

Red Flag For Joint Campaigns

Building a more effective Air and Joint Force through better operation and strategic wargaming.

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Almost every airman knows the story of Red Flag. In the skies over Vietnam both the Navy and the Air Force were losing almost as many aircraft as they shot down. The Red Barron study revealed that most of our losses occurred during a pilot's first eight missions. Clearly, we were teaching our pilots how to fly, but they were learning how to fight through on the job training - and the tuition was high. Navy then started their Top Gun school with dissimilar combat training and the Navy's aerial combat score started to improve. Just after the war the Air Force built on Navy concepts and started Red Flag, a live wargame that simulated an entire enemy integrated air defense system. The effect on the tactical proficiency of our force has been tremendous.¹

Can the Air Force improve its operational and even strategic proficiency to the same degree? While our sister services have been using wargaming to improve their effectiveness for over a hundred years, the Air Force has "only" been using wargames for the past several decades. Just as we built on Top Gun and created an even more effective training environment, we need to build on the wargaming experience of our sister services and create something even more effective - wargames that adjudicate effects in an asymmetric, network centric environment. In doing so we can help improve the wargaming of the Joint community and all the services, thereby improving their effectiveness as catalysts of transformation.²

First we will look at the importance and scope of wargaming today. Then we will examine some of the enduring and emerging challenges to effective wargaming. Finally we will address how war gaming needs to evolve to meet those challenges.

War gaming Today

*This is not (exactly) the enemy we wargamed against.*³

Lt Gen William Scott Wallace⁴
Commanding General, V Corps
Operation Iraqi Freedom

War gaming played an integral part in the planning of Operation Iraqi Freedom. Wargames helped coalition forces understand Iraqi plans for delaying their advance by forming irregular units to fight in crossroad town and cities. These wargames then helped the Army develop a counter strategy—maneuvering to the West and bypassing cities. However, their wargames also misled. They had not anticipated that the Iraqis would adapt to coalition maneuvers and attack from the cities. This was the main stimulus for General Wallace's remark. Wargames also

depicted the Iraqis as continuing to fight after the fall of Baghdad. Hence, when major combat ended, the deployment pipeline contained heavy combat units, instead of units more useful for an occupation.⁵

The Importance of Wargaming

If wargames were seldom used by the military, or if such misleading results were rare, there would be little need to improve them as we look toward winning tomorrow's wars and tomorrow's peace. However, wargames have played a pivotal role in military matters for centuries, even though they sometimes yield misleading results – at times with serious consequences.⁶ For better or for worse, wargames are important. They touch almost every aspect of our military – from creating strategies to creating strategists. However, while there have always been circumstances that contributed to wargames depicting misleading outcomes, current trends suggest such circumstances will occur with increasing frequency. Fortunately, mature judgment, integrity and a new generation of wargames can reverse this trend, making wargaming a powerful tool for winning wars – and winning the peace.

While wargames are used for a broad spectrum of applications across the Department of Defense, the Joint Staff, and each of the services, their use fits into two broad categories - creating strategies and creating strategists, that is helping to devise more effective strategies, and helping to educate more effective strategists.

Developing Strategies

Wargames help shape national military strategy. For almost a century they have functioned as catalysts for transformation for both the US and German militaries.¹⁷ They have been an integral part of past Quadrennial Defense Reviews. The Joint Staff's J-8 Division has hosted extremely influential Political Military wargames for nearly half a century. Each service also conducts "Title 10" wargames designed to anticipate technological and force structure needs at varying numbers of budget cycles into the future.

Wargames have had their best-known impact at the operational level. While US doctrine has not required the use of wargaming in planning until the recent release of Joint Publication, 3-30, *Command and Control for Joint Air Operations* (JP 3-30), such use dates back roughly a century.¹⁸ Both of our wars against Iraq were extensively wargamed. Combatant Commands use wargames to test operations plans as an integral part of the deliberate planning process. The outcome of such wargames shapes the Combatant Commanders' Integrated Priority List (IPL).

In contrast, the use of wargames for tactical planning seems to date from the post Vietnam era.¹⁹ While the Vietnamese Communists wargamed even low level attacks, small unit wargaming was not used frequently in the US Army until the early 1980s. The Air Force is just now starting to use wargames for tactical planning as its mission rehearsal software evolves toward true wargames.

Developing Strategists

The second and oldest use of wargaming centers not on developing current strategies but on developing future strategists. Such use literally goes back to the time of the Pharaohs, and was the first use the Prussians made of their first modern wargame.¹⁰ Today wargaming plays an important role in professional military education at every level.

Wargames are used extensively in the education of our future senior leaders. “Pol Mil” (political military) wargames are used at the National Defense University and a few civilian universities to educate senior civilian and military leaders. In recent years both the Army and Navy War Colleges completed new wargaming facilities. A wargame is also used in the core curriculum and in an elective of the Air War College.

Wargames are also used in the education of future operational leaders. Wargaming accounts for a large percentage of the curriculum of the Joint Forces Staff College,¹¹ supported by a large new wing of their facility. The Army Command and General Staff College also has a huge new wargaming facility, while the Naval War College, lower level, uses the same magnificent facility as their seniors. Marine Corps University also has an extensive wargaming operation. The Air Command and Staff College offers an elective on wargaming and features a wargame as the culminating activity of their core curriculum.

Red Flag is the best-known Air Force wargame for education and training at the tactical level. Red Flag’s enhancement of tactical combat effectiveness is well known. Emphasis on the Air Operations Center (AOC) as a weapon system has resulted in Red Flag evolving so that it also helps develop AOC skills. The ongoing transformation toward an expeditionary Air Force has prompted the initiation of “Flag” wargames for combat support forces also. At the “high tactical” level wargames are also extensively used in the accession programs of all services and in early PME schools such as the Air Force’s Air and Space Basic School and Squadron Officers School.

Clearly, wargaming influences almost every level of the defense establishment - from guiding the decisions on how we should transform to meet the challenges of 2030 to helping to educate cadets and lieutenants who will be the leaders of our services in 2030. How positive of an influence these wargames are depends on several factors - principally accuracy. Unfortunately the historical record indicates that wargames have faced enduring challenges in the past. Worse, current trends suggest old challenges may become more acute while new challenges may emerge in the future – unless we act to evolve wargaming.

Challenges to Effective Wargaming

Enduring Challenges

Fortunately, while history shows wargames can mislead it also suggests why they mislead. Most misleading results can be traced to one or more of five causes. The most serious is command influence – the ranking individual involved in the wargame deciding on the outcome before or after the wargame takes place.¹² Next, wargames may mislead if the enemy does not follow the strategy followed in the wargame.¹³ In General Wallace’s case, the enemy started out behaving as predicted but when the Iraqi’s saw their strategy was not working they adopted a new strategy

the wargame had not anticipated. Next, wargames sometimes fail to adjudicate a decisive element of the depicted conflict.¹⁴ Then the key event in the conflict may occur beyond the period depicted in the wargame.¹⁵ Finally, not exploring the full spectrum of chance may cause misleading outcomes. Wargames tend to focus on the most likely outcomes.¹⁶ Sometimes in war very improbable things occur.¹⁷

Emerging Challenges

Contemporary wargames are best at depicting traditional attrition warfare between conventional surface forces. However, America's adversaries and American's military are both evolving in such a way that big force on force clashes seems likely to be the exception rather than the rule in the future. Air and space power in particular have been transforming war. The growing acceptance of Effects-based Operations, the improving integration of air and space – and of both into the joint team – indicates this transformational trend will continue. Yet while new concepts and new technologies continue to evolve, our current adjudication software only provides results in terms of direct attrition.

Wargaming tempo must accelerate to match operations tempo. Against a slowly evolving Soviet Union the cumbersome wargames used to support the two-year deliberate planning process were good enough. Now US forces operate in the Crisis Action Planning mode more and more often and the old wargames have trouble keeping up. Other problems include not being able to wargame the entire course of action, not being able to wargame enough times to develop an appreciation for the spectrum of plausible outcomes, and the slowing down of our decision cycle. A slow decision cycle increases the chance an adversary will be able to turn inside our decision loop. [They had years/decades to plan, wargame and script their operations, we often have only hours to respond]

Trends also point to a need for a more responsive generation of wargames for educating strategists. The Global War on Terrorism has increased the areas in which military leaders must be knowledgeable, yet PME courses have not increased in length. Wargaming capabilities that balance time, educational requirements, and the needs of the evolving global strategic environment can help educators maximize the utility of wargames in their respective curricula.

Finally, the trend toward a lighter, more expeditionary military requires us to change how we wargame. Wargames that require specialized hardware and contractor support are not compatible with the needs of expeditionary forces. To best support the warfighter, new wargames must be both deployable and have an inherent reach back capability.

Therefore, wargaming needs to transform so it can continue to be a catalyst for transformation, it must become faster for a higher ops tempo world, and it must become more expeditionary to support air and space forces.

The next Generation of Wargaming - the Key to Transformation

One approach to transforming current wargaming capabilities involves developing a comprehensive picture of the attributes a future wargame should possess. We call wargames with

this set of attributes Third Generation Wargames. Such wargames would build on the foundation of the early first generation, two sides strategy wargames, and contemporary second generation attrition wargames. A Third Generation Wargame would more accurately depict the concepts (like effects based operations) and conflicts (like asymmetric terrorist threats) that prevail today. It would have faster execution in keeping with our increased ops tempo and a more expeditionary hardware platform. How would we achieve all these enhancements?

No technological breakthrough will be necessary. As will be shown below, the components of Third Generation Wargaming already exist or are very close to being realized. The challenge is mainly one of integrating several innovations into one package to create a synergistic benefit far greater than any one of the innovations could produce singly. The best analogy is the development of the tank during the First World War. The component technologies - internal combustion engine, caterpillar track, hydraulic recoil for the gun, and armor plate - had originated during the previous century. Yet it took most of the war to get these individual technologies to “fly in formation” and create the tank. Similarly some of the techniques Third Generation Wargaming will use were first employed in the 1880s,¹⁸ yet all the required innovations have not appeared in a single product.

In all events, the next generation of wargames will need to support more comprehensive, dependably accurate adjudication and faster, more expeditionary execution.

Comprehensive

Dramatic increases in accuracy could come principally from models that account for discrete and cascading physical effects, individual and cascading human factors, and by better depicting time by explicitly adjudicating the duration of decision loops. Progress has been made in each of these areas, yet the greatest increases in accuracy require the synergistic effect of improvements in all three areas. This is the heart of the Third Generation Wargame concept.

Of the three principal components of improved adjudication the most progress has been made in the modeling of physical effects. Today many models depict physical effects cascading through systems in realistic and unanticipated ways.

Perhaps no element of third generation wargaming is more controversial than the modeling of human factors. Here again, though, much progress has been made in both the quantification of influences on human effectiveness and on the why humans make decisions.

Finally while Col John Boyd’s concept of decision loops has been widely accepted throughout the Department of Defense, no wargames incorporate his concept of varying length decision loops at different levels of war, much less model impacts upon and variations of those lengths.¹⁹ Still progress is being made in this area, particularly at the Air Force Research Laboratory’s Information Directorate.²⁰

Expeditionary

An awareness of the importance of decision loops will be more than built into third generation war game software. The software will be designed to ensure it does not negatively influence the decision loop of the using command. To achieve this, Third Generation Wargames will have efficient interfaces, run on hardware that is easily deployable, and have an inherent reach back capability.

Meeting the Challenges:

Enduring Challenges

Will these enhancements to current attrition adjudication methods eliminate the historic causes of misleading wargame outcomes? No. Still, to varying degrees a Third Generation Wargame engine should reduce their probability. Specifically:

Command Influence: Third Generation Wargaming will be least helpful in this area. Minimizing such problems will continue to require mature judgment, integrity and moral courage. Judgment will still be required, of both senior and junior participants.

Enemy not following your plan: Again, nothing can eliminate the chance of your adversary acting in a way you do not expect – if only for the specific purpose of acting in an unexpected way. However, by Third Generation Wargaming expressly modeling the decisions of each enemy headquarters echelon, such variations become less likely. In fact, a third generation wargame can be one of the keys to predictive battle space awareness because modeling an enemy's decision process may allow us to anticipate the changes in strategy and doctrine General Wallace complained about.

Key variable not adjudicated: This would seem the greatest strength of Third Generation Wargaming. Now a greater number of key variables can be adjudicated. Such wargames will finally allow us to wargame out effects-based strategies and help us anticipate a greater range of effects – including systematic collateral damage - those cascading effects which we do not desire.¹²¹

Exercise does not cover enough time to reach the decisive point: This may actually be the most important contribution of Third Generation Wargaming. Third Generation Wargaming will allow campaign modeling from the initiation of strategic deployment through the conclusion of transition to peace operations with tactical units on both sides acting in doctrinal ways.

Luck: Faster adjudication will also allow greater insights into the role of luck. Third Generation Wargaming will allow courses of action and plans to be adjudicated tens of thousands of times, revealing the probability distribution of outcomes.

Such improvements in and of themselves will contribute to achieving predictive battle space awareness and enhance the implementation of effects based operations. However, for Third Generation Wargaming to meet the needs of our increasingly expeditionary Air Force, as well as our evolving needs for professional development, additional enhancements are needed.

Emerging Challenges

In the emerging world of asymmetric threats, expeditionary operations, and effects-based warfare, Third Generations Wargames will be invaluable. They will allow commanders to plan while deploying and develop effects-based strategies against asymmetric threats. Commanders will then be able to reach back with their strategy and have their plans run thousands of times allowing them to see the spectrum of plausible outcomes of their actions.

Third Generation Wargaming will also help meet our emerging professional development needs. As our force becomes smaller and more expeditionary, the need will grow to deliver just the right training at just the right time. As they can be executed quickly in the field wargames can be executed quickly in the classroom – leaving more time for teaching other subject matter. Perhaps most importantly, a fast easy to use wargame will be used more often, even when not formally assigned, promoting the life-long development of our airmen as strategists.

Conclusion

Faster to execute Third Generation Wargaming will allow our airmen to “fly” their first few campaigns in an environment even more forgiving than Red Flag. Perhaps even more importantly, such games have the potential to allow joint and air and space forces to go beyond traditional force on force wargames – to go beyond planning for victory in a traditional force on force war. As Third Generation Wargaming depicts all aspects of conflict, operational planners could acquire insight into options to win the violent peace that all too often follows the conclusion of major combat. By helping develop strategists and refine strategies Third Generation Wargaming can contribute to winning the “war after the war.” If they can help former enemy nations to become important trading partners, willing military allies and popular vacation destinations they will have helped win the highest level of victory – a just and lasting peace.

Notes

11. To learn more about Red Flag, its origins and impact see, “Red Flag,” Walter Boyne, Air Force Magazine, November 2000, 44-52.

12. In his Winter 2001 Aerospace Power Journal article then Colonel now Brigadier General select Bobby J. Wilkes also argues for the desirability of a campaign level Red Flag through wargaming and also asserts much broader benefits from wargaming.

131. General Wallace was originally quoted as saying, “This is not the enemy we wargamed against.” He quickly stated he had been misquoted and had actually said, “This is not exactly the enemy we wargamed against.” For more on the incident see “Wallace Stands Firm On Interpretation of Iraqi Resistance,” *InsideDefense.com*, May 07, 2003.

141. General Wallace is currently Commander Combined Arms Command at Ft Leavenworth, KS.

151. As of this writing, an article on the role of wargaming in the planning of Operation Iraqi Freedom (OIF) has not appeared. However, the Air Command and Staff College Joint Forces course director, COL (P) Phil Parker had the opportunity to talk to most of the principle OIF ground commanders and all told him that wargaming played a huge role in shaping the final plan.

161. Caffrey, "Toward a History-Based Doctrine for Wargaming," *Aerospace Power Journal*, Fall 2000.

171. Wargames played an important role in the transformational development of German blitzkrieg and wolf pack systems of warfare and in the development of US amphibious, carrier aviation and airmobile warfare. See Caffrey, Matthew, "Toward a History-Based Doctrine for Wargaming," *Aerospace Power Journal*, Fall 2000, pp. 33-56.

181. The US Navy started wargaming its war plans around 1900 while such German use dates from at least 1850. See Caffrey, Matthew, pp. 33-56.

191. This may not be true. Tactical wargames have been played at the Naval War College from the 1880s and at Marine Corps since at least the 1930s. It is plausible, perhaps likely, that a number of students applied these techniques to real world tactical problems after graduation. Still, the first references to US use of wargaming for tactical planning *that I have found* post date Vietnam.

1101. Caffrey, pp. 33-56.

1111. While The Joint Forces Staff College's website (www.JFSC.NDU.edu) indicates wargaming play a part in all seven of their courses, information posted is not specific enough to establish the percentage of student time spent during each on wargaming. However, several recent graduates of their core course, The Joint and Combined Warfighting School, estimate 25% to 40% of their time was spent preparing for and participating in wargames.

1121. The two best examples (worst) of these are the Japanese admiral "resurrecting" two of his carriers during the wargame prior to Midway, (told in every history of wargaming, for example, Perla, *The Art of Wargaming*, Naval Institute Press, 1990, p. 46) and the British general telling the umpires before the exercise that it would please him if the experimental armored force flunked the exercise. (This accusation by Liddell Hart is mentioned in several histories of British armor development during this period, for example Murry and Millet, *Innovation in the Interwar Era*, Office of Net Assessment, The Pentagon, 1994, p. 34 and Winton, *To Change an Army*, University of Kansas Press, 1988, p. 180-183) In both cases cheating internally "worked" but the cheaters came to grief when the Americans sunk the same two carriers during the real battle and the Germans went on to develop blitzkrieg warfare.

1131. The Japanese during World War II provide the best example of this problem. Wargames of the landings produced casualty figures so close to the actual that the results were said to be "eerie." Then the Japanese changed their doctrine from defense on the beaches to defense in

depth and the actual casualties came in several times higher than forecast by the wargame. See Caffrey 2000.

1141. Here the best example is from the first Gulf War. Most wargames predicted between 32,000 and 36,000 coalition casualties. At least one, and it appears all, such wargames, depicted Iraqi units as fighting to the last man. (A defense contractor confirmed this for me, on the condition that I not site his name or the name of his company. Their projection was 32,000 casualties and he said their projection was lower than most, and yes, in their wargame every Iraqi unit fought to the last man.) As another example, Germany's wargame Operation Otto conducted before the invasion of the Soviet Union also failed to adjudicate a key element – the Soviet practice of beginning to form new divisions as soon as each completed training and departed garrison. Most Soviet divisions operational in November 1941 did not exist in June 1941. For more information see Earl F. Ziemke and Magna E. Bauer, *Moscow to Stalingrad: Decision in the East* (Washington, D.C.: Center of Military History, US Army, 1987), 16–18.

1151. The most famous case of this cause was Germany's wargame Operation Otto that predicted rather accurately the course of the invasion of the Soviet Union up to the end of the time wargamed – early November 1941. Had the Germans continued their wargame longer – and if its accuracy were maintained – they may have anticipated and better prepared for the challenges of a Russian winter. This wargame also failed to adjudicate a key factor, see above footnote.

116ii. This is particularly true of wargames adjudicated by panels of experts, typically referred to as BOGSAT (Bunch Of Guys Sitting Around a Table). Panels typically focus on coming to a consensus on the most likely outcome. In war some very unlikely events sometimes occur (See following note.) This can also be true for wargames adjudicated by manual or computer “stochastic” means. Stochastic adjudication establishes present probabilities for the occurrence of attrition and many other events then compares a randomly generated number against that probability. If a wargame is only executed once it is possible the outcome is abnormally favorable or unfavorable to one side. Even when one execution happened to produce the most probable outcome, war often produces improbable outcomes – as the loss of a F-117 during Allied Force illustrates.

1171. Though not as improbable as the F-117 shoot down, the World War II loss of the Royal Navy's battlecruiser HMS *Hood* illustrates this problem the best. During World War II British intelligence analyses correctly concluded that KMS *Bismarck* was so formidable as to be able to defeat any single Royal Navy capital ship (defined in this case as a battleship or a battlecruiser) in individual combat. However, a British operations research (OR) study predicted that if the Royal Navy could intercept KMS *Bismarck* with two capital ships, they could expect to defeat the German battleship in a cooperative engagement. The study demonstrated mathematically that it was likely *Bismarck* would sink one of the British ships, but would be so badly damaged by the two-versus-one engagement up to that point that the solitary German capital ship could be defeated by the remaining British capital. The actual battle began when *Bismarck* was intercepted between Greenland and Iceland by *Hood* and battleship HMS *Prince of Wales*. Unexpectedly, *Bismarck* destroyed *Hood* shortly after the battle began, well before the either British capital ship had inflicted significant damage on their adversary. With *Hood* destroyed

and *Bismarck* still almost untouched, the surviving British battleship, HMS *Prince of Wales*, prudently withdrew. Source: LCDR Dan McDonagh, USN, Retired (Naval War College staff, 1988-90 and 1992-94.)

1181. For example, many believe the human factors element of Third Generation Wargaming will be the most challenging, yet in 1877 a Saxon officer, Captain Naumann published a set of wargame rules incorporating a number of human factors. (See Andrew Wilson *The Bomb and the Computer*, Delacorte Press, 1968, p. 12. By the 1880s there was considerable debate in the Prussian/German military over which of three competing methods most accurately captured the impact of casualties on unit effectiveness. I found no debate on the whether adjudicating such human factors was possible in the first place.

1191. See Grant T. Hammond, *The Mind of War*, Smithsonian Institution Press, 2001, for more information on Boyd and the development of his ideas.

120. (For an overview of AFRL and Information Directorate's activities go to <http://www.rl.af.mil/>. For more detailed information contact this author.

1211. These effects may interdentally harm our efforts or produce unintended harm to civilians. For example, Patton's drive across France was slowed then halted in part because of an unintended effect of US airpower. Allied efforts to isolate the Normandy beachhead through airpower were very successful, but often destroyed bridges so thoroughly that Patton's engineers took far longer than anticipated to rebuild them, forcing those bringing supplies to Patton to take longer routes and consume more gas themselves. As an example of collateral systems damage, during the First Gulf War bombing took down Iraq's electrical power grid as many key military installations had unreliable electrical generators or often no generators at all. Unfortunately that same power grid powered Iraq's sewerage treatment and water purification plants. The unintended shut down of those facilitates created a danger of epidemics.

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