

The Promise and Peril of Wargaming

Wargaming can be a powerful tool for educating soldiers, developing military doctrine, and determining future investment strategies. However, wargaming also has real limitations: if misapplied, wargaming can reinforce bad assumptions and be used to justify unrealistic or faulty battle plans.

By Taylor Grossman

Developed during the Gupta Empire in the sixth century BCE, the abstracted strategy game *Chaturanga* is often cited as the earliest iteration of a wargame. Other examples have been traced back to ancient Greece (*Pessoi*), Egypt (*Senet* and *T'au*), and China (*Wei-chi*). Modern wargaming has its roots in the early 19th century, where it emerged out of the Enlightenment-era belief that any human endeavor – including the chaos of battle – could be analyzed through the scientific method. Yet over time, wargaming has come to embrace other elements, including chance, that emphasize the less rational facets of conflict.

Wargaming continues to be used to educate and innovate. Military leaders and policy analysts have employed various types of wargames to simulate possible future scenarios, determining technology investment pathways and developing tactical and strategic war plans. Today, wargames can be particularly useful for exploring emerging technologies and their potential impacts. Yet, wargames must be used with caution. They are by design experimental and can thus distort or reinforce long-held perceptions and false assumptions about future outcomes. Poorly designed or intentionally manipulated wargames can lead players to draw the wrong conclusions. Wargames also have inherent scoping limi-



Participants look at the visualization during the NATO-organized Locked Shields cyber defense exercise in Tallinn in April 2019. *Ints Kalnins / Reuters*

tations depending upon which level or kind of military operation they are set to explore. For example, a tactical wargame that focuses on troop movements and maneuvers is unlikely to result in reliable strategic conclusions. And if used in isolation – particularly without considering the political realities within which actual militaries operate – wargames can be used to justify incomplete and incoherent battle plans.

The Art of the Wargame

The term “wargame” has been a source of much debate. Policymakers have frequently shied away from its application, fearing that the notion of a “game” makes light of the seriousness of war. Other military professionals have preferred terms like “exercise” or “scenario” because they are less politically charged. The practical definition of a wargame can also be fraught. Often



compared to models or simulations, wargames are distinct. Models represent reality; simulations represent reality over time. Wargames, by contrast, include an element of narrative creation, whereby players become immersed in the world of the game and influence its outcome. The environment of the wargame is not immutable. Unlike a simulation, the game's outcomes are not set entirely by the inputs. While the wargame's authors devise the broad mechanics of game play, the players themselves can and should direct the exact course the wargame takes. In this way, a single wargame is never played the same way twice.

Indeed, early wargaming innovators were keenly aware of the importance of creating a distinct narrative and reality within the game itself. In the early 1800s, Prussian strategists introduced chance into their wargaming by having players roll dice to determine specific outcomes, such as when directly engaging with opposing forces. War, they argued, was not entirely predictable. To be useful, wargaming also needed to include an element of randomness. Wargamers also started using neutral referees to ferry communications between players and translate player decisions into game actions. Referees were not fully passive but served a key interpretive role which could influence – either accidentally or purposefully – the course of play.

Wargames have always faced similar trade-offs between realism and playability. Take questions of temporality: wargames vary greatly in their use and representation of time, from a single round of play signifying several years, to events unfolding in real time. Battle space representations also differ. Early Prussian wargames employed abstract grids reminiscent of a chessboard, which later evolved into the hexagonal layout often still used today. Other wargames deploy significant war materiel over large physical areas. In 1941, the US Army launched the Louisiana Maneuvers, a massive wargame played by upwards of 350,000 men over at least 8,000 square kilometers. Questions of cost and replicability are important: a more involved wargame may be more expensive and less feasibly duplicated but may yield logistical insights not as easily gathered in a more pared down and abstracted simulation.

Finally, the relationship between adversaries can be structured in several ways, each with its own distinct advantages and disad-

vantages. Some definitions of wargaming require an adversarial element (often a Red team versus a Blue team). Others include games that consist only of a response side: the game itself serves in many ways as the adversary, introducing a series of inputs to which players must respond. Wargames can be "no-notice" exercises, where the participants are not informed ahead of time, or involve extensive pre-briefing materials and preparatory events. Both structures have their benefits and downsides. Preparation can help ensure participants achieve key learning objectives but can also lead to overdetermination. Millennium Challenge, a major wargame held by the United States in the summer of 2002, was marred by such accusations after the leader of the Red team claimed that their side had been unfairly disadvantaged and even restrained over the course of the game. "No-notice"

For militaries in peacetime, wargames can prove to be an incredibly fruitful environment for hands-on experience.

exercises can lead to more organic outcomes, but they often have the opposite problem: under-preparation can lead to dramatically one-sided gameplay. Such was the case of the Eligible Receiver exercise held in 1997, where the National Security Agency (NSA)-led Red team achieved its objectives – infiltrating the Defense Department networks – within days and shut the wargame down over a week early.

Experiential Education

Wargames are a useful teaching tool for students and servicemembers alike. For militaries in peacetime, wargames can prove to be an incredibly fruitful environment for hands-on experience. Nothing will fully capture the tumult of real warfare, but wargames can help soldiers experience the contours of battle. In some cases, wargames have helped train and identify future military leaders. The Louisiana Maneuvers of 1941 helped catapult the career of Dwight D. Eisenhower, who started the wargames as a lowly colonel but by the end had been fast tracked toward the general staff.

In periods of military transition, wargames can also offer invaluable training opportunities. American wargaming post-9/11 has focused on adapting soldiers to hybrid threat environments. Ahead of the invasion of Iraq, individual US Army units began playing wargames focused on tactical

maneuvering. Indeed, much of the early 2000s wargaming focused on new, unconventional tactics and enemies, from terrorist actors to irregular fighting forces.

As militaries have become smaller and budgets leaner, wargames have been used to practice employing joint operations and coalition partnerships in the field. Wargaming has become an international enterprise: more and more countries participate in major American wargames, and NATO has become a significant wargaming outfit. China and Russia have also frequently held joint wargames called Peace Mission, often including upwards of 150,000 troops. Within countries, wargaming can also reinforce the importance of command efficiency. In the US, for example, the Marine Corps Wargaming Division held a wargame in January 2001 with a new experimental command structure for marines and sailors operating in the field together. The results were so promising that joint doctrine was changed later that year, underscoring the necessity of a single commander. In November 2001, for the first time in the history of either organization, a marine was put in command of navy personnel in the field as Task Force 58 led the way into southern Afghanistan.

Shaping Policy through Wargames

Perhaps at their best, wargames can help shape policy development and technology investment. Wargames allow policymakers and military strategists opportunities to test many different configurations quickly and cheaply before settling on a specific course of action. The US Naval War College developed a series of wargames in the 1920s and 30s that simulated the growing importance of the Pacific theater. Previous Naval strategy had focused on the Atlantic; strategists at the War College, however, were increasingly concerned about the force's preparedness to fight in two theaters simultaneously. The war games underscored the potential challenges of such a future and validated further investment in a Navy equipped for dual-theater engagement.

The Naval War College games also helped leaders develop a new carrier doctrine that would prove indispensable in the coming war with Japan. Through repeated games, War College staff realized that they needed to find a way of swarming enemy fleets quickly with large numbers of aircraft. At the time, however, the USS Langley – the Navy's first aircraft carrier, converted from

a cargo ship in 1920 – could only hold about a dozen aircraft at once. Based on this limitation exposed during the wargames, naval leaders developed a new system that expanded the USS Langley's carrying capacity to more than fifty aircraft. This innovation helped define the Navy's carrier doctrine going forward. Naval architects even tweaked the designs of aircraft carriers in production to accommodate these larger numbers of airplanes.

Wargaming can also rapidly probe the strengths and weaknesses of new technologies before they are integrated into military systems. In the United States, the Air Force Research Laboratory has frequently used wargames to test the battlefield utility of future technologies and then invested accordingly. In a 2015 Defense Department memo, the US doubled down on using wargaming in just such a way: "When done right, wargames spur innovation and provide a mechanism for addressing emerging challenges, exploiting new technologies, and shaping the future security environment. They can potentially make the difference between wise and unwise investment trajectories and make our forces more successful in future conflicts".

Pitfalls and Limitations

Wargames, however, cannot and should not be used as conclusive evidence; rather, they help to elucidate important questions and create space for possible solutions. Wargames are ultimately abstractions based on a series of assumptions. Although their utility comes from the unscripted, semi-organic interactions between players, the wargame designers introduce factors that help shape the course of gameplay. False or

misleading assumptions can lead players to arrive at incorrect conclusions. The US Dark Winter wargame of 2001 is a classic example of such design flaws. The game, which simulated a terrorist attack that released smallpox across North America, was sharply criticized at the time by public health experts and social scientists for using a very high transmission rate for the disease (1:10), likely overestimating the effects of the outbreak and distorting the players' responses.

Wargaming can create these kinds of compelling narrative distortions. If overly designed, a wargame can help reinforce the

Further Reading

Pat Harrigan / Matthew G. Kirschenbaum (eds.), *Zone of Control: Perspectives on Wargaming* (Cambridge, Massachusetts: MIT Press, 2016).

Peter P. Perla / Ed McGrady, "Why Wargaming Works," *Naval War College Review* 64:3 (2011), 111–130.

Lt Col Matthew Caffrey Jr, "Toward a History-Based Doctrine for Wargaming," *Aerospace Power Journal* (2000), 33–56.

Martin Van Creveld, *Wargames: From Gladiators to Gigabytes* (New York: Cambridge University Press, 2013).

Jacquelyn Schneider / Benjamin Schechter / Raquel Shaffer, "Cyber Operations and Nuclear Use: A Wargaming Exploration," *ssrn.com*, 04.11.2021.

Erik Lin-Greenberg / Reid B.C. Pauly / Jacquelyn G. Schneider, "Wargaming for International Relations research," *European Journal of International Relations* 28:1 (2022), 83–109.

Andrew Wilson, *The Bomb and the Computer* (New York: Dell Publishing, 1968)

agenda of its creators. By some estimates, the Louisiana Maneuvers wargames of 1941 suffered from just such a perversion. The games, held in the wake of Germany's invasion of Poland, arose during a period of uncertainty for American airpower. While the US Air Service had seen action in the First World War, aircraft had primarily played a reconnaissance role. The full combat potential of aircraft was a source of debate. The Louisiana Maneuvers thus became an extension of an ongoing bureaucratic fight within the military over the future role of air power. Several designers of the game manipulated its structure so that airpower played a support role for ground forces, rather than operating as a primary offensive force. Unfortunately, the games helped reinforce this view among war planners. Air forces would not see a full combat role until the US learned several costly lessons in the early days of WWII.

Born as a tactical military planning tool, wargames also often fail to incorporate the nuances of political realities. Before WWI, the Germans used wargames to simulate an invasion of France through neutral Belgium. While the invasion itself was successful (interestingly enough, the British, too, conducted a similar wargame the same year and reached a near-identical conclusion), the wargame did not contend with

the public outrage that would ultimately accompany such an invasion. Belgians did not rally in support of Germany – quite the opposite, in fact. Other countries mobilized to defend Belgium far more quickly than Germany had recognized, leading not to a quick victory but a prolonged quagmire that would become the Great War.

Wargames must also be recognized for their limitations.

Similarly, the Japanese wargamed their attack on Pearl Harbor before 1941, but also failed to acknowledge the full political ramifications that would result.

Of course, by their very nature, wargames are limited in how they incorporate politics. However, political realities often directly impact military situations, including through mobilization timelines and response scenarios. Wargamers must recognize the limits of their own creations and refrain from drawing conclusions beyond the scope of the games themselves. A tactical wargame may help illustrate the potential problems with an invasion approach, but it will not (and should not) lead to operational or strategic conclusions.

And finally, political and military leaders may fail to heed the lessons of a wargame altogether. Before the beginning of World War I, Russians leadership wargamed possible scenarios and found again and again that Russia would face operational challenges pitting its geographically split army against a more efficient and concentrated German military. Yet the command issues

were never solved, and in 1914 Russian forces found themselves divided and outmaneuvered in much the way the earlier wargame had demonstrated.

More recently, leaders have failed to heed the warnings drawn from wargames of information and communication technology (ICT). The US Army Research Laboratory has conducted a series of wargames examining industrial control systems (ICS) that have been integrated with ICT systems, demonstrating the potential vulnerabilities that arise from such configurations. Academics have also explored the increased possibility of escalation created by introducing ICT systems into nuclear command, control, and communications (NC3) configurations. The US military, at least, has appeared to ignore such warnings.

The Future of Wargaming?

Wargames continue to be a powerful teaching and development tool for military and policy leaders. As Ukraine prepared its counteroffensive last summer and fall, the country engaged in several wargaming exercises with the United States that helped shape its eventual battle plans. Ukraine had initially favored a broader counteroffensive; through the wargaming efforts, Ukraine settled on a more limited approach focused on retaking Kherson from the Russians. This plan proved successful in the field.

Wargaming can also help countries experiment with different emerging technologies, weighing options and potential combat applications before investing millions or more. For a smaller country like Switzerland,

these benefits can be especially pronounced. Through wargaming, Switzerland can develop combat expertise in its servicemembers and make efficient investment decisions as it approaches an increasingly uncertain future. Indeed, Switzerland already does participate in joint wargames like Locked Shields. Through the Swiss Security Network Exercises, Switzerland has also stress tested its crisis management system, uncovering possible weaknesses in the ways cantonal administrations interact with the federal government in Bern. The 2019 exercise featured a series of terrorist attacks across the country and engaged key critical infrastructure, including the rail systems.

Yet, wargames must also be recognized for their limitations. A poorly developed wargame can lead to incomplete or even incorrect conclusions. A tactical wargame cannot provide insights beyond its scope. Wargames can provide useful lessons, but they are not conclusive evidence in and of themselves. Rather, they can be a fruitful testing ground for new ideas and new technologies and can help shape the development of stronger military doctrine going forward.

For more on perspectives on Military Doctrine and Arms Procurement, see [CSS core theme page](#).

Taylor Grossman is Senior Researcher in the Cyberdefense Project with the Risk and Resilience Team at the Center for Security Studies (CSS) at ETH Zürich.