

The Art of War (Gaming)

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INTRODUCTION

The origins of modern wargames go far back to the Gupta Empire in 6th century India, when *Chaturanga*, a chess-like game, was played by commanders and kings to hone their military craft. Such informal games have formed a part of the training of both military commanders and royals throughout history. However, it was the Prussians who, in 1820,¹ formally introduced wargaming as a tool to educate military officers as well as validate operational plans. The game, known as *Kriegspiel*, was essentially a board game, played on a highly detailed terrain map, and an extensive set of rules with two umpires that formed the core of the game. The impact of this wargame on the Prussian military's performance during the Franco-Prussian War of 1870 is well summarised by General Kraft of Hohenlohe-Ingelfingen,

The ability to quickly arrive at decisions and the cheerful assumption of responsibility, which characterized our officers in

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1. Milan Vego, "German War Gaming," *Naval War College Review*, Vol. 65, No. 4, Article 10, 2012, p. 110.

the Franco-Prussian War of 1870–71 was in no small measure due to the wargames.

The Prussian way of war quickly spread to other parts of Europe and America, with most militaries adopting some form of wargaming in their operational plans. During the inter-war period, however, wargames had essentially been reduced to evaluating various ‘what if’ scenarios rather than as a training/educational tool for officers. It was only the German General Staff which continued to make a clear distinction between ‘educational’ and ‘testing’ wargames, and it was also the only known military at the time to conduct wargames at the tactical, operational as well as strategic level of warfare.² Alongside land operations, naval warfare was also greatly influenced by the advent of wargaming, with the German and Royal Navy (UK) using it as early as 1873. With time, naval wargames evolved from purely tactical set-ups to projecting naval power as a part of a broader national maritime strategy.³ However, the same cannot be said about wargames focussed on air operations since the concept of ‘air power’ itself had not been firmly rooted in the doctrine of most forces at the time. It was not until the middle of the Cold War in 1976 that the US Air Force (USAF) Chief of Staff directed the Air University to “*put more war in the War College*”. This resulted in the world’s first Air Force Wargaming Institute being set up in 1986 with dedicated hardware and software support, taking up almost 56,000 sq ft of land.⁴

Today, almost all major military forces follow a formal operational planning process with the aim of developing multiple

2. Ibid., p. 120.

3. J W E Smith, “New Research into the History, Theory and Practice of Naval Wargaming”, *Mariner’s Mirror*, 107(1), 2021, pp. 100-103.

4. Air Force Wargaming Institute, “Wargame Compendium: Academic Year 2022-2023,” Maxwell Air Force Base, Alabama, p. 10, <https://www.airuniversity.af.edu/leamay/afwi/>

Courses-of-Actions (CoAs), allowing the commander to decide on the final CoA. The ability of the commander to make correct and timely decisions depends not only on his own experience and craft, but also on the ability of his staff to accurately wargame own CoAs against the enemy's most likely and most dangerous CoA. While the planning process itself is generally a time- consuming and tedious task, realistic wargaming of a CoA can be an even more difficult task. Throughout history, there have been multiple instances of over-simplification of wargaming due to factors like lack of resources, lack of expertise and even a general lack of faith in the process. With the ever-increasing complexity of the modern battlefield, the ability to wargame a CoA to a high degree of realism is vital to ensure it plays out in a similar manner in operations.

SCOPE

The aim of this paper is to provide the reader with a holistic understanding of wargaming and its impact on military operations, and the complexity of wargaming modern operations with, special emphasis on air operations.

DEFINING WARGAMING

There is no universally recognised definition of wargaming in the world and various organisations have chosen to define it with minor variations. One of the commonly used definitions is given by the US Department of Defence Joint Publication 1-02 (Dictionary of Military and Associated Terms):

A simulation, by whatever means, of a military operation involving two or more opposing forces, using data on forces and/or influence of such factors as terrain, weather, and intelligence.

Depending on what is the purpose of a particular wargame, the importance of decision-makers may vary but can never be overlooked. For this reason, the *UK Handbook on Wargaming* cites a slightly different definition from the *Red Teaming Guide* published by the Development, Concepts and Doctrine Centre (DCDC), UK:

A scenario-based warfare model in which the outcome and sequence of events affect, and are affected by, the decisions made by the players.

From the above definition, it is important to note that while there is an artificially created warfare model which may or may not involve computers, the emphasis is on ‘decision makers’.

One important aspect of wargaming that is often overlooked is that ‘wargames’ are designed by humans for very specific objectives that may range from training to evaluating operational plans. This aspect, and the fact that wargaming can be done at different levels of war, makes each game unique. However, certain features that are common to all wargames can be summarised as follows:

- **Game Setting:** Narrative supporting the game and providing context to the players. The extent of detail to which the settings are laid out will determine the immersion level for the players. Defining the ‘problem’ while designing a wargame is one of the most critical elements and will directly affect the outcome of the game.
- **Players:** Depending on the objectives of the wargame, the players may or may not form the centrepiece of the wargame. For example, a training/education oriented wargame will be focussed on learning value for players, whereas a planning/operational level wargame will be focussed on the outcomes.
- **Gaming Method.** This aspect encompasses not only the regulatory framework under which the game is to be

conducted, but also aspects like ‘*game time*’ and analysis techniques. Depending on the scale and nature of the wargame, it may be a fully automated, a partly automated or a manual process. A training wargame for staff officers may be more focussed on providing accurate simulation of command staff wartime procedures, whereas a wargame used for evaluating operational plans will be more focussed on accurate simulation of the plan in action. Both these wargames will require different approaches and have vastly different needs for computing power. Apart from the aspect of adjudication, gaming methods can also vary in the form of being seminar-style, course-of-action-based or matrix-style.⁵

- **Game Control:** This ‘*white-force*’ is responsible for directing the wargame in the intended direction. This may be dictated by ‘training requirements’ for certain wargames or inserting plausible contingencies in games used for validating operational plans. In most cases, ‘control’ is formed out of experienced wargamers and subject matter experts capable of providing adjudication when a conflict develops.

Wargames have traditionally been characterised as long-drawn boring events with a rigid framework requiring specialist officers to run them. This was overcome in the initial years in Germany itself by replacing the rigid adjudication rules with seasoned war veterans who would give out results of ‘x vs y’ engagements much faster. This set-up came to be known as ‘*Free Kriegspiel*’⁶ and worked well for a long time, with a greater number wargames being played and generally high acceptance

5. Matthew B. Caffrey, Jr., “On Wargaming”, *The Newport Papers*, 43, 2019, p. 29, <https://digital-commons.usnwc.edu/newport-papers/43>

6. Wargaming Handbook, Ministry of Defence (UK), Development Concepts and Doctrine Centre, 2017, https://assets.publishing.service.gov.uk/media/5a82e90d40f0b6230269d575/doctrine_uk_wargaming_handbook.pdf

for wargaming. It is, however, evident that this set-up requires a nucleus of experienced officers capable of applying their wisdom to future engagements. Being a human-adjudicated set-up, there would be considerable 'influence' from higher-ranking players, leading to biased and unrealistic results which would only come to light during the actual operations. When Germany went to war in World War I, Kaiser Willhelm II paid the price for always winning in his wargames when he suffered a crushing defeat at the hands of the Allies while executing the same plans used during the wargames.

WARGAMING AND COMPUTER SIMULATIONS

Both these terms are often, and incorrectly, used in place of each other, resulting in a shallow understanding of the much wider canvas of wargaming. A typical wargame involves simulation of multiple aspects of various operations and the accuracy of such simulations have a major impact on the outcomes of decisions made by human players. Taking a case of a wargame centred around air operations, a Suppression of Enemy Air Defences (SEAD) plan made by one side and played out against the enemy Integrated Air Defence System (IADS) will depend heavily on the extent to which both these aspects are simulated. This includes, but is not limited to, accurate simulation of Electronic Warfare (EW) aspects, performance of anti-radiation missiles, Air Defence (AD) systems, terrain, and Line of Sight (LOS) issues, weather, Intelligence, Surveillance, Reconnaissance (ISR) cycle, etc. The wargaming inputs that go into this simulation from the human players will involve aspects like shot doctrine for Surface-to-Air Missile (SAM) systems, emission policy, force structure and packaging, use of terrain, decoy plan, etc. When played in real-time, both sides will be giving these inputs as the game progresses and the simulation will take care of the complex process of factoring everything and giving a result as close to reality as possible. This

essentially means that it is impossible to replay a wargame in the same manner twice, but it is possible to repeat an event simulation repeatedly to validate the outcomes of 'x vs y' engagements with or without varying simulation parameters. When the terms are used casually, it can be said that all wargames are simulations of sorts but not every simulation is a wargame.

To understand the advent of 'modelling' and 'simulation' in wargames, we need to go back in history and observe how wargames were adjudicated. Essentially it would be done in two ways: either through an extremely detailed set of rules or through decisions given by experienced wargamers and combat veterans. The complexity of military operations in the day was not very different from what it was many hundred years back and, hence, gave the following advantages to wargame designers of the time:

- **Experience:** With wars of all scales being a common feature of the time, the amount of experience available in the officer corps was immense. More importantly, this experience was relevant for future wars since major changes in warfighting techniques came up only by the end of World War I.
- **Pace of Operations:** While Napoleon did make 'marching speed' one of his force multipliers, it needs to be understood that this speed was still very easy to wargame. Even a tactical level turn-based wargame played out on a board would not be greatly affected due to the speed of marching of the armies of the time. Once the forces met, the battles of the time were highly restricted in terms of space and could not influence anything beyond a few miles. The same can be said for naval warfare and, hence, wargaming adjudication methods were suited to both forms of warfare.
- **Modelling:** In any engagement involving two units or more, it is critical that the outcome takes into account all the factors affecting the engagement, including aspects like training standards and morale. For example, if a line of British

Redcoats met a similar number of French troops in the open, the Redcoat's three volley-a-minute would trump the French troops. Due to the rigid manner in which armies fought in the day, this could be scaled upwards to give results for larger formations and this was validated by experience as mentioned above. When the effect of artillery would be considered, the number of guns in support would be used as a datum to provide attrition, which again would be vetted by seasoned fighters. This system worked well till the time attrition warfare was in vogue but does not work well for 'effects-based' operations which form the bedrock of air power. A combat model which does not simulate multiple layers of enemy systems with associated inter-dependencies, cannot be used to simulate effects of attacks carried out by the opposing force. This aspect impacted the evolution of air campaigns during Gulf War I when the 'Instant Thunder' plan developed by Colonel John Warden did not yield the desired results in wargaming, which did not help the cause of air power proponents in the US military. While Warden had planned a campaign to yield strategic effects, the attrition-warfare-based combat model used in wargames could not calculate the impact of his air campaign.⁷

It is important to understand that modern warfare does not distinguish among air, land and maritime operations as independent battlegrounds. Military exploitation of space and cyber domain along with elements of grey zone warfare has further complicated the nature of war. This changing nature of war necessitates wargaming to be supported by scalable and customisable computer simulations that allow human interaction

7. Caffrey, n. 5., p. 131.

in exactly the same manner as it would happen in a real-world scenario.

CASE STUDY: EVOLUTION OF USAF WARGAMING

The USAF traces its roots to the US Army Air Force (USAAF) which was essentially the air arm of the US Army in World War II. However, by the end of World War II, the USAAF had evolved into a strategic force which would dominate the American military landscape during the Cold War alongside missile systems. Due to the lack of emphasis on tactical air power in the 1950s and 1960s, the USAF wargaming was primarily targeted at a nuclear war which was wargamed using a computer-based 'air warfare model' developed by RAND.⁸ The late 1970s saw Exercise Red Flag being started to provide fighter pilots with near realistic air combat training, whereas Exercise Blue Flag was started in 1984 to enable command staff to become expert campaigners without real assets being used in the air. This soon spread to training all North Atlantic Treaty Organisation (NATO) theatre-level commanders at the Warrior Preparation Centre, a facility that supported the advanced wargaming needs of all three Services.

The 1980s was also significant for the USAF as there was a major push for improving Professional Military Education (PME) at all levels: Air War College, Air Command and Staff College and Squadron Officers School. A dedicated wargaming facility was designed by a USAF officer which would not only meet conventional wargaming needs like crisis-planning but also validate concepts and help defend the USAF's budget and acquisition plans. One major step towards achieving realism in wargaming was the formation of a dedicated 'Red Team' made up of highly trained reservists who would be called on requirement basis. A dedicated wargaming facility was planned at Maxwell

8. Ibid., p. 77.

(Air Force Base) AFB which spanned 42,600 sq ft and would cost \$ 3.5 million to build, and \$ 6.5 million to set up. The system, which was developed by a civilian contractor, came to be known as Command Readiness Exercise System (CRES) and achieved initial operational certification in 1984.⁹ Within a short time, these wargaming advancements were put to the test when USAF planners orchestrated one of the largest and highly successful air campaigns during Gulf War I. The lynchpin of this air campaign was penetrating the Iraqi Integrated Air Defence System (IADS) and rendering it ineffective to allow maximum support to the land campaign. This was facilitated by a computer-based tool known as Extended Air Defence Simulation (EADSIM) which could provide realistic results regarding how many aircraft in a particular wave would be able to reach their targets.¹⁰

Based on the experiences gained from the Gulf War, the USAF renewed its effort to improve wargaming techniques with the establishment of the Air Force Agency for Modelling and Simulation (AFAMS) in 1996. While the job of the Air Force Wargaming Institute (AFWI) was to create and run wargames primarily cued towards PME, AFAMS was tasked with building accurate models and running operation concepts to validate them. By the 1990s, the USAF had also moved to a distributed wargaming set-up wherein Blue Flag could be run without gathering participants at a single place, which was both time consuming and costly.¹¹ While Blue Flag was primarily intended for training the Air Operations Centre (AOC) warfighters, the USAF also set up a \$27 million facility known as the Theatre Aerospace Command and Control Simulation to train all the participants, including air battle managers and SAM operators.

9. Ibid., p. 106.

10. Ibid., p. 132.

11. Ibid., p. 154.

To address the shortcomings of wargames in depicting the enemy as a 'system of systems', the USAF held a four-star Modelling and Simulation Summit which led to the creation of a new directorate to better simulate the impact of air power in joint wargames. While addressing the issue of air power being undervalued in joint wargames, the USAF also started the Aerospace Future Capabilities Wargame to improve acquisition and force structure plans for the future.¹²

Presently, the AFWI runs multiple wargames each year, with two major wargames based on future conflicts—one set 10 to 12 years away and the second one 12 to 24 years in the future. These are known as Title-10 wargames and include many smaller wargames which test operational logistics, air-mobility plans and communications. These wargames are supported by the following software.¹³

- **Command Professional Edition (PE):** This is a commercially available air-naval wargaming simulator that allows simulation of engagements right from a 1vs1 up to a global scenario. The professional edition allows customising of platform data to realistic details, and AFWI has customised it to receive batch input from players to avoid a steep learning curve and improve efficiency. The commercial version is widely used by hobby wargamers and is considered the best in its class.
- **Joint Theatre Level Simulation—Global Operations (JTLS-GO):** This is an internet-based tri-Service wargaming software that allows conventional and limited simulation of Nuclear, Biological, and Chemical (NBC) warfare as well. The software is intended for joint operations and is used by multiple nations, including our western neighbours.

12. Ibid., p. 168.

13. n. 4, p. 12.

- **Synthetic Theatre Operations Research Model (STORM):** STORM is the USAF's solution to simulating effects of an air campaign on the joint operational plan through use of a complex model of enemy forces that is highly customisable and scalable.
- **Standard Wargame Integration and Facilitation Tool (SWIFT):** SWIFT is primarily used for designing and conducting turn-based wargames for analytical purposes. Its application is mainly in joint wargaming domain involving elements of the Department of Defence.
- **Vassal Engine:** This is a commercially available software to adapt board games into a computer game allowing multiple players to participate over the internet. This is mainly used for seminar-style wargames for the higher leadership.
- **Falcon View:** This is the primary geo-reference system used for advanced wargames and includes overlays ranging from satellite imagery to aeronautical charts. The Joint Mission Planning System (JMPS) used by the USAF, US Navy (USN) and US Marine Corps (USMC) uses this software which allows realistic operational plans to be fed into either JTLS, Command PE or STORM.

A closer study of the evolution of the US Army, US Marine Corps and US Navy wargaming makes it evident that the path chosen by the USAF deviates towards heavy reliance on modelling and simulation while preserving the human element in wargaming. The greatest resistance to using the complex computer-based wargaming set-up comes from the players as they must learn to use these new systems which have no relevance outside of the wargame. This has been a thrust area for the AFWI and the Graphical User Interface (GUI) is kept as close as possible to the air campaigning tools being used in the Air Operations Centre (AOC).

WARGAMING ROADMAP

Any student of military history knows that the ability of any military force to accurately assess the nature of the next war will greatly influence its ability to come out as the winner. Wargaming presents the only method through which commanders can narrow down their options and select a final course of action. Especially when application of air power is considered, the high tempo of air operations means that the commander will have a narrow window to change course once the plan is put in motion. A commander orchestrating an air campaign will have to deal with making decisions in a highly compressed timeline as the first Air Tasking Order is put into action. Sub-processes like ISR and Electronic Warfare (EW) cycle and their synchronisation with the Air Tasking Cycle or lack of it will further complicate the commander's task. These aspects make realistic wargaming a crucial aspect for developing an effective air campaign and makes wargame design and development a key result area for commanders. A dedicated wargaming community will not only impact operational planning but also drive force structuring and doctrine development in the future.

The complex nature of modern warfare and rapidly evolving technology demands that wargame design needs to be undertaken by professionals from diverse fields like field-grade officers, intelligence experts, data scientists and computer engineers. This must be supported by a dedicated wargaming facility with associated hardware and software resources to design and run wargames. Above all, it requires military officers with the qualities of a professional wargamer to lead the wargame development. These qualities need to be identified early in their careers and subsequent PME needs to be tailored towards diversifying these officers into professional wargamers. Today's thriving commercial wargaming community needs to be tapped to learn the nuances of wargaming and followed up with professional

courses on wargame design which are conducted by multiple international universities. While it may seem counter-intuitive for military officers to think that they would need training to become professional wargamers, it is well summed up by a leading expert of wargaming,

Only soldiers can create the games that reinforce their prejudices and demonstrate their brilliance to themselves, if not to the enemy. The guys with that attitude don't want to know what's true, only to confirm what they believe to be true.

– Peter Perla, author of *Art of Wargaming*