creation and construction of the war game capability facility is the enduring capability managed by PM WGC. The interim phase will identify required capabilities, supporting technologies and methodologies, and best practices. The wargaming capability will enable methodologies of exploration, abstract thinking, discovery, and rapid synthesis. Partnership between MCWL WGD and PM WGC allows the acquisitions professionals access to the cognizant agency for wargaming tasked with institutional and strategic-

On 27 November 2017, in Orlando, FL, Col Monta provided an overview to members of industry at the I/ITSEC 2017 event. *(Photo by author.)*

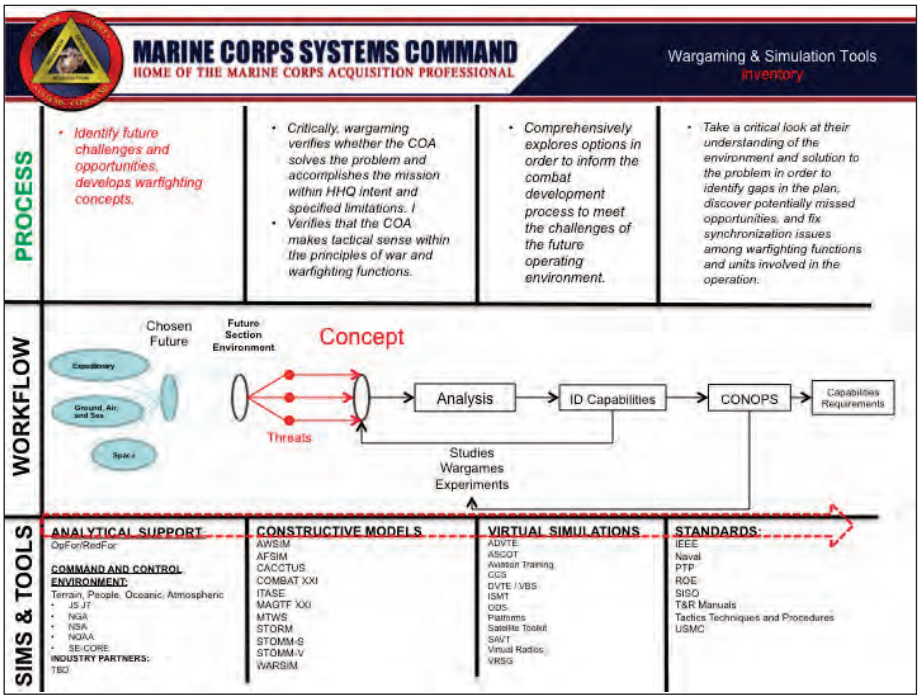

Figure 1.

level wargaming. The two offices coordinated site visits of existing Joint and other Services' war game facilities.

Site Visits

MCWL; Marine Corps Systems Command, SEAL; and PM WGC conducted various site visits to learn from other agencies that have built similar facilities. Our intent has been and is to gain valuable lessons learned that involve building a facility, to include multimedia, power, heating and air conditioning, visualizations across war games, and simulation spaces. Site visits included venues such as Special Operations Command, South Korea's Battle Simulation Center and the Naval War College.

Site visits revealed the following:

- The Marine Corps Wargaming Capability facility needs to exceed the capabilities of the facilities visited.
- The facility must be built with multiple purposes to accommodate attributes identified in Figure 1 and enable "out of the box" leadership discussion arenas and decision-making forums similar to those used by the Chairman, Joint Chiefs of Staff.
- The facility needs to bridge the gap between joint and coalition networks via secure distributed networking while at the same time having the adequate space and secure storage requirements for each.
- The wargaming workforce will likely be a combination of subject-matter experts assigned to a particular exercise with personnel permanently assigned to the facility as analysts and engineers.
- The facility must enable integration across operational analysis, wargaming, training, intelligence, and logistics subject-matter expertise.

Modeling and Simulation (M&S) Technology and LVC Simulations

M&S technology is one of the enablers to supporting the wargaming capability. Simulations, simulators, and visualization tools themselves have unique requirements for infrastructure, architecture, standards, and the protocols needed to cover aspects of authoritative data generation, sources, validation, verification, accreditation, and data capture before, during, and after the conduct of a war game. Simulation tools can enable the transition of information collected from a war game to an analyst for use in the subsequent analytical modeling tools. The analytic community would be the first to question source, quality, quantity, and validation of data required to provide the foundation for analysis. There must be data integrity and security measures for data used, generated, and provided for formal analysis. Therefore, all the simulations, protocols, processes, and procedures must meet the most sophisticated and highest standards to have any meaningful utility. M&S physics-based simulations are essential, as they produce outcomes modeled at the level of individual engagements between a weapon and a target. These outcomes support wargaming and validate the decisions that flow from the results of a war game. Physics-based algorithms are necessary for analytical purposes and investment decisions. The wargaming capability program provides an opportunity to be consumers of an authoritative data source and common tools for assessment, analytics, and training scenarios. M&S and artificial intelligence, utilized appropriately, can address a defined solution space, identify findings, generate understanding, and propose a way forward.

In 2015, an inventory of simulation modeling tools was conducted to determine if existing training simulations could support a war game. Program Manager, Training Systems, Col Walt Yates, advised on the MAGTF Tactical Warfare Simulator (MTWS) program and the need to leverage physics-based models.

> MTWS should not be considered as a tool that would be of use in the area of wargaming since MTWS is an aggregate resolution model based on Lanchester equations and not an entity resolution physics-based simulation of ballistic trajectories and projectiles impacting on armor and is not suitable for use as an analytical model. Because of the low-powered computing capabilities that existed 30 years ago when designing the original architecture of MTWS, it did not use physics-based models because the 1990s era PCs would not be able to handle the computational requirements. [The Program Manager, Training Systems] has a replacement for the current MTWS fully funded and [is] begin-

ning its replacement research in FY18. The new MTWS will be a candidate for use as a wargaming tool because it will have physics-based modeling and entity resolution. The completion of the re-engineered MTWS is forecasted for FY22.[2]

Col Yates believes that wargaming is an activity Marines practice as part of the Marine Corps Planning Process that happens across the Corps (in garrison and in the field) and that it is support to varying degrees of analytical fidelity, depending on the environment and the tools available. Developing better wargaming tools is a big component of the wargaming capability but not the whole of it.

Materiel Developer and Lead Systems Integrator

The PM WGC was initiated shortly after the July 2017 Executive Offsite. Because of the complexity of the issues involved, PM WGC was stood up to ensure that during the requirements generation process, acquisitions and full life-cycle implications would be considered to properly deliver and sustain a materiel solution. The extensive prior experience of combined program management offices in integrating complex systems such as the Marine Corps Enterprise Information Technology Services has prepared them for the challenges of delivering a world-class Marine Corps wargaming capability. The focus goes beyond current capabilities and limitations and extends into the creation of a coherent strategy that will not only enhance current capabilities used for support but also integrate "systems of systems" that will better inform war game capability customers from MCWL; Combat Development & Integration; Program and Requirements; Plans, Policies, and Operations; Training & Education Command; etc. In December 2017, PM WGC hosted the Marine Corps Wargaming Symposium, with more than 200 attendees representing stakeholders in the Marine Corps wargaming community, including DOD civilian and active duty personnel, industry, and academia representatives. The two-day symposium was a robust professional development program featuring single and panel presentations from subject-matter experts within the professional wargaming community. Sessions were interactive, including an audience question-and-answer session with the speaker. Col Monta's office will ensure that the materiel solutions enable improved processes and methodologies that will allow for human-in-the-loop war games, running concurrent with modeling tools transparent to the end users, which will provide a high level of confidence for each war game. The mission of PM WGC is to establish a wargaming capability that provides a comprehensive environment to conduct the full spectrum of war games and to ensure that all war games are date enabled and provide defensible positions based on both insights and analytical findings.

On 16 September 2016, Industry Day, Quantico, VA, MCWL and the Marine Corps Systems Command (MCSC) hosted a question-and-answer session. Commander, MCWL, BGen Julian D. Alford, discusses the warfighting capability with the members from industry and CG, Training & Education Command, MajGen James W. Lukeman; Deputy CG, III MEF; CG, 3d MEB, BGen John M. Jansen; Commander, MCSC, BGen Joseph Shrader; and Executive Director, MCSC, Mr. James Smerchansky. *(Photo by author.)*

> ***"New tech to an old problem doesn't necessarily fix it."***
> ***—Col Monta, PM WGC***

Conclusion

The wargaming capability will be a one-of-a-kind capability that will be more than the sum of its parts. All of the research described in this article is just the tip of the requirements matrix. It is important that the JCIDS process identify the performance specifications to account for integrated wargaming capabilities, to include M&S and LVC, which will allow the PM WGC to construct the design specifications. PM WGC will deliver that capability per the acquisitions *DOD 5000* and milestone decision authority conducting concurrent planning, simultaneous market research, and complex systems integration.

Notes

1. Personal interview with Dr. Lademan.

2. Personal interview with Col Yates.