History of Wargames:

Toward a History Based Doctrine for Wargaming

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- A Congressman with a national reputation as a defense expert opposes the President's plan for military action because of the casualty levels predicted by war games.

- One weapons program is canceled and another accelerated, both largely due to the results of war games.

- An air component commander convinces an area CinC to change the deployment plan of a major regional plan due to problems anticipated through a war game.

Our expectations of the future shape that future. Those who concern themselves with the future of warfare develop their expectations in many ways, from the study of history to the building of complex mathematical models, to the integration of both these approaches using the medium of wargaming. Without question war games shape those expectations, hence they help shape the future. Ever more powerful computers appear to promise ever better war games. Yet is the Emperor really wearing clothes? Or to use a more contemporary expression, isn't the validity of "garbage in garbage out" independent of computing power? Will war games lead or mislead us in the future?

As several historians have observed, "I know of no guide to the future but the past."

For almost 200 years modern war games have been providing life saving insights and fatal mirages. If these different outcomes were random there would little use in studying that history. However, as the Caffrey Cycle illustrates, history provides the raw material for anticipating cause and effect. It is important to know the history of wargaming in order to gain a foundation upon which to build an understanding of how to maximize wargaming's benefits while minimizing its dangers. This paper will conclude with a theory of wargaming that I believe is consistent with that history.

There are other reasons you should keep reading. First, just as the declassification of Ultra deepened our understanding of World War II, so learning about wargaming's impact on history will broaden your understanding of modern military history. Second, learning how others have used wargaming may give you some ideas on how wargaming can increase your mission effectiveness.

Knowing how potential future adversaries wargamed in the past may also give you insights into how they will fight in the future. If you look closely you may even see some indications of the value of wargaming to a democracy. Finally, the history of wargaming is an interesting story in its own right.

What's in a name?

Before we get into the history it is necessary to make sure we understand the language. The term, "wargame" is simply a translation of the German term, "kriegspiel." One source of confusion is that many in the military are simply uncomfortable with the term "wargame", feeling perhaps that war is too serious for "games". As a result you will often see every term but wargame used to describe wargames. These include Map Maneuver, Chart Maneuver, Field Maneuver, Exercise, or increasingly, "modeling and simulation."

Some say, "Modeling, Simulation and Wargaming," as if it were one term. Each is not only distinct; they build on each other. Models are simply proportional representations of reality. A painting is not a model but a blueprint is. Models vary in abstraction, for example, a physical model of an aircraft, a blueprint of that aircraft, or a mathematical equation representing that aircraft's characteristics are all models. Simulations are proportional representations of reality over time. For example, a small wing that is exactly the same shape of a full size wing is a model, put that wing in a wind tunnel and measure the effect of various wind speeds and you have a simulation. As for wargames, while the earliest (first generation) wargames were multi-sided abstract representations of combat, modern (second-generation) wargames require multiple sides that compete within a simulation of an armed conflict.

An exercise may or may not also be a wargame depending on whether or not it fits the above criteria. Typically the deciding factor is the presence or absence of a thinking opponent. Hence a Red Flag exercise with its aggressor force is a wargame while a mobility exercise is not.

In The Beginning

In his entertaining and insightful TV series and book, ***Connections***, James Burke describes human progress as a series of connections, needs, and clues coming together to produce invention. He cites the plow as the trigger for all later inventions in that it allowed people to settle, hence have the time to invent. While I admire Mr. Burke greatly I must point out the plow is many rungs up the technology ladder. There is a far more basic trigger, one that unfortunately leaves no direct archeological record – language.

Without language each generation could not pass on what it has learned to the next. Each generation would literally have to keep reinventing the wheel, if it ever got that far. While the invention of language left no direct evidence, from early archeological sites we have found indirect evidence – toys. Actually, proportionally correct small versions of adult weapons and tools – the first models. Too small for actual hunting, these models indicate that adults were speaking to, and teaching, their children. By allowing the children to simulate adult tasks survival skills were passed from one generation to the next.

For thousands of years the only toys were these small versions of adult implements. Then with the rise of civilizations we find evidence of strategy games. Though abstract they represent the first generation of wargames. Interestingly, it appears these games were developed independently - the points of origin of quite distinct games being separated by hundreds of years and thousands of miles. This is not surprising as necessity is the mother of invention and all of these civilizations were feeling a new necessity. A clue to that necessity was that these games were found only in the tombs and homes of the ruling classes.

This is because the world had become more complex, and specialized. It was no longer sufficient for the son of a ruler to know how to shoot a bow. It became necessary for him to learn how to outthink the ruler of the adjacent state. Though games like "Go" and "Chess" are abstract depictions of war, they do teach "down-board" thinking. That is anticipating the consequences of your possible moves and your opponent's possible responses. And, this is an essential skill in the deadly game of war.

The story of "modern" wargaming starts in Northwest Europe, an unlikely place as these Europeans were one of the few advanced civilizations NOT to invent an abstract strategy game. When around the turn of the last millennium, India's strategy game Chess came to Europe by way of the Moslem world it was used in the traditional way. The same people, the sons of the ruling class, played chess for the same reasons sons of rulers had played various strategy games for millennia.

1664 – 1800 On the Brink

As the Renaissance gave way to the age of enlightenment, fundamental change began to accelerate - change that in time would affect and be effected by wargaming. An entire book could be written (and has) on the increasing trend toward quantification. Maps and blueprints became increasingly accurate. Frederick the Great of Prussia made heavy use of these increasingly accurate maps in planning his campaigns. This quest for accurate quantification was reflected in increasingly realistic versions of chess. Starting in 1664 several new versions of chess were produced each depicting military forces and terrain more accurately then the previous. In 1797 the actual terrain along the Franco-Belgian frontier was depicted. Yet with all their improvements these games belong more to the first generation of abstract strategy war games then to the future.Movement was still accomplished in the traditional, "I move a piece, you move a piece," fashion and they were still being used as war games had always been used, to train the sons of rulers. More importantly, while they were games, they were not simulations.

Britain came close to inventing modern wargaming. In late 1781 a Mr. Clerk of Great Britain developed a method of using model ships to simulate historical engagements. By carefully placing his "ships" in their historical locations at the beginning of an engagement, stepping through the battles, and analyzing the influence the geometry of the combatants had on their combat power, Mr. Clark

was able to acquire many useful insights. Though clearly a military simulation, Mr. Clark's work was not a multi-sided game.

Yet fundamental changes in society would soon produce fundamental changes in the way war games were designed and used. From the New World came the voice of a longhaired revolutionary. This propagandist, Benjamin Franklin, had the audacity to say that all men should play chess, as it would help them learn how to look after their own defense. In Europe too, Voltaire encouraged the common people to play chess. The nobility was scandalized. If mere commoners played chess where could it lead?

Well… though a bit of an oversimplification this type of thinking helped lead to the French Revolution and that revolution led to Napoleon. Today we tend to think of Napoleon as a great military genius. Indeed, Napoleon *may* have invented the first operational war simulation. He would "walk through" his campaigns in advance, using colored pins on maps to help him visualize where his units and those of his enemies would be when.

Yet genius was not the full explanation for Napoleon's success. He inherited from the French Revolution a meritocracy. Previously, only children of officers could be officers. Now, fully half of Napoleon's marshals had started their careers as common soldiers. Also, the French people, a nation in arms, could field a far larger army then a similar sized state. Genius, meritocracy and numbers made a combination very hard to beat.

The history of warfare contains records of many innovations large and small. When innovation provides a decisive advantage (suddenly or through an evolutionary series of small innovations) a Revolution in Military Affairs occurs. One side comes up with a significantly more effective way of fighting and the other side comes up with a counter – or ceases to exist. The crowned heads of Europe needed to come up with a counter. To also adopt democracy was not their first choice – it's good to be King. Yet something had to be done. Nationalism was their first recourse. "Forget that Liberty stuff, we Germans must drive out the French." Nationalism helped the crowned heads expand their armies. Soon the kingdoms of Europe had fairly close to the same proportion of their subjects under arms as France. However numbers alone would not be enough to defeat Napoleon. To help match Napoleon in genius Prussia invented modern wargaming.

1811 – 1824 The Birth of Modern Wargaming

There is broad consensus that the second-generation war games were ushered in by a Prussian named Reisswitz. However, there is much disagreement whether credit should go to the father or the son.

In 1811 the Herr von Reisswitz, the Prussian War Counselor at Breslau invented a war game that was a quantum leap beyond the earlier war chess innovations. Dispensing with the board, he constructed a sand table that modeled actual terrain. He represented units by blocks that were in the scale of the terrain,

representing regiments in column. He also introduced limited intelligence. Each side would give their orders to an umpire who was required to update the terrain table, resolve combat and tell the two sides only what their forces would actually be able to report. To determine the outcome of combat the umpire was provided with tables listing a number of outcomes based on range and other factors. The roll of dice determined the exact outcome, in order to depict the uncertainties of the battlefield!

Arguably, not since Gutenberg had one man made so many interlocking breakthroughs at the same time. Yet most historians do NOT credit Herr von Reisswitz with initiating modern wargaming. Why? Because for all its innovation Prussia used Reisswitz's invention in the same old way – educating princes for war.

But times were changing. Remember how the crowned heads of Europe used nationalism to increase the size of their armies? Even after the defeat of Napoleon, dynastic rivalries encouraged, and the industrial revolution permitted, armies to continue to grow. Prussia soon found it had too many soldiers for only the sons of officers to command. Faced with this officer shortage even conservative Prussia began allowing the sons of mere bankers, industrialists and government officials to become officers!

One of these new officers was Lt von Reisswitz Jr.. He soon realized that he and his fellow, "outsiders" simply did not know as much about war as those who had literally had been taught it on their father's knee. He believed *his* father's game could help. Yet he also knew frugal Prussia would never agree to the expense of building sand tables for each garrison. The solution? In 1824 he adapted his father's game so it could be played on topographic maps. At a stroke he made wargaming cheaper, more convenient (you cannot roll up a sand table) and more flexible. After all you could select a map of the Austrian border lands one week and a map of the French frontier the next.

Lt Reisswitz soon demonstrated his innovation to the Prussian Chief of Staff, General Karl von Muffling. After initial bored skepticism General Muffling became increasingly excited. Finally he exclaimed, "It's not a game at all, it's training for war. I shall recommend it enthusiastically to the whole army." Actually, he soon **ordered** the frequent use of war games by all units.

This may have been the beginning of Lt Reisswitz's problems. His rules were thick and cumbersome. As a result war game-driven exercises were slow and tedious. This, and resentment born of wargames being scheduled during what had previously been free time, led to wargames being intensely disliked by many officers. Lt Reisswitz felt this resentment was focused on him, and in 1827 he took his own life.

1825 – 1871 Wargaming Comes of Age

Of course not all young officers hated wargaming. In fact one young captain thought so highly of them that he wanted to do more wargaming then required.

To do so in 1850 he founded the Magdeburg (Wargaming) Club and became it's first president. Even when he was attending the War College in Berlin he made the time to found a wargaming club in that city.

In 1857 now ***General*** Helmuth von Moltke became Chief of Staff of the Prussian Army. He could and did order an increased use of wargaming. General von Moltke then discovered something that continued to frustrate Generals to this day - issuing and order and having it carried out was not necessarily the same thing. Wargaming was still intensely unpopular with many officers. The kindest way to say it is that his orders were not carried out in full. However, Moltke understood what motivated his subordinates and he soon devised an effective strategy to increase the use of wargaming. To understand Moltke's strategy and why it worked you need to know a little about how Prussia was evolving.

I stated above that the keys to Napoleon's success were numbers, genius and a meritocracy. Nationalism and industry had allowed Prussia to largely overcome France's numerical advantage. Moltke believed wargaming would help with genius, yet even with wargaming the chances of producing a genius on a par with Napoleon's was slight. So Prussian military reformers devised the concept of collective genius, many well above average men in key places producing the same battlefield effect as one genius. Indeed to produce such men the Prussian War College was founded. Yet producing them was only half the battle. How do you ensure the brightest are where they are needed most in a monarchy their senior commands go to royal princes regardless of their competence?

The Prussian solution was to establish a staff corps. Each "von" chosen by birth would be assigned a chief of staff, chosen by ability. The nominal commander of the army would entrust to the "von" while his chief of staff would look after the technical details like, - oh - strategy, operations, and logistics. Under this system there were two "tracks" to high rank. First, if your dad were the King you would make general. Second, if your dad was not the King or some other very high noble, your only hope of attaining high rank was to go to the War College and then be selected for the staff corps.

As relatively few officers were royal princes there were many applications to the War College. Moltke's strategy was simple, he required that each application package include a letter, signed by the local commander, evaluating the applicant's performance as the senior umpire for an installation-wide war game. As there could be only one senior umpire per war game, Moltke assured each installation would accomplish a war game for each application they sent in. It worked.

When the successful applicants became War College students Moltke saw to it that they did a great deal more wargaming. Wargaming appears to have always been part to the curriculum at the War College, but Moltke added new, surprisingly modern, elements. His innovations were grouped under the title - Staff Ride.

Periodically Moltke would take the entire student body of the War College and as much of his General Staff as he could spare and literally ride on horseback to one of the actual invasion corridors into Prussia. Moltke would then personally

describe the situation he viewed the most likely first clash between invading and Prussian forces.

He would then turn to the most junior student present and ask for his plan of battle. He would then ask the second most junior, then the third until he would ask the opinion of the most senior General present. Why? If the most senior spoke first would any junior disagree? Besides the younger officers might come up with something innovative. They would then ride to a hill overlooking where Moltke felt the next phase of the battle would be fought and the process was repeated.

By the end of the day the group would have arrived at a consensus battle plan. Yet the exercise did not end there. They then played a map-based war game. The entire group would retire to a local inn. Moltke would then name the senior ranking general (aside from himself) to command the invading forces. He then named the second ranking general to command the Prussian forces. He continued thus until the staffers and students were split into two equal teams. He did this for two reasons. First, Moltke believed that if their plan could succeed against some of their smartest strategists it would probably also succeed against any enemy strategist. Second, with two equal size teams more officers could participate meaningfully. The Blue (Prussian) team would use the plan devised during the day. The team representing the invaders would develop their own plan.

This was sophisticated enough but Moltke was not done yet. The next day he would contact the local garrison. (This ***was*** an actual invasion corridor.) He would direct the garrison commander to march a few hundred soldiers where the plan called for thousands to march. This was done to test the marching times and other details of the plan. When all this was done the plan went on the shelf as the ***actual*** plan for an invasion along that corridor.

Now let us think about all this for a minute. Moltke started with an "off site". He then brainstormed to reach a consensus. Moltke then tested the resulting plan against a world-class adversary, and finally tested the results with a field exercise. With all our technology are we really this conceptually sophisticated today?

1872 – 1913 Wargaming Becomes Global

Oddly enough Moltke and Prussia won a series of wars, usually against opponents with larger forces that were technologically equivalent. There was near universal agreement that Prussia's victories were due to generalship. This advantage in generalship was produced by her War College and her general staff system, and behind the success of both stood wargaming.

Not surprisingly the rest of the world started coping Prussia's (now Germany's) wargaming methods. The side bar chronology lists specific dates for specific countries. For the sake of brevity, I'll generalize here. There does seem to be a correlation between the year a country was defeated by Prussia and the year

they adopted wargaming. Typically an officer would translate a German work on wargaming. This officer was usually a military engineer or an artillerist, probably because those disciplines could handle the math involved. Then some years later wargaming would be formally adopted by that country's military. Even then there was typically resistance.

Russia is an interesting case, in some ways unique and in some ways typical. Russia was probably the first country outside of Germany to experience modern wargaming when, as children, the future Tzar and the future Kaiser fought against each other using one of Herr von Reisswitz sand table war games. (There is no record of who won.) Then in 1875 the Russian general staff directed the use of wargaming throughout the army. Despite this order in 1906 a commission investigating why Russia was defeated by Japan concluded that the Japanese use of wargames and the Russian failure to use them provided Japan with an important advantage. (In fairness, the commission also listed many other factors.) As a result the Russian general staff again ordered the army to use war games.

1776 to 1912 Coming to America

Like so much about America, our wargaming is partially home grown and partially acquired from overseas.

The first American to produce a modern war game may have been Capt Totten, 4th US Cavalry. He claims to have produced a manuscript in 1880 for a wargame without knowing wargames had already been in use in Prussia for half a century. By the time his "Stratagos" was published in 1890 he had read several books on German wargaming and had incorporated some of their techniques.

One individual who disputed this claim was Major W. R. Livermore, of the Corps of Engineers. Having published in 1883 he claimed, and is usually given the title of, the father of American wargaming. While Major Livermore freely admitted he started by simply translating German rules he then went on the compare their attrition tables to actual statistics from the Civil War and Prussia's own wars in 1866 and 1870-1871. He found that the German attrition tables usually predicted lower casualties then the historical record indicated, and he adjusted his tables accordingly.

Yet despite this foundation in historical fact, when Major Livermore sought official acceptance of wargaming by the US Army he was blocked by the Army's then Chief of Staff, General William T. Sherman. Sherman knew war as few men did.He disapproved Major Livermore's proposal to incorporate wargaming into army training stating, "wargames depict men as if they were blocks of wood, they are not blocks of wood but human beings who are seized by fear and sustained by leadership." His basic objection was that Major Livermore's game, like all up to that time, only depicted attrition, that is, units always fought to the last man. Sherman knew better.

Well, if Major Livermore could not succeed with the Army perhaps he could with the Navy. There he found a remarkable ally. William McCarty Little is one of those historical anomalies who have shaped the world far more than rank or title would suggest. McCarty Little had been medically retired for dubious cause in the middle of a promising naval career. Instead of being bitter, he went on to help found the Naval War College and to father naval wargaming in America. For years he did so as a volunteer, receiving no pay beyond his retirement stipend.

Through one of those happy coincidences of history McCarty Little's retirement home in Newport, Rhode Island, where his old boss Capt Luce was trying to found the Naval War College. Remarkably, Major Livermore just happened to be stationed near by. Little did a wide range of tasks needed to get the college started. Among these tasks in 1887 he wrote and delivered the first lecture on wargaming given to a professional audience in the United States. While he drew on his conversations with Major Livermore and the writings of Captain Sir John Phillips Colomb, Royal Navy, many of the insights were his own.

McCarty Little struggled for years to keep both the Naval War College and naval wargaming afloat. He continually innovated. In 1887 he and Major Livermore conducted the first joint Army-Navy war game-driven field exercise. The Army high command promptly forbade any future joint exercises. In 1889 McCarty Little ran a wargame at the Naval War College. Wargaming has been conducted at the Naval War College each year since.

Gradually McCarty Little won his fight. As early as 1894 and 1896 war games influenced the Navy's budget. In 1895 a war game played a decisive role in convincing Congress to fund the Cape Cod Canal. In 1899 the Army set up a War College and McCarty Little did what he could to ensure their curriculum included wargaming. From 1899 to this day it has.Soon it became the Army's turn to innovate; turning to transparent overlays instead of blocks, so that a permanent record of each move was made. Also, to standardize the input of moves to the umpire they devised a format for an operations order, the father of the joint format still used today.

While success was gradual, we can use a remarkable 1912 article in ***Proceedings*** to declare victory. In this visionary article McCarty Little describes concepts that would be much in vogue almost 90 years later. He argued wargaming had and should shape national policy, that it was the cure for peacetime "stove pipe" mentality, and that it could not only produce better plans but could condition its practitioners to think, hence react, quicker then their enemy (Observation, Orientation, Decision, Action Loop) hence gaining a important advantage. The clarity, persuasiveness and confidence of this remarkable article clearly indicated wargaming had come to America – and like earlier immigrants had truly become American.

1872 – 1905 German Wargaming, innovation and decline

While wargaming was spreading throughout the world it was not standing still in Germany. Unfortunately, (for Germany) not all of wargaming's movement was in a forward direction.

The combat experience Prussia/Germany gained during their wars of unification had a powerful influence on their wargaming.One of the first things they learned was something that Sherman could have told them, that units did not fight to the last man. In 1877 a Saxon Captain named Naumann published rules to cover what today we would call **break points**, that is, they implemented criteria for determining at what casualty level units would cease function. (By the way, in the late 1980s this author was told it was impossible to depict break points in contemporary Air Force war games.)

Second a number of German officers advocated what came to be called Free Kriegspiel. Through a series of books published between 1873 – 1876 (See time line) these officers successfully argued for a radically different type of wargame. At its base the concept was simple, wargames has always been unpopular due to the cumbersome, time-consuming adjudication rules. These officers argued that Germany's combat experienced officers could substitute their military judgement for many of these rules. They argued this would allow games to be played more quickly, and allow longer periods of game time to be depicted. Finally, they predicted free play would make wargaming relatively more popular and hence used more often.

At first their innovations seemed to be working well. At its best the professional judgement of experienced combat veterans could produce more accurate outcomes in less time than the old methods. There were two problems though. First, as time went on, Germany's veterans of 1871 gradually aged, retired, and died. Their replacements could not produce adjudication with the same accuracy. The second difficulty was more damaging and, to a degree, commutative with the first.

Today we would call it command influence. When one of the players outranked the umpire, that player tended to value his professional judgement over that of the umpires. As even a high-ranking player may not be completely objective this tended to reduce the accuracy of the war game.

Nowhere was this problem more visible or more damaging then in the case of Kaiser Wilhelm II. Thinking himself a great military genius, Kaiser Wilhelm never missed a staff ride. The rides still started on a hill overlooking a possible invasion corridor. Just when Moltke would have asked the most junior officer for his opinion the Kaiser would immediately announce the "perfect" battle plan. You can imagine the level of debate. During the actual wargame, instead of splitting up the officers evenly as Moltke would have done, everyone wanted to be on the Kaiser's team. The results were predictable.The Kaiser's side always won. It was Germany's loss.

1890s – 1913 The Birth of Second Generation Civilian War Games

While many of the citizens of the Western Democracies had played Chess since the time of Franklin and Voltaire they had missed out on the second generation of simulation wargames initiated by Reisswitz. During the early and mid 1800s a number of war chess war games were published in the United States but these had more in common with earlier versions of war chess than with modern wargaming.

Perhaps not surprisingly the "technology transfer" that led to the civilization of wargaming started with a couple of reservists, one British one German. Both illustrate the impact dedicated individuals can make.

Spenser Wilkinson began his crusade while still attending college. In 1873 while on summer vacation in Germany he glancing through a pamphlet on the continental military balance and was shocked to learn Britain's Army was among Europe's smallest. Wilkinson immediately began reading books on military history and theory; he joined the British equivalent of our ROTC and within a year organized England's first wargaming club. This was the beginning of a lifelong effort to increase Britain's military preparedness that included a career in the reserves, positions in the government and advocacy of wargaming within and outside of the military. Presumably through Wilkinson's efforts in 1900 one member of Parliament listed wargaming as a hobby. More on Wilkinson latter.

The German reservist's contribution to civilian wargaming was more indirect. Before civilians would be interested in complex simulation wargames they needed to be motivated to study war. Hans Delbruck provided much of that motivation.His family had advised Prussian Kings on matters of war for generations. "It was vital that the King understood war for it is on the outcomes of war that the nation prospers or dies," he said. "Now Germany is evolving toward a democracy, the people are becoming the sovereign, and it is just as important that they understand war."

To help achieve that end he became the foremost military historian of his time, he is considered by many to be the father of modern military history. Rather then the traditional, "great man" school of military history, Delbruck used his training as a reserve officer on the German General Staff to analyze past campaigns. In addition to his books, that are still considered classics, he founded the first chair of military history at a civilian university. He also founded and edited the first defense affairs journal aimed at a civilian audience. We will also see Delbruck later.

The first direct contribution to civilian wargaming came from England. There a civilian had published detailed rules for naval battles. To play the game, very detailed profiles of the ships were needed indicating the thickness of the armor and other details. Data on only four ships were included with the original game, and customers were soon clamoring for more. He then came out with a game supplement with the needed profiles and data for all British ships. Now his players had some variety. Still, playing a war game against other British ships was a little like kissing your sister and there was soon demand for a supplement with data on foreign navies. His next offering provided the needed data for the entire German Navy.

What happened next indicates that political correctness is not a new concept. There was an uproar in the press – the Germans are our friends, how dare he imply our navies may someday fight? Learning his lesson the next rules supplement Mr. Jane came out with was called All the World's Warships. (This way no one nation was singled out.) So the entire Jane's group, that has contributed so much to the reference sections of libraries around the world, and to the British balance of payments, started with a wargame.

Finally, a ground combat simulation war game was published for civilian use. The author's avowed purpose in designing the wargame was to help civilians to better understand how terrible war was. He predicted that if the peoples of democracies truly understood how terrible war was they would make sure their governments would never again start one. While the author, H.G. Wells, made many correct predictions in his long career, this one was, at best, premature – his book of rules called, Little Wars, was published in 1913.

While both works were fairly popular, the number of civilians playing simulation wargames would remain modest for many decades. While the fairly complex rules deterred some, the main problem was the cost of the metal soldiers or ships each game required. Only the fairly small upper middle class or wealthy class could afford full sets of such "miniatures" around the turn of the century. Still, this is not to say early civilian simulation war games did not have an impact on history. One young British aristocrat enjoyed wargaming with miniatures well into his adult years, his name, Winston Leonard Spencer Churchill.

1905 – 1918 Wargaming and the Great War

Arguably the most decisive war games of all time were played in 1905. That was the only year Count von Schlieffen's plan for a wide turning movement through neutral Belgium and Holland was war gamed while he was still on active duty. This was during the period that the Kaiser was attending the staff rides. For this test the entire general staff and virtually the entire War College class were on the Kaiser's (German) team while two 1st Lieutenants played the armies of France, Britain, Belgium and Holland. No question on the validity of this test was recorded. After all it predicted the destruction of the France so quickly that the British did not have time to come to France's aid. The Kaiser was pleased.

In the same year at Wilkinson's urging the British played a war game examining the consequences of a new war between Germany and France. While accounts differ slightly the British game also envisioned a German turning movement through Belgium. Like the German war game the British game also indicated the Germans would destroy the French Army before a British Expeditionary Force (BEF) could get to the continent. This is effectively the same outcome as the German wargame played the same year. However, Wilkinson and his fellows were not nearly so pleased as the Germans with that outcome. This wargame led to a host of actions, in no small part due to Wilkinson's ensuring the results of the wargame came up on the floor of Parliament. Repercussions ranged from reworking mobilization and cross channel plans to informal staff talks with the French.

Ironically, British wargaming was short lived. War games dropped in popularity as it became evident wargames of the period could not address the psychological and political dimensions of the Boer War. Still, as the Germans lost the key first campaign of World War I because the BEF was in the wrong place at the right time, the impact of Britain's brief flirtation with wargaming on world history would be hard to exaggerate.

One war game that did not shape history, but should have, took place in Saint Petersburg early in 1914. The French thought they knew Germany's broad plan in the event of war, an immediate offensive against them hoping to defeat France before Russia could fully mobilize. To defeat this strategy France urged her Russian ally to focus all her mobilization efforts on her two most modern armies. As their mobilization was complete, these two armies would invade East Prussia. This would help Russia, as the Germans would be unready for such an early offensive. Even more importantly it might help to keep France in the war by causing the Germans to divert forces from her campaign against France. Russia agreed to the French strategy and developed it into a detailed plan. This wargame would test this new plan.

The wargame began well. The same two generals commanding the designated armies directed the Russian side in the war game. Both armies advanced into East Prussia against little opposition. Then the Russian armies entered an area of lakes that made cooperation between the armies difficult. The two Lieutenants playing the German side placed a thin screening force in front of the Russian army to the North they then shifted the bulk of their forces to the south, surrounding and destroying the other Russian army. With that the war game ended.

Roughly seven months later the same two Russian generals commanding the same two armies implemented what appears to be the exact same plan. Once again both armies made good initial progress. Once again they reached the area of lakes that made cooperation between the armies difficult. Now the real Germans placed a light screening force in front of the Russia's Northern Army and shifted the bulk of their forces to surround and destroy Russia's Southern Army – near the town of Tannenberg.

In Germany in the decade before the First World War something of a wargaming renaissance was underway, due to the much criticized Moltke the Younger. This Moltke has received much abuse over the years for "ruining" Schlieffen's master plan. While it is true Moltke made some decisions during the execution of the plan that with 20/20 hindsight appear clear errors, he did much to improve planning methods before the war. If he made any pre war mistakes it was to work only to make existing wargames and the existing plan better instead of taking a fresh look at both.

Moltke started by going to the Kaiser, a childhood friend thanks to his famous uncle. Moltke gently and respectfully told the Emperor that his participation in the Staff Rides was closing off rigorous debate, hence reducing their value both as an educational tool and as a planning tool. The Kaiser agreed not to voice military opinions during future staff rides.

Next Moltke examined the wargames themselves. He discovered machine guns were not depicted in the war games, he was told this was because there was insufficient data to predict their impact on attrition precisely. Moltke saw to it that data was acquired from the Russo-Japanese War and machine guns were added to the wargames. He then asked why logistics were not included. When told war games could not account for logistics he pointed out that the Italian War College had been including logistics in their war games for decades.

When logistics were depicted during the next wargame of the Schlieffen plan it was learned the two armies on the outside of the great wheel would run out of ammunition two days ***before*** the campaign ended. As a result Moltke saw to it that Germany organized the first two motorized units of any army anywhere in the world – two ammunition supply battalions.

Of course when war came the plan did not work as well as the Germans hoped. Why? Moltke's efforts to make the wargames more fully depict contemporary combat results did produce positive effects. Germany was relatively less surprised by the nature of the early fighting. In part for this reason their equipment was relatively closer to what they actually needed. What got Germany into trouble was not what they wargamed wrong but what they failed to wargame.

They did not simulate the diplomatic and political consequences of their actions. Spontaneous efforts by Belgian civilians to destroy their own railroads caught the Germans by surprise. There were no such "units" in German wargames. Even more serious, they did not simulate the diplomatic consequences of invading Belgium in the first place. This is a bit of an oversimplification, but invading Belgium brought the British Empire into the war, and that Empire eventually brought in the United States, and the additional weight of US forces ultimately defeated Germany. Again, they got most of the details right, but none of their war games addressed the most decisive consequences of their invasion of Belgium. They lacked the "political" dimension of strategy.

There is relatively little is known about wargaming during the Great War. Perhaps a few games were conducted or perhaps the records are yet to be found. There is a record of one series of war games, and much of that record is due to the moral courage of one man - Hans Delbruck.

Germany conducted a wargame prior to each of her 1918 "Peace Offensive" operations. These campaigns were intended to win the war before the Americans could arrive in force. Germany had a "window of opportunity" as its recent victory over Russia had freed up a great many forces, and few Americans were yet on the continent. But, if they failed, Germany's prospects were bleak. While they achieved spectacular advances by World War I standards, these offensives did not reach any truly strategic objectives and hence ultimately failed.

Delbruck, writing in his defense journal ***during*** the war, criticized the General Staff. He stated that the wargames had roughly predicted the indecisive outcomes that took place – yet the General Staff went ahead. He claimed that if representatives of the Foreign Ministry were present at the wargames they would have realized that the initial advances would have caused panic in allied

capitals. If before the offensives had lost momentum, he claimed, Germany had offered generous peace terms (like giving back – oh - most of Belgium) the offer might have been accepted. Now Delbruck feared Germany would not get nearly such good terms. He was right.

1919 – 1938 Inter-War Wargaming – the Visionary and the Blind

Delbruck may have had a hand in bringing about the most sophisticated wargaming of the inter-war or any other period. While many accepted the simplistic (and wrong) "stab in the back" theory of why Germany lost the war, many in government and the military worked for a clearer understanding. Delbruck testified before a government panel that poor strategy was the root cause of Germany's defeat, and the General Staff's purely military analysis of war plans was a cause of this poor strategy. Their wargames could only show the attrition effects of invading neutral Belgium or unrestricted submarine warfare. They could not predict the political effects of these actions or their subsequent military consequences.

Whether Delbruck's influence on what followed was direct or indirect is unclear. What is clear is that the German government soon established strategic level war games - not at the shadow general staff - but at the ministry of defense. These wargames were truly comprehensive, with industrialists brought in to advise on the speed of industrial mobilization, attachés brought back from their assigned countries to play those country's militaries realistically, and diplomats integrating their actions with the militaries. Even journalists participated, commenting on likely world public opinion. How could all these "stovepipes" be brought together? Perhaps Germany was so weak after World War I that her leaders realized they had to work together just to survive.

Perhaps for the same reason, wargaming received even more emphasis within the military. Deprived of most their forces, Germany could still wargame with forces she did not yet possess. In addition, the Germans took an extremely pragmatic and detailed look at the history of the war. From this history they derived at first tentative theories about what would and would not work in future wars. As the theories were rigorously compared to the historical facts, a new doctrine began to emerge. In turn this doctrine was rigorously tested in wargames. They employed hardware and tactics and then further refined their hardware and tactics - all with forces that did not physically exist. The Germans called the concept they so developed, "Mobile Operations." Within a decade it would become known to the rest of the world as - Blitzkrieg.

Germany's World War II preeminence in armor is all the more remarkable because the United Kingdom ended World War I with the world's most potent armored force whether measured by technology, numbers or tactics. Britain also produced the inter-war period's most prominent and articulate armor theorists, J. F. C. Fuller and B. H. Liddell Hart. How did Britain fall so far behind? Well, there were many social, political, economic and military considerations that worked against Britain maintaining her lead.

Still, a "fixed" wargame may well have been the most decisive single blow. General Archibald Montgomery-Massingberd, Chief of the Imperial General Staff from 1933 to 1936, detested the internal combustion engine. He let it be known that he would find it pleasing if England's only experimental armored force would fail in an upcoming field wargame. The umpires dutifully scored the unit a failure and Montgomery-Massingberd used that outcome as justification to disband the unit.

Although not as bad, the inter-war period was also the low point of US Army wargaming. Though little is written, all that is known is bad. Two articles on naval wargaming briefly commented on the devolution of Army wargaming during this period. Perhaps due to the malaise born of slow promotions and low budgets, most army wargames stopped being wargames and instead became one-sided scripted exercises. These exercises deadened initiative, as the outcome was always the same regardless of brilliance or stupidity, diligence or laziness of the participants.

The only other reference to Army wargaming during this period was from a biography of Claire Chennault. While on the faculty of the Air Corps Tactical School Captain Chennault had been called to testify to Congress on the Army's professional military education coverage of air power. He paid his own way because he was told the Army budget had insufficient funds to pay for his travel. At the hearings he stated that he and his school had tried to insert contemporary air power into Army Command and General Staff College wargames. They were unsuccessful. He reason he was told was that the Staff College had a learning objective of practicing trench warfare. When airpower was included in the war game trench lines would not be formed. Hence airpower had to be removed so that their learning objectives could be achieved.

Chennault argued that these wargames needed to include airpower precisely because airpower would prevent World War I trench systems from forming. If the students did not learn how to fight the more mobile style of future war through wargaming, they would have to learn those lessons at a far higher cost on actual battlefields.

When Captain Chennault returned from testifying he was informed he had been accepted to attend the Army's Command and General Staff College in error, hence his slot had been revoked. Not seeing a chance for advancement without attending CGSC, Chennault left the service.

This was NOT an isolated incident. The faculty of the Air Corps Tactical School (ACTS) participated in Army War College (AWC) annual wargame from 1923, hoping to educate senior Army officers in the doctrinal use of airpower. The results were uniformly disappointing. Despite the gradual inclusion of air officers in the planning process, the AWC restricted air participation to activities in the combat zone and not against vulnerable enemy rear-area targets. The artificial nature of the depiction of airpower disgusted the ACTS participants, and may have actually been dis-training for the Army's future leaders.

Things were not perfect in the Army's air arm either. At Maxwell Field the Air Corps Tactical School (ACTS) was evolving the doctrine and educating the

airpower leaders that would fight World War II. On the surface their teaching methods appeared outstanding. Periodically the students would apply what they learned by writing a plan to attack a real target. The faculty would then pick one of these plans and the entire student body would climb into aircraft and execute the plan. Not since Moltke's staff rides did planning receive such a fast real world confirmation. There was just one problem. ACTS was simulating actual missions - they were not wargaming them. The bombers always got through to Selma, as there was no enemy resistance. How this caused doctrine to evolve, or more likely not to evolve, is hard to say.

There was one bright spot. A young captain recognized the need for wargaming and further recognized the need for airmen to understand how air power fit into overall theater campaigns. On his own initiative he developed an air/sea/land, war game that took maintenance, supply, and even airfield construction, into account. Student feedback to his war game was mixed. Immediately after execution, the war game received a lot of criticism for being difficult to play. However, it was the number-one-rated class in graduation surveys.

Unfortunately the war game was so complex and cumbersome that after the captain's departure, no other faculty member was willing to take it over. So, how much impact could such a short-lived war game have? Well, a decade later the war game's designer, now General George Kenney served as MacArthur's combined forces air boss. Many historians believe Kenny was the prime architect of the entire air, sea, and land campaign in that theater. How much impact indeed?

Clearly the wargaming success story of the inter-war period is that of the US Navy. Both the fleet and the Marine Corps made impressive use of wargaming, with a positive impact that has seldom been equaled before or since.

The Navy built upon the work of McCarty Little, continually refining his technique. Even before World War I the bulk of their wargames began looking at a possible war with Japan. Initially, all war games assumed the American fleet would dash across the Pacific, fight and win a big climactic battle and relieve the Philippines. However, as the Naval War College refined its methods, the logistical constraints on such a rapid advance became obvious. Soon the wargames also made clear the need for forward bases in such a campaign. As understanding increased, the time needed for the advance grew from days to months to years.

Other elements were lass clear. All through this period US intelligence on the specific characteristics of Japanese weapons and of their training levels was atrocious. Instead of arguing over what they did not know the Navy turned this handicap into an advantage. How they did it shows their keen insight into education and human nature.

In the words of George S. Patton, "Americans love to win." The students going through the Naval War College were no exception. They certainly wanted the win the big "capstone" wargame at the end of their school year. As students have always done, they asked those who graduated before them for advice, or in the vernacular of the US military – "gouge." Graduates were happy to provide advice, "try to engage the Japanese at night, they are blind, watch out for their

torpedoes though - they are killers, fortunately though their ships sink like rocks after the lightest of battering." However, when they talked to someone who graduated in a different year they learned, "avoid night engagements the Japs are incredible, and their ships are so rugged they can really close in and slug it out, at least you don't have to worry about their tinker toy torpedoes." Slowly it dawned on the students - the faculty was giving the Japanese different strengths and weaknesses in each war game!

What were the students to do? Unable to simply learn Japanese strengths and weaknesses before the game they had to play the game in such a way that they could learn them through experience before any decisive engagements took place. Once they learned what those strengths and weaknesses were they would then develop a strategy to put US strengths against Japanese weaknesses, while protecting our weaknesses from Japanese strengths. They would then force the decisive engagements. In other words, they were "learning how to learn".

This by itself was a breakthrough, but the Navy's wargamers did more. Despite the Navy of this period being influenced by battleship admirals the Navy's aviation community was able to develop operational concepts and procedures that were ready to implement when, at Pearl Harbor, the Japanese took away our option for battleship tactics. How did they do it? Buried in the back of his book ***Thriving on Chaos***, Tom Peters finally gets around to explaining how a business can afford to encourage failure, "Make your failures as cheap, fast and educational as possible." By reducing the cost of failure this advice allows more new ideas to be tried out without killing the company. In a similar way the Navy was able to use wargames to cheaply, quickly and educationally try out different ideas in aviation and even ship design. For example, the circular formation used during World War II by carrier task forces was first developed during an inter-war wargame. Some of what they learned resulted in changes in ships already under construction. In other cases, what they learned helped win World War II.

As Admiral Chester Nimitz, US Pacific commander later put it, "The war with Japan had been reenacted in the game rooms at the Naval War College by so many people and in so many different ways, that nothing that happened during the war was a surprise . . . absolutely nothing except the kamikaze tactics toward the end of the war; we had not visualized these."

Yet as impressive and important as the wargaming achievements of the aviators and the fleet were, the United States Marine Corps carried out arguably the most important wargaming work done during this period. The Naval War College's war games had shown the importance of forward bases in any war with Japan. Yet World War I had seemed to show that, against modern weapons, amphibious assaults were problematic. Besides, there was still the age-old problem of having to quickly capture a typically well defended port with infantry alone. You could land men across beaches from ship's boats but you could not land the artillery or other heavy weapons they needed, nor could you efficiently and effectively land the supplies they would need.

So the Marines had to solve an enduring problem, widely believed to have been made worse by modern technology, and they had to do so despite one of their traditional handicaps - a very sparse budget. Wargaming was their key. Through

both map wargames and live wargame exercises, they developed their doctrine of amphibious operations. They set out to make an offensive against Japan sustainable, yet what they really developed the key to Allied success in all theaters. D-Day and victory in Europe would have been impossible without the work done by the USMC during the 30s - with almost no budget and all too little recognition then – or since.

Finally, late in the inter war period civilian second generation wargaming enjoyed a small increase in popularity with the publication of Fletcher Pratt's Naval War Game. Its popularity was probably enhanced by increased civilian interest in things military and by relatively easy to understand and use rules. Still, with America struggling to emerge from the Great Depression not too many propel could afford the luxury of the required miniature naval vessels.

1933 – 1941 The Storm Builds

It can be argued that the most potentially decisive wargames of World War II were never played. When Hitler came to power he quickly put a stop to the strategic-level war games played at the Ministry of Defense. He considered them a pseudo-intellectual pursuit. He would make the future strategic decisions for Germany based upon "blood and soil," that is on his own genius and intuition. Germany nevertheless continued to wargame operational and tactical problems. If you consider Germany fought well at the operational level but blundered at the strategic level, the possible impact of allowing these games to be continued can only be guessed at.

Still, there may not have been any effect on history, if Hitler had not listened to the wargame results. In 1938 General Beck, then Chief of the German General Staff, conducted a wargame of a German campaign against Czechoslovakia. While the wargame predicted a German victory, the fight would be so costly that it would weaken Germany to the point she could be conquered by any of her neighbors. Hitler ignored these findings, as he believed the Czechs would not fight.

This should not suggest that wargames did not play an enormous role in the German war effort from start to finish. In early 1939, before the war began, the Germans wargamed their attack on Poland. While they certainly would have won that campaign anyway, the wargame seems to have had some effect in speeding up their victory. More importantly, differences between the wargame's predictions and the Army's actual performance was one of the motivations for the rigorous training regime implemented between the victory over Poland and the offensive in the West.

Also, Hitler was not above sighting a wargame when its outcome confirmed his inclinations. In the Spring of 1940, a then relatively obscure Lieutenant Colonel by the name of Manstein, proposed an innovative plan for the coming offensive. Instead on swinging through Holland and Belgium as Schlieffen had proposed 35 years earlier, Manstein proposed a massive armored thrust through the Ardennes Forest, across the Meuse River, and on to the Channel coast. In so

doing he would cut off the British Expeditionary Force and the most modern elements of the French Army. Initially his ideas received a chilly reception by the high command.

He persisted though, wargaming his plan at his headquarters and showing that the plan could work. Well, thought the high command, perhaps there was something wrong with his wargame. His plan was wargamed again at higher headquarters, and again the plan worked. Perhaps, the plan would work on paper but tanks could not actually negotiate the Ardennes. Next, a field wargame was conducted over similar terrain within Germany and again the plan worked. At this point Hitler got involved. He had been wanting some plan that promised a more decisive outcome but, this early in the war, he was still reluctant to overrule his generals. Now, with the endorsement of the wargames, he ordered the change. The result was a French defeat far faster and more complete then would have otherwise been possible.

Wargames could also discourage. German games played before the war on the subject of a strategic bombing campaign against Britain, and war games played after the fall of France on a cross-Channel invasion, both showed how difficult such operations would be. When the actual Battle of Britain proved indecisive as predicted the discouraging predictions of the cross channel invasion wargame were taken even more seriously.

Hence a wargame predicting disaster should the Germans attack the Soviet Union could have had some effect. True, after conquering France Hitler was far more secure politically. Still, many prominent generals did not like the idea of invading the Soviet Union in general and they did not like the plan that came from Hitler's headquarters in particular. Hence, the usual pre-invasion war game was unusually important. Given the massive size and depth of the operation, the Germans conducted what was probably the largest, longest war game to that date, and possibly of all time.

Operation Otto , was conducted over three separate occasions as the Germans attempted to wargame a long campaign through to its conclusion. At the end of their third session, they had only wargamed through to early November. Yet no fourth session was scheduled. One reason was that the war game predicted the destruction of 240 Soviet Divisions, with only 60 remaining, and a front line that stretched from the gates of Leningrad to the edge of Moscow and deep into the Ukraine. Surly the Soviets could not recover at such a point. Those officers who continued to have misgivings about the invasion after the Operation Otto, felt they had no military basis to object.

Ironically, in the actual campaign on the actual "date" that Operation Otto ended the Germans had advanced about as far as predicted by the wargame and had actually destroyed more (248) Soviet divisions. However, instead of the Soviets being down to 60 divisions they still had 220 divisions. How could the war game be so wrong? They got most of the details right as far as the capabilities of individual Soviet divisions and their reconnaissance had given them a very accurate picture of the Soviet order of battle at the beginning of the campaign. It was what they did not depict that misled them. The Soviets had a plan to mobilize entire new divisions upon the beginning of hostilities. The German

wargame made no provision for new Soviet divisions. To make matters worse, beyond the time period wargamed the Soviets acquired an old ally, the Russian Winter. Expecting victory, German forces were woefully unprepared for winter fighting. It is intriguing to speculate how history might have been different if the Germans had held a fourth session of *Operation Otto*.

At about the time of the first phase of the *Operation Otto* war game, the Red Army was also wargaming a German invasion. Though much shorter, this wargame also shaped the war. The Russian plan for a German invasion was to initially stand on the defensive wearing the Germans down in a fighting retreat. Then, when the Germans were tired, the Soviets would counterattack and drive the invader from Russian territory. While the plan worked – in the wargame – the German side penetrated far deeper into the Soviet Union then anticipated. When Stalin was briefed on the outcome he was outraged.

This exercise appeared to have three impacts. Stalin blamed the deep penetration on the Red Army waiting too long to counterattack. This may help explain the premature counter-attacks made in the actual invasion. The wargame did alert Soviet leaders to the possibility of deep penetrations by a German invasion, so the actual German advance was probably somewhat less of a shock. Finally, Stalin concluded that one of the reasons the Red Army did so poorly was that the young general playing the Germans had done a brilliant job. Already well thought of by Stalin, this increased the general's stature further. This general's name? Zhukov.

At the same time that Germany and the Soviet Union were wargaming their future conflict, the United States Army was increasing the rigor of its wargaming in an attempt to prepare for less specific future challenges. Part of the reason for this change was due to the Army's new Chief of Staff, George C. Marshall. Like Moltke, Marshall had liked wargames and wargaming from the time he was a very junior officer. Now, with the likelihood of war growing, he turned principally to the field exercise type of wargames.

The best remembered of these exercises were the Louisiana Maneuvers. While live play increased realism, especially in unit *movement*, *combat* used systems of adjudication very similar to map wargames. As much of the Army's equipment was new, the wargame could only be as accurate as the guesses about the effectiveness of this new equipment.

There were some honest mistakes. The head of the tank destroyer program provided the adjudication guide for the effectiveness of tank destroyers. Later events would show these guides overstated their lethality, but until then these exercises "proved" their effectiveness. As a result, in the early battles in North Africa the tank destroyers were used too aggressively - with sometimes tragic results.

There was also more deliberate command influence over the exercise. Efforts were made before play ever began to guarantee an outcome that would "prove" the ground officers' position on the employment of air power. Their efforts were successful. As a result the US entered the war with small numbers of aircraft assigned to each army unit. For this reason, even though we had more aircraft

in North Africa, the Germans were able to overwhelm the few aircraft assigned to the ground units defending a place called Kasserine Pass. The Luftwaffe mauled US ground units while most of our aircraft bored holes on the sky over unengaged units.

The Japanese also used wargames to test their plans. In August of 1941 Japan's Total War Research Institute conducted a global political military war game that attempted to assess the likely outcome of World War II in all theaters. Paying close attention to the politics within target, neutral and friendly countries, this wargame (which did ***not*** include an attack on Pearl Harbor) predicted an Axis victory and may have encouraged Japanese entry into the war. Once the decision for war was made, more wargaming of specific operations became the responsibility of the executing service. These war games were more detailed hence could more accurately predict relative attrition, but they did NOT include political considerations.

Some historians have maintained that Japan's wargaming in support of her attack on Pearl Harbor illustrates how wargaming should be done. Japan's original plan was rather conventional - simply sail the carrier force from its normal base in the Inland Sea straight toward Pearl Harbor. During the wargame of this plan the Japanese officers playing the Americans used their limited sea surveillance assets to search in the direction of Japan. As a result the American side spotted the Japanese force well out to sea and mobilized to meet it. The Japanese side did "win" (i.e. they sunk more ships then they lost) but it was a Pyrrhic victory Japan could ill afford at the beginning of a long war against a industrially stronger nation. So the Japanese planners went back to their planning cell and came up with a new plan. Now they would depart from the Kurile Islands, begin by sailing toward Alaska and then turn to approach Pearl Harbor from an unexpected northerly direction. This plan was wargamed with much better results. Japan's subsequent victory at Pearl Harbor was used as proof of wargaming done the right way.

But was Pearl Harbor a Japanese victory? Certainly it was a tactical victory by standards of attrition ratios. It was also clearly an operational victory as the US was unable to effectively interfere with Japanese conquests for almost six months. But was it a strategic coup for Japan? The blow was delivered before Japanese diplomats were able to deliver their war message to the US Secretary of State. Shortly after his great "victory" Admiral Yamamoto said, "I fear all we have done is waken a sleeping giant and fill him with a terrible resolve." The purpose and unity Pearl Harbor gave the American people far outweighed any temporary advantage it gave Japan. How could this be missed during planning? Japanese Naval wargaming did not take political impact into account.

1942 - 1946 World War and Eclipse

With the entry of the United States the war had become truly global. Wargaming would be used in every theater, though few records of wargaming by the US Army, the US Army Air Force, or the British has yet been found. In the Pacific both sides made extensive use of wargaming.

The Japanese war game in preparation for the Battle of Midway was easily the most notorious war game ever played. During the game the American side's airpower sank two Japanese carriers. Rear Admiral Ukagi Matome, Yamamoto's chief of staff and commander of their carrier force for the operation, unilaterally reversed the umpires' ruling on the loss of the carriers. The carriers were restored to the game, and the Japanese side went on to capture Midway. Weeks later, during the actual battle, the Americans sank the same two carriers, plus two more. This time Admiral Ukagi was not able to reach into the "dead pile" and replace his ships.

This morality play is arguably the most often told incident from the history of wargaming. While the above is true, it makes the argument against the Admiral more "open and shut" then was actually the case. Most authors fail to mention that the American aircraft that sank the carriers during the wargame were B-17s. In the actual battle the B-17 proved completely ineffective (they never hit an enemy ship), so, in a narrow sense, Ukagi was right. Still, Admiral Ukagi failed to address the issue the loss of his carriers in the wargame should have brought up - what if the American's get in the first hit? Would we have enough strength to win anyway?

In contrast, the US Navy was working hard to get the most out of its wargames. A few months into the war, when we thought we knew the real relative strengths and weaknesses of the Japanese, Admiral Nimitz sent two lieutenant commanders back to the Naval War College. Their mission was to see if the College, through trying depict all the different combinations of Japanese strengths and weaknesses, had ever got it right. They found records of two different years when the college had come close. The commanders brought back with them to the Pacific the doctrine and plans from those years.

The Marines also got to see how close their inter-war wargaming came to actual amphibious operations. Frankly, their early landings revealed some inaccuracies in their wargaming. These inaccuracies had helped to produce flawed doctrine as well as the development and purchase of not quite the right equipment. But the war games and the decisions they influenced were at least close. The Marines learned that in the high tempo of war it is infinitely easier to fix something that is close than to come up with a capability from scratch.

The Marines refined their wargaming techniques quickly. Within a few amphibious assaults they were getting results that were so close to the subsequent casualty count and "island secure" times that one Marine called it, "eerie." Yet the wargame for the next landing predicted casualties far lower than actual and the island took far longer to secure. They used the same wargaming techniques as before, and the same intelligence methods to estimate Japanese strength. Indeed when the island finally was secured it was found their estimates of Japanese strength used in their wargame were only a little *low*. Why then was the game so wrong? It was due to a Japanese war game.

The story of this Japanese wargame answers a still bigger question, "after the Japanese were hopelessly outnumbered in 1944 and 1945 why did they keep on fighting?" Due to a complex arrangement to exchange our embassy staffs the Japanese ambassador to the United States and his staff were not able to get

back to Japan until after the Japanese defeat at Guadalcanal. Upon their arrival, instead of be allowed to see their loved ones the entire embassy staff was taken to a secret location outside Tokyo. There they played the US side (the ambassador playing Roosevelt, the Army Attaché Marshall, etc.) in a rare Army/Navy wargame. The outcome of the war game was that Japan lost the war. Now what? As a result of this war game a new strategy evolved. Japan could not defeat America but she could kill Americans. As America was a democracy they believed if they could kill enough soldiers, airmen, sailors and marines, the Americans would grow war weary and give Japan better terms. Hence the doctrine became not victory but a delaying action calculated to inflict the maximum cost on the Americans in time and blood.

This new doctrine was what had gone wrong with the Marines' wargame. For wargames to correctly predict outcomes the real enemy must follow roughly the same strategy and doctrine followed by the wargame's Red Team. In the Marine wargame their Red Team continued to follow Japan's previous doctrine, as they were unaware of the shift in Japanese strategy that their American success had precipitated. As the enemy did not fight as expected, even doing everything else right did not produce a correct outcome. Later in the war Japan's ability to do the unexpected produced the biggest variance from the War Plan Orange wargames. That innovation was called Kamikaze attacks.

In the European Theater both the Germans and Russians continued to wargame throughout the conflict.

The Soviets evolved a unique style of wargaming. Closer to Herr von Reisswitz's game than his son's, Soviet war games typically centered on elaborate terrain models of the battle area. Both the Blue and the Red sides would write out orders for the entire operation and turn them over to the umpires. The umpires, using incredibly detailed and cumbersome adjudication procedures, would take days or weeks to execute a fight all the way through to its conclusion. Only then would the two teams be called back, typically seated on bleachers arranged around the terrain table, and then walked through how the war game unfolded step by step. Essentially these were one-move war games. If the commanders did not like the outcome of the war game the entire process had to be repeated.

Understanding the Soviet style of wargaming helps you understand their style of fighting. Soviet offensives tended to start off with a kick, plenty of well-focused combat power. Over time though they would run out of steam. There would then be a pause, typically longer than the pause between operations for any of the other major combatants. Then the Soviets would kick off another initially powerful, focused operation. Most historians attribute this episodic method of offense to Soviet logistical limitations and the troops simply needing a rest. These explanations undoubtedly contain much truth, but as the Soviets were outrunning their logistics they were also outrunning their plans. Knowing how the Soviets wargame also explains their seeming obsession to collect statistics on military movements, attrition, river crossings etc.. They were collecting data to improve the accuracy of their future war games.

The Germans made heavy use of wargaming throughout the war. To describe all of their efforts would require a paper the length of this work. Here is just a sample.

While *Operation Bodyguard*, the deception plan for the Normandy invasion, had confirmed German suspicions that the main invasion would come at Calais, the Allies were not able to hide all their preparations across the Channel from Normandy. The Germans concluded that these preparations were being made for a feint, an attempt to trick them on the location of real invasion. Still, they conducted a wargame of an Allied landing at Normandy and concluded that an Allied lodgment was probable! This caused considerable concern in the high command. Though they may have joked about the ugly American uniforms, they had come respect the initiative shown up and down the chain of command of the American Army. If the feint was successful the Americans might decide to make the feint their main effort.

The Germans therefore ordered reinforcements into Normandy. The regiment that made Omaha Beach so bloody was one of those reinforcements. So was the 21st Panzer Division, the unit that prevented the British from taking Caen on D-Day. The invasion would have been much more difficult if it had not occurred before two-thirds of the planned reinforcements arrived.

Ironically, while one German war game made D-Day far more costly for the Allies, another actually helped the Allied cause. When the invasion took place many key commanders were away from their headquarters as they were on their way to a second wargame. This wargame would test how well they could meet an invasion of Normandy when all the planned reinforcements were in place. The delays caused by key commanders being away from their command posts actually helped that invasion succeed.

Finally, the Germans' wargame of the "Middle" Battle of the Ardennes may have been the most unusual game of the war. After the German Army was chased across France, resistance began to stiffen. Early in the Fall Field Marshal Model, commander of Army Group B ordered the Fifth Panzer Army, the German formation defending the Ardennes sector, to conduct a wargame of an American attack. On 2 November 1944, while the wargame was going on the Americans actually attacked. Instead of dismissing the game Field Marshal Model (Who was present at the wargame) sent only the commanders of units in contact back to their commands. He then directed that actual American movements be fed into the game. The Germans then wargamed out each of their orders before executing them. Finally, it was time to commit the reserves. The Field Marshal Model called the commander of the reserves over to the wargame map, personally briefed him on his mission and sent him on his way. It is difficult to imagine the leader of a counterattack ever having better situational awareness.

This and many, many other war games undoubtedly helped the German Army fight its battles and campaigns more effectively. However, Hitler had gotten Germany into a war in which she was hopelessly outnumbered and in a bad cause. The defeat of the Axis Powers ushered in an eclipse of wargaming. Just as recent scholarship suggests the Dark Ages were never quite as dark as some had previously thought, wargaming never completely disappeared.

It did decline substantially. Obviously, with the disbanding of the Axis armed forces all their wargaming ended. Within the United States the use of wargaming dropped almost as steeply. Days of wargaming at the Naval War College plummeted from 420 war game days a year (obviously sometimes multiple war games were going on at the same time) to 23 war game days. Initially this may have been due to a lack of enemies to wargame against. Only inside the Soviet Union was wargaming expanding and becoming more rigorous.

Even if we knew this at the time it probably would not have encouraged more wargaming within he US. After all, the Soviets were our brave wartime allies. Even as wartime good will rapidly evaporated demobilization continued. Atomic bombs had made war, and with it wargames, obsolete.

In time America and the West would learn at a great price that the reports of war's death had been greatly exaggerated. This would create the demand that would produce first the recovery and then the advancement of wargaming. The road would be long and full of triumph and tragedy.

The late 1940s and 1950's: The Long Road Back

Our expectations of the future shape that future. In the immediate aftermath of World War II the US expected peace guaranteed by atomic weapons and the Soviets expected continued conflict and doubted the effectiveness of atomic weapons. Because of those expectations wargaming atrophied within the US and grew in the USSR.

As the world was becoming bipolar militarily, politically and economically so too was it dividing into two schools of wargaming, the US and USSR schools. The injection of World War II experience and data lead to an increased prominence and credibility of Soviet wargaming. In the US demobilization lead to many officers with wargaming experience leaving the service. As atomic weapons would deter future wars it appears there as no effort to capture their expertise before they left. If atomic bombs would deter wars then the military simply needed to be efficient managers, maintaining sufficient military force to deter at the lowest practical cost to the tax payer. This management mindset influenced how we educated our future leaders. If you were to review all the services' War College curriculums in the late 40s and 50s you would find a great many hours dedicated to management and communications and very little time dedicated to wargaming or any other study of war.

As in the early missile programs, the Soviets widened their lead in wargaming because the US was standing still. Unlike missile programs, Red wargaming was virtually unknown outside of the Soviet Union so their lead did NOT spur us to action.

Still, this bipolar wargaming world, in which the Soviets did, by far, more wargaming, quickly began to change. Actually, the seeds of wargaming's eventual recovery in the West were planted even before its post-World War II eclipse. Techniques and technologies developed during the war years would

eventually support its recovery. Perhaps most importantly, the contribution wargaming made to all sides during the war would not be forgotten.

A lasting legacy of the war was the mobilization of the scientific community for the war effort. The Manhattan Project is the most famous example, but the Radar work at M.I.T. and countless other projects on both sides of the Atlantic contributed to allied success throughout the war.

Mathematicians frequently had a rapid impact, along with others who came to be called the operations research community. First employed to help win the Battle of the Atlantic by seeking ways to use initially scarce Allied resources to the best effect. Due to its success by wars end, "OR" was tasked to look into every type of military problem.

The war also spurred the development of computational devices for applications as diverse as code breaking and artillery tables. The continuing requirement for computational machines during the beginning of the cold war provided the seed money for what would soon take off as the computer industry.

As for the actual recovery of wargaming, the Navy again led the way with the first increase in time scheduled specifically for "wargaming". In 1947 the Naval War College Wargaming activity increased contact time allotted to its principle war game to allow greater logistic play. The Korean War helped wargames recover indirectly. This conventional war and the key role played by US Navy carriers, especially early in the war, suggested that neither war nor navies were obsolete. A major breakthrough came in 1958 when the Naval War College's computerized Navy Electronic Warfare Simulator (NEWS) became operational. While later articles would admit this first computerized wargame never quite worked (aside from it's big status screen) the mere fact that the war game was computerized lent an air of modernity to what was supposed to be an antiquated procedure.

The Korean War at least demonstrated the possibility that conventional forces may again be needed. This was one of the motivations behind setting up the North Atlantic Treaty Organization (NATO). With NATO can an increase in allied officers attending US service schools. Hence as wargaming recovered in the US an increasing number of allied officers were exposed to it. Of course, this was also the period the Soviets set up the Warsaw Pact. Officers from the "satellite" nations were trained using Soviet methods and often in Soviet schools. Hence from the start Soviet training and operational wargaming spread throughout the Communist Block.

The US Air Force's initial use of wargaming seems to have stemmed the most directly from the OR community. After the war the Air Force facilitated the creation of RAND (an independent non-profit corporation) as a way to retain access to OR specialists and other scientists who had proved so helpful during the war. As early as 1948 RAND began experimenting with "crisis" gaming. Though after 1949 RAND returned to more traditional OR methods, in 1954 they launched a number innovative wargaming projects. RAND began a computer model of the Cold War competition between the US and the USSR. Input from the Air War College and the State Department prompted RAND to add political

and economic factors to their wargame. Thought the depiction of these factors in a December 1954 wargame were viewed as crude the potential value of including such factors were recognized. To increase flexibility RAND later turned to a Free Kriegspiel style of play, and in so doing re-invented the German Political/Military wargame. Also in 1954 RAND attempted to game through an entire nuclear war. The next year RAND used an Air Warfare Model to accomplish a "net assessment" at the Air War College. Given the great credibility of OR at the time, this too gave an impression of modernity to Air Force wargaming.

Wargaming also recovered some in the Army. Stung by its lack of preparedness in Korea, the Army began a continuing series of field maneuvers in 1955. Their cartoon adversaries the "Aggressors" bore little resemblance to the Soviets or their tactics, but it was a start. And, as the Army began to realize it might have to fight the Soviets, it started debriefing officers of the last army to do so in the hope of finding useful lessons learned. One of the things the Army learned from debriefing the German Generals was the value the Germans derived from wargaming. This knowledge seems to have precipitated a number of articles in Army publications urging less use of scripted exercises and more map and field maneuvers.

As the 40's included events that would later become significant, so the 50's included a wargaming development that went largely unnoticed at the time. In 1953 a young man named Charles Roberts started selling a cardboard-mounted map war game he designed called "Tactics" to civilians. By 1958 he had sold 2000 copies and had come within $30 of breaking even. Encouraged, he founded the Avalon Hill Game Company to sell war, economic, and sports simulation games to the general public.

By the end of the decade wargaming was clearly on the rebound. In 1958 RAND had begun to reinvent Germany's Political/Military wargaming techniques. In that same year the US Marine Corps established a Landing Force War Game series at Quantico, Virginia, and even The Harvard Business Review published an article on adapting wargaming techniques to developing business strategy. Talk about a comeback.

1960's: As Bad as it Gets

It would be difficult for the 1960s to have gotten off to a more promising start for wargaming. Wargaming was becoming international again. A 1962 list of organizations active in wargaming cited one Canadian and two British organizations. Still, much of that promise was due to an energetic and forceful Secretary of Defense, Robert McNamara. His strategy was to use the management techniques that succeeded at Ford Motor Company and the OR techniques that helped win the Battle of the Atlantic, and merge them to help win the Cold War. His goal was effective defense at a cost the US could sustain over the long haul.

At its core his concept of deciding on new defense initiatives was elegantly simple, accomplish a life cycle cost analysis to learn what a proposal would really cost, and then use OR techniques to estimate military utility. For example, two wargames might be conducted one with and one without the proposal being implemented. Yet, the decade would also include some of the worst wargaming ever performed.

The decade got off to a great start for naval wargaming, with Admiral Nimitz giving wargaming a ringing endorsement from the stage of the Naval War Collage. "The war with Japan had been [enacted] in the game room here by so many people in so many different ways that nothing that happened during the war was a surprise," he said, " – absolutely nothing except the Kamikaze…". That same year the Naval War College began offering a course in wargaming. Two years later the Navy conducted the first ever remote war game with the players aboard ship and adjudication accomplished at the Naval War College. By mid-decade the Navy had upgraded their wargaming system to the Warfare Analysis and Research System (WARS). Even so, those responsible for naval wargaming felt naval warfare was growing in scope and complexity faster then they could increase the capabilities of their wargames.

Major advances were made in Air Force wargaming. Working with the Joint Staff and RAND, the Air Force started to wargame the Strategic Air Command's Single Integrated Operational Plan (SIOP) against a Red SIOP. (Actually the term used was Red Integrated Strategic Operation Plan, so the acronym could be pronounced.) The RISOP was prepared by a team of intelligence officers who worked, not only to accurately predict the numbers and types of Soviet weapons, but their strategies and tactics as well. On the defensive side, the Air Force also wargamed the defense of North America using a war game called Big Stick. Big Stick was demonstrated at the Air Command and Staff College in 1961, and in 1964 the conduct of an exercise using Big Stick became part of the school's core curriculum. For the first time since 1931 wargaming had returned to Maxwell AFB. It had come to stay. Finally, in 1967, the Air Force introduced the world's first instrumented air weapons range. Established at Eglin AFB and used in Weapon Effectiveness Testing, the full impact of this innovation would not even begin to become apparent until the next decade.

The Army also did some very effective wargaming during the 1960's. Wargaming was used by helicopter enthusiasts to develop the concept of an Air Mobile Division. In 1962 they then used wargaming to sell the concept to McNamara, who directed that the Army follow through with the idea quickly. When the Army deployed their first Air Mobile Division to Vietnam they, like the Marines before them, found that real combat was different from the war games in some ways, but like the Marine's wargaming Army's initial concepts were close enough to allow field adaptation.

McNamara's procedures were not always so successful. In 1961 a Joint Chiefs of Staff-level wargaming operation was established to provide an unbiased, joint arena to conduct McNamara's wargames. The next year wargame/cost study predictions helped convince McNamara to support the creation of an Air Mobile Division, while relatively low cost effectiveness predictions influenced him to cancel the Skybolt air-to-surface missile system. This caused a storm of protest from Britain, which had spent a significant part of their limited defense funds on

the assumption the program would continue. The US was blindsided by this criticism because McNamara's attrition per dollar calculations did not even consider possible diplomatic repercussions of program cancellation. Worse followed.

Attempts were made during the 1960's to broaden wargaming beyond attrition. After the Bay of Pigs fiasco President Kennedy had complained that his military advisers did not understand the political implications of recommendations they were making. This encouraged the increased use of Political Military wargaming at the Pentagon and at professional military schools. In 1964 the Advanced Research Projects Agency funded efforts to produce a wargame that would depict all the political, psychological and economic ramifications of an insurgency. This would have produced an entirely new generation of wargames capable of examining all wars in a much more comprehensive way. Regrettably, despite some interesting work in this area the defense planning community continued to use attrition based second generation wargames.

In April of 1964 the JCS conducted a manually adjudicated politico-military game called Sigma I-64. This exercise tested US theories of operations at the strategic and operational level in Vietnam. The exercise was repeated in September (as Sigma II-64) with even higher-level participation. In his book War Games, Thomas Allen implies these wargames predicted a US defeat, and yet we committed forces anyway. An analogy to the 1914 Russian wargame comes to mind.

However, review of the actual declassified reports on both exercises presents a different image. First, the strategy executed in the wargame did not match that followed in the actual event. During Sigma II-64 the blue side immediately executed attacks on an expanded version of the JCS's 94 Target List, and North Vietnam's ports were promptly mined. When in 1965 the US deployed large formations to Vietnam the administration choose to follow a strategy of gradual escalation. Second, and perhaps more importantly, each exercise depicted only the first several months of US involvement. Even if they had been able to adjudicate the political consequences of US casualties the wargames did not cover sufficient time for those consequences to arise. It would seem an analogy to Operation Otto is actually a more appropriate analogy.

Still, even if the war had been wargames through to its conclusion it is unlikely the political consequences of casualties would have ever been predicted. Progress in computer adjudicated "pol-mil" games was probably retarded by the sincere belief among many OR professionals that it was simply impossible to model human factors (they called "intangibles") like training levels, fatigue, and break points – for units, or for a nation that watched thousands of body bags return home year after inconclusive year. (They apparently did not know Germany had wargamed break points since the 1880s.) An indication of just how misleading such molds can be came at the end of the decade. President-elect Richard Nixon asked the Joint Chiefs how long he would have to maintain public support for the war in Vietnam for the US to win. In February of 1969 a wargame was conducted, that indicated we had won in November of 1968.

Ironically, it appears the most accurate wargaming of the conflict was done by the Communist North Vietnamese. Using Soviet wargaming methods, presumably learned at Soviet professional military education institutions, the North Vietnamese would wargame each of their major operations. First they would build a terrain model of their objective. Then one group would develop their plan of attack while another team developed the enemy (US) defensive plan. Umpires would then map out the collisions of both plans and the results would be briefed to all. The process was repeated until the outcome satisfied the Red commander. The familiarity with the plan this method produced allowed the Communists to conduct fairly complicated attacks without radios, coordination being accomplished by a subordinate commander's memory of the plan and simple wristwatches.

At least the 1960's witnessed the steady growth of initially simple civilian wargaming. While the decade started with one publisher and a few thousand annual sales it ended with a half dozen publishers with total sales of over 100,000 units per year. The sophistication of these wargames also increased over the decade as the pressures of the market place dictated that each new "release" in some way had to be qualitatively better than what had come before.

1970's To Study War

Very little was published on wargaming in the early 1970s. Perhaps this reflected the anti-military attitude of the times. It appears there was also something of a downturn in the actual use of wargaming. If so, the decline did not last long. As before, the Navy led the way, but this time they were soon overtaken - by the Air Force.

Vietnam was not going well. Among all the other problems our air-to-air kill ratio had dropped from spectacular in Korea (12 or more to 1) to dismal (occasionally worse then 1 to 1, seldom even 2 to 1). A study conducted by the Air Force called "Red Baron" concluded among other things that while we were teaching our pilots how to fly well, we were not teaching them how to fight. If a pilot survived his first eight missions "on the job training" would teach him to fight, and he would probably survive his tour.

The Navy acted to fix this problem first by establishing their Top Gun school. As anyone knows who has seen the movie, the aggressor/instructor pilots flew small, nimble jets similar to those flown by the enemy in Vietnam. They also attempted to duplicate Soviet style tactics. These measures were so effective the Navy saw an immediate improvement in their kill ratios over Vietnam.

The Air Force response took longer to kick off but was more comprehensive. In 1974 the Air Force Established the Fighter Weapons School at Nellis AFB, Nevada. The school would be similar to the Navy's Top Gun school in that only the best of the best would attend, but different in that air to ground tactics would also be taught. Then in 1975 the Air Force initiated the Red Flag series of exercises to improve the fighting skills of all their combat pilots. Both the School and Red Flag employed aggressors like the Navy, but they also installed an

electronic range like that at Eglin to allow more accurate adjudication and debriefing of engagements. Over time the Air Force also created an entire enemy nation in the Nevada desert complete with strategic targets, and defended by radars and surface-to-air missiles that even gave off visual cues similar to real missiles. All this not only provided excellent training but also provided a very realistic environment for trying out new equipment and tactics.

Also in 1975 the Navy established its Command Readiness Program. While this program simply institutionalized the distributed wargaming capability the Navy had experimented with much earlier, the effect on combat proficiency was probably similar to that achieved at Red Flag. At decade's end the Navy launched a new batch of games at the Naval War College, their Global War Game series. A deliberate attempt to recapture the ability to gain valuable insights that Navy inter-war games produced, Global also started with fast climatic Naval battles. Also like the War Plan Orange wargames the rigors of wargaming change that expectation and with it our expectations of a war with the Soviets.

The 1970s were also good to commercial wargaming. Fears that the unpopularity of Vietnam would effect sales never materialized and commercial wargaming entered what was considered by some their "golden age". An increasing number of publishers and growing sales encouraged increased innovation. Various games considered effects of morale, training levels, surprise, and a host of other supposedly "intangible" factors.

Commercial wargaming was also starting to attract serious attention. Sinai was perhaps the first to do so. Published in 1973 this theater level wargame included scenarios for each historical Arab/Israeli war and an "early 70's hypothetical conflict." Within months of publication this "hypothetical conflict" became the 1973 war. Though the course of that war surprised almost all defense analysts it tracked fairly closely with the typical outcomes of this commercial wargame. In 1974 the US Army became the first service to buy a commercial style wargame when they paid for the development of the tactical ground combat simulation – "Fire Fight". (More below.)

In 1975 Origins, the first national commercial wargaming convention, was held in Baltimore adding to the cohesion of the civilian wargaming community. Sales rose steady during the decade, exceeding 2 million units in 1979.

Still, the trend that would have the most profound effect on wargaming in the long run came from within the services. As the 1970s progressed, company grade officers from all the services began to enter positions of greater authority. Many felt the fighting forces in Vietnam were let down by a failure of strategic vision and a lack of basic campaign planning. As individuals and as groups many worked to ensure that the services would be better prepared intellectually the next time. In the Air Force Lt Col Denny Drew pushed to put more "war" in the War Colleges. In the Army many officers such as Lt Col Ray Macedonia pressed for more wargaming. The "Fire Fight" contract was one of several initiatives to come up with war games that were more user-friendly or more accurate products. The expectation was that if wargames could be made more user-friendly than earlier types, then they would be used more. Much less progress

was made then anticipated though, as unit commanders were busy people, especially with all the personnel problems of the "hollow force era", so little additional wargaming was actually accomplished except by enlisted and junior officer enthusiasts.

1980's Promise and Performance

Things seemed to come together for wargaming in the 80's. Each service, our NATO allies, and even commercial wargaming, made major progress. A good thing because efforts to "get it right" after Vietnam would be tested sooner and in a manner different than almost anyone could imagine.

The most important improvements of the early 1980's were clearly made by the Army. In 1980 the Army opened the National Training Center at Fort Irwin California. This "Red Flag for ground forces" employed a mix of an Air Force style instrumented range, technology similar to laser tag, and a credible aggressor force to produce the most realistic and educational combat environment ever. More wargaming was also being done at home station thanks to a simple innovation pioneered by III Corps at Fort Hood, Texas. III Corps simply established a base wargaming center that would handle all the administrative details of conducting a war game. Suddenly overworked commanders found it took ***less*** of their time to conduct a wargame then other types of training, and the use of wargames skyrocketed.

The Navy also made major innovations. In 1981 the Navy upgraded its WARS wargaming system to produce the Naval War Game System or NWGS. Just seven years later they upgraded their system again to the Enhanced Naval War Game System or ENWGS. Each upgrade roughly doubled the computing power of the previous system. Yet the scope of Naval War College wargaming always seemed a generation beyond their latest computer system and as in the 50's wargame faculty filled the gape with innovation, common sense and long hours. This teem effort was put to work through increasing academic use of wargames within the Naval War College, increasing fleet use, the rapidly growing Global exercises.

As Global increased in sophistication it became increasingly evident that a war with the Soviets would likely be protracted and that in a protracted war the Soviets were doomed, by the West's superior scientific and industrial might. As Global attracted more and more of Washington's power hitters, that perception became more wide spread, coloring not only Navy strategy but national strategy as well.

Finally, as Global helped to increase the credibility of wargaming with Congress the Department of the Navy turned to wargaming to help support budget proposals. In 1984, the Navy began to explicitly wargame their Program Objective Memorandum (POM) initiatives. In 1988 the Marines began wargaming their POM initiatives as well.

The impact of these innovations may have prompted greater Air Force efforts in wargaming. In 1984 the Air Staff Director of Operations was given oversight of all Air Force wargaming. In 1986 construction was completed on the Air Force's first wargaming facility, located at Maxwell AFB. Two years later this $21 million facility/computer system was declared fully operational - despite continuing problems with their adjudication software. As with the problems the Navy War College had with the early generations of its computer adjudication system, hard working individuals came up with work-arounds and Center was soon making significant contributions to Air Force wargaming.

The 80's was also a successful but transitional decade for commercial wargames. Print wargame publishers considered the decade a disaster as they saw their sales plummet. Peaking at 2.2 million units in 1980, sales dropped to less then a million at mid-decade and half a million by the decade's end. Most of the early drop was due to competition from role playing games like Dungeons and Dragons. Later much of the decline was due to the rise of a new (for civilians) wargame medium.

The advent of home computers allowed the recreational software industry to take off, and with it, computer based wargames for home use. The decline in print games probably would have been still steeper but this decade saw some of the most sophisticated and innovative designs ever produced. Leadership, moral, training levels and other supposedly intangible factors were depicted in more and more print wargames. One commercial wargame called Gulf Strike, depicted air, sea, land, special and logistical forces at the theater level. Compared to designs like this, early computer designs, constrained by the low power and poor graphics of early home computers, seemed crude by comparison. Still, the computer handled the bothersome adjudication, provided limited intelligence on the enemy and even provided an opponent through a computer artificial intelligence routine.

The 80's also saw important innovations in Joint wargaming. 1982 was a big year, with the National Defense University finally receiving a dedicated wargaming center, and the joint Warrior Preparation Center becoming operational in Germany. The Warrior Preparation Center was specifically designed to allow senior US and NATO country headquarters practice joint warfare and try war plans without having to maneuver troops in the field. The growing bills for exercise damage, growing environmental concerns, and concerns over Soviet capabilities to monitor live exercises, all contributed to increasing support for the center. In 1983 a TV special "The Crisis Game" provided the public with a peek into the political military wargames the Joint Staff had been quietly conducting since the time of Kennedy. By the late 1980's all area Commanders-in-Chief (CINCs) were using games to gain insights for their war plans. A 1989 study concluded that US Central Command was clearly ahead of the pack in its use of wargaming – a circumstance that turned out to be fortunate.

The 1980s also saw the first unclassified reports in the West on how the Soviets wargames. In small part this was due to greater openness and articles that wanted to appear frank but revealed few details began to appear in the Soviets open press. However, the real meat came from defectors from the Afghan Army.

Trained by and in Soviet wargaming methods these officers were only to happy to provide exhaustive detail on Soviet wargaming technique.

1990 – 1991 War on Sand Table and Sand

To a degree, the Gulf War was a fight between Soviet and US wargaming methods. Beyond a doubt US methods came out ahead, but this success should not blind us to very serious deficiencies that the war revealed.

To understand how Iraq wargamed the Gulf War we must understand how they wargamed the Iran/Iraq War. Iraq's initial invasion of Iran appear to have been opportunistic and little planned. After becoming overextended, mauled and thrown on the defensive, Iraq's planning became more careful. They used Soviet methods for their ground offensives, down to the terrain models and bleachers for debriefings. Late-war Iraqi offensives bore all the signs of operations planned by Soviet wargaming methods; the initially highly synchronized attack making rapid progress, only to slow as plans were overtaken by events.

However, Soviet terrain model wargaming is not suitable for exploring the strategic impacts of air power. So, in 1986 Iraq contracted with the US defense contractor BDM for a computer wargame that would depict Iran's air defenses and the "system" impacts that hitting Iranian targets would produce.

The Iraqi invasion of Kuwait also followed the pattern of Soviet wargamed operations - a fast start that petered out – at the Saudi border.

To understand US action during the war, knowledge of pre-war war games is necessary.

Months before the war, CENTCOM conducted a war game at the Marine Corps Base at 29 Palms, California. In the exercise many "Scud" surface-to-surface missiles landed on or near US air bases. While few missiles were adjudicated as hitting anything, the delays in launching sorties required by the need to confirm that no damage or chemical weapons were present, were having a major effect on our sortie generation rate. The Air Component Commander for the exercise, General Horner, asked the CINC, General Schwarzkopf, to beef up the deployment of Patriot surface-to-air missiles – which had anti-SSM capability.

Just prior to the Iraqi invasion of Kuwait, CENTCOM played another war game called Internal Look. In this exercise only a token US force was sent "to show resolve". Iraqi forces drove south and the US had trouble getting sufficient forces in theater to slow the Iraqi advance. With these exercise outcomes fresh in his mind, Schwarzkopf's emphasis on getting as much combat power into theater as fast as possible becomes more understandable.

The morning of the Iraqi attack, Mark Herman, the designer of Gulf Strike and employee of the defense contractor Booze Allen, was approached by representatives of the Joint Staff and asked to produce a wargame of the developing situation. He was on contract by lunch. (and now classified) By

modifying his commercial wargame Gulf Strike, he was able to begin play of a now classified wargame by mid afternoon!

Early in the deployment of US forces, the Air Staff's "Checkmate" office was used as the nucleus to form a joint planning cell. This cell, lead by Col John Warden, produced the "Instant Thunder" air plan. The plan envisioned a conventional strategic air attack against Iraq, incredibly a controversial concept at the time. The plan was sent to the Air Force Wargaming Center for exploration. The resulting wargame produced no effect, as the software had no way to adjudicate the impact of hitting strategic targets – being designed to model Cold War attrition campaigns. Fortunately, the plan was accepted anyway and it served as the foundation for the initial air phases of Desert Storm.

As time for the Coalition counterattack approached, an element of the US government pushed for CENTCOM to occupy western Iraq with the 101st Air Assault Division. It was believed that this would prevent mobile Scuds from getting close enough to launch against Israel. CENTCOM quietly wargamed such an operation, passed on the estimated casualty figures, and the suggestion did not come up again.

Many others in Washington and elsewhere were wargaming the Desert Storm plan. Although outcomes varied somewhat, most official war games indicated Coalition casualties would total about 30,000 of which 22,000 would be US, and of which 3,000 would be killed. Senator Sam Nunn of Georgia had access to these numbers and decided to oppose the US counter offensive as it was his political judgement that the American people would not accept casualty figures that high.

As the time to attack grew closer, individual units started to wargame their own parts of the plan. First Infantry Division wargamed its operation to breach the Iraqi barrier fortifications so many times that one of the battalion commanders expressed a preference for death over wargaming it one more time.

At least one Army unit used a commercial wargame to exercise its part of the plan. We know this because someone in the unit wrote the publisher claiming a sandstorm had blown their game away. The soldier asked the publisher to please send a replacement wargame – quickly.

It's easy to overlook one category of wargame when discussing US success on the Gulf. Pilots based in Turkey referred to Northern Iraq as "The Range" and a number of soldiers were taped saying, "the NTC (National Training Center) was much harder." The superb training received during live wargames like Red Flag and the NTC, contributed much to our success.

As Coalition forces moved forward, they uncovered evidence of Iraqi wargaming, the characteristic terrain model and seats of Soviet style war games. From the terrain modeled, it was clear the Iraqis were rehearsing to repel in amphibious invasion. Our Navy/Marine deception plans had worked!

Despite our overwhelming military victory in the Gulf, many have been unsatisfied by the state of peace that followed. It appears the US never

wargamed through to the establishment of peace. The Marines had planned to conduct such a wargame at their Quantico Wargaming Center but military victory came so quickly we unilaterally ended offensive operations two days before the wargame was scheduled to begin. But why hadn't any of the earlier wargames been continued through to the establishment of a sustainable state of peace? This may be due to the time required to wargame combat makes it difficult to find the time to wargame through to a conclusion. Or it may be due to our attrition models being incapable of modeling the human aspects of war. It may also be that the overblown casualty predictions convinced our political leaders that the simple liberation of Kuwait was all the American people would have the will to achieve.

The impact of wargaming on the Gulf War was enormous, and mostly positive. Certainly the NTC/Red Flag type wargames proved their worth. Yet the official casualty predictions were over 20 times too high. The predictions are even worse if you consider these wargames never produced "friendly fire" casualties. If these casualties are subtracted from the US total the predictions are 30 time to high. These false predictions had real political and military consequences. Theater C-130 transport aircraft were configured to airlift out our "hordes of wounded", not to fly in the fuel that was actually needed. It may be noted that the "commercial" war game designers / military analysts, such as Jim Dunnigan and Charles Kamps, predicted far fewer Coalition casualties than the "official" estimates – mainly because they were used to "factoring in" the intangibles that old-time government hands always said couldn't be calculated.

So did these bad casualty predictions produce yet another eclipse of wargaming?

1990s: The Return of Achilles

No.

More money is being spent on wargaming within the US and world wide then ever before – and with good reason. Much of this increased investment is producing excellent value for the cost. Yet the central problem of the bad predictions is being explained away, pronounced impossible to fix, or ignored.

In the euphoria of Coalition victory, and a victory with far fewer casualties than expected, no one was in a mood to complain. If any explanation was made at all it was simply that no one could have predicted that the Iraqi army would not fight. No one seemed to remember that the Iraqi army had fought hard for eight years against Iran without surrendering in droves. What was different this time and why hadn't the war games seen it?

A few saw the problem. An excellent RAND paper, "The Base of Sand" captured the problem well. High casualty estimates were just a symptom of a bigger problem. What was needed was a more comprehensive adjudication of armed conflicts. More computing power without a more comprehensive understanding of war would "simply produce the wrong answer faster and with more persuasive graphics." Few saw the problem this way. Instead emphasis has been placed on

reducing the cost of wargaming and making them more Joint. Both worthwhile goals, especially in light of the increasing use of wargames, and the general trend toward jointness in military operations.

In 1990 the Deputy Secretary of Defense created the Executive Council on Modeling and Simulation (EXCIMS) to take a comprehensive look at wargaming within the Defense establishment. What they saw was a maze of adjudication software - most looking at one regime of warfare (such as ground), using different data, and producing different answers to the same questions. All these different models were not only wasteful they were also harmful. Ground and naval surface forces had clearly played an important role during the final days of the Desert Storm campaign, yet no one service's war game could fully depict such a joint operation.

As a first step to bring order to this chaos, a permanent office was established to take a DOD- wide view of wargaming. In 1991 that office, the Defense Modeling and Simulation Office (DMSO) was established. Next it was important to establish an information clearing house so that new duplicate wargames were not created out of ignorance. The first such office was established in 1993 as the Tactical Warfare Simulation and Technology Information Analysis Center (TWSTIAC). However, different types of information were available from various sources, so to provide defense wargamers with "one stop shopping", a new center was established in 1999, the Modeling and Simulation Information Analysis Center (MSIAC).

While these measures were important, to really save money many existing models had to be consolidated into a smaller number of more comprehensive models. While many improvements were, and are, being made most improvements increased the accuracy of the adjudication of attrition. The new DOD-sponsored game, JWARS, was to replace most analytical models while JSIMS, using modules developed by each service, was to replace all the models used to train CINC staffs. As an interim measure, until these new wargaming systems could be made ready, software was developed that allowed existing service war games to talk to each other – Aggregate Level Simulation Protocol (ALSP).

The increasing use of wargames makes such cost containment measures all the more important. The same considerations that made the Warrior Preparation Center popular in Germany: savings compared to live exercises, no environmental impacts, and no possibility of "overhead" observation, has made wargame exercises an increasingly popular option in every command.

Also, increased competition for limited defense dollars and the success of Global as a lobbying tool have led all the services to conduct Global-like wargames. Collectively called "Title Ten" wargames, the Air Force's version, called Global Engagement, was started at Maxwell AFB and will in the future while be held in Washington, while the Army's version, Army After Next, is held at Carlisle Barracks, Pennsylvania.

The 90s have been a decade of surprising sales trends and important innovations for commercial wargaming.

Initially sales of print wargames continued to decline, falling to about 200,000 units a year by mid-decade. Yet, despite repeated rumors of print wargaming's death sales have now stabilized at about 150,000 units a year. One reason for this recovery is that desk top publishing techniques are reducing the cost of producing print wargames. This means that lower sales may still be profitable. Industry trends are for more titles, each with smaller print runs.

Computer wargaming are moving in the opposite direction. The explosive growth of the recreational software industry ($25 Billion in global sales in 1997) has attracted much Hollywood talent. This new talent has increased the production valued and the costs of all titles. Increased costs means only titles that are expected to generate lots of sales get made. As wargames are not perceived to have the mass appeal of titles like Tomb Raider, wargaming's share of the recreational software industry's output has fallen from 25% when the personal computer began to about 10% today. (Still, 10% of $25 Billion…)

The biggest surprise though has been the return of militaries wargaming. Originally the hobby of the rich and near rich the rising standard of living has made "Miniatures" an increasingly popular and increasing middle class medium. When asked if computers will make their wargame medium obsolete they point to their usually hand painted figures as the ultimate "high resolution graphics."

Wargame sales are also increasing globally. US publishers are selling more overseas, with the export sales of many computer wargames exceeding domestic sales, and more and more international wargame publishers are entering the market – with some excellent products.

Most innovations centered around making wargames in all mediums more user friendly. As for print wargames, years of blaming external competitors for their decline is being supplemented by an increased realization that easier to understand wargames were needed especially to attract new blood to the medium. Computer based wargames tended toward increasingly intuitive interfaces. At the same time though the increased computing power of current personal computers are allowing them to rival print wargames in accuracy. New Miniatures rules are also stressing clarity.

These trends are combining to make commercial wargames increasingly valuable tools for teaching voters about war. As Hans Delbruck pointed out over a century ago, in a democracy the people are the sovereign hence it is vitally important that they understand war. Through all its mediums commercial wargaming is reaching a larger percentage of the American people then ever before. More user friendly and more accurate games are imparting more understanding. As the trend toward professionalism means fewer and fewer citizens of most democracies actually serving in the military commercial wargaming is helping provide that vital understanding of war.

As the end of the 90s approach, there are some indications defense wargaming may have reach the millennium early. In October of 1999 a well attended NATO conference on modeling, simulation and wargaming demonstrated that wargaming had indeed become international again. Earlier in the year major test of JSIMS by the US Atlantic Command demonstrated that this important $150

million system was approaching operational usefulness. Finally, as a fitting conclusion to a century of achievement and growing capabilities, on 28 September 1999 the Naval War College dedicated its new $19 million wargaming facility. The facility will house the Wargaming department's 150 full time staff and 300 networked computers. Most appropriately this latest attempt by the Navy to "push the envelope" of wargaming is named for the selfless individual who started it all over a century ago – its named McCarty Little Hall.

Yet despite a decade of heavy investment and significant innovation all is not well with defense wargaming. In the Spring of 1999 defense wargaming received the acid test, when America again sent its people into harm's way, this time in the skies over Kosovo. The Air Force committed a larger percentage of its assets to the fighting over the former Yugoslavia than it had committed to Desert Storm. How well did wargaming do? Again war games failed to provide insights to the types of human effects and system impacts that were the main focus of NATO's air campaign. When there was no Forward Edge of the Battle Area to move and no "blue" ground forces, most DoD attrition models had nothing to measure. But was this a fair test? A fair question. True, all wars are unique, but this one was far more unique than most. That is why it is important to consider the entire history of wargaming before reaching any conclusions.

An Assessment of History

Just as astronomers needed to look at all the data on the past locations of planets before the true nature of the solar system could be discovered, so we must look at all the impacts on, and of, wargaming. When we look at its entire history the conclusion that wargaming can provide an invaluable edge is undeniable. From the battlefields of Europe to the Sands of Iwo Jima to the skies over Vietnam, wargaming repeatedly provided insights that often proved decisive. However, history also shows that wargames have at times misled their users with disastrous results. A balanced assessment needs to look at the good and the bad. Also, if there is a pattern to the bad outcomes perhaps we can devise a strategy to eliminate or at least minimize them. Lets start with the good.

The Value of Wargaming

While wargames provide many advantages, the benefits can be grouped into three, sometimes overlapping, categories:

Personal Development : This was the earliest and arguably still most important value of wargaming in the long term. From the citizens of a democracy choosing a new Commander-in-Chief, to a fighter pilot choosing engagement tactics, the record shows wargaming has increased effectiveness. It does so in several ways. First it creates an artificial urgency. Instead of a possibly boring lecture, now the user is in a competition. This increases attention and retention. Second, it provides for a higher level of learning, as its users must apply their knowledge in new ways, increasing the depth of their understanding. Finally, through the

artificial experience of wargames, participants not only learn to make better decisions (anticipating the countermoves of their adversaries), but through practice they learn to make decisions faster. This increases the chance that they can react faster than their adversaries, gaining all the advantages described by Col Boyd in his discussions on the decisiveness of decision time loops.

Force Development : As most writings on Revolutions in Military Affairs argue, new technology only becomes effective when new tactics, operating procedures, and organizational structures are in place that exploit its advantages. As the US Marines and the German Army showed during the inter-war period wargaming can be used as a partial replacement for war in the Caffrey Cycle of military doctrine development. Hence wargaming can help us to both buy the most appropriate forces and to use then in the most effective way.

Strategy Development : From the inter-war Naval War College wargames to countless Soviet preparations for attacks on the Nazis, to Desert Storm, war games have helped to develop specific plans for specific operations. As in all the above cases the value (or damage) in any specific case depended on the accuracy of the wargame.

Sources or Failure

The record shows that false predictions in wargames reduce the advantage of wargames and can turn them into a liability. Even in professional development wargames, inaccuracies can lead to what is called "dis-training." If we can identify sources of inaccuracies perhaps they can be minimized or eliminated. What have been the sources of past inaccuracies?

Command Influence : Fixing a wargame is about as useful as changing the results of a medical test. In time the truth will out, and in the mean time much damage can be done. General Montgomery-Massingberd could stop armored development Great Britain but that did not make tanks less effective. When German tanks drove into Belgium no one could "fix" the outcome. As defense dollars get even scarcer and wargaming becomes an even more credible lobbying tool, there will be increased temptation to "cook the books." Don't. We owe it to our children not to cause another Kasserine.

Incomplete depiction of the conflict : In all my research I never found a case where a war game gave a misleading outcome because the war game used a .925 probability of kill and the real "PK" was .952. The record doe's shows case after case where commanders were mislead by wargames that omitted relevant aspects of the conflict depicted. From the ability of the Soviet Union to mobilize new divisions to the impact of body bags on public support its what is left out that will mislead.

The Enemy not following your plan : All the wargames played on the defense of the Fulda Gap are wrong. The Soviets never did invade. From the Marine wargames in the pacific to Schlieffen and his famous plan, enemies reacting differently than anticipated can produce unanticipated outcomes even if the

wargamer got everything else right. Can this problem be solved? No. Even when you play according to the enemy's doctrine there is a chance the enemy will change his doctrine, especially if you are winning. However, the record also shows common sense efforts by many countries have at least minimize this source of false predictions.

Toward a Third Generation of Wargaming

Can these sources of misleading outcomes be eliminated? Well, avoiding the temptation to "fix" wargames will require moral strength and accurate adversary play will require long and diligent study of potential adversaries (and luck), but there should be a technical solution to war games which leave out key elements of the conflict.

We need a new generation of wargamess that take wargaming from depicting attrition battles between armed forces to depicting struggles between opposing nations. This will not be easy. It will require types of adjudication and categories of data that have not been considered in the past. However, at least conceptually, the solution is quite simple. Three areas of enhancement need to be made to our current second generation attrition wargames:

System Effects : The Instant Thunder plan, as it evolved into Desert Storm had an enormous effect, yet contemporary wargames did not even include target categories for most of its targets, much less how disabling such targets would have a ripple effect though the enemy's system. Potential enemies and we ourselves must be modeled as a system of systems, with each military and economic entity requiring inputs and producing outputs.

Human Factors : In all the pre-Desert Storm war games not a single Iraqi soldier surrendered. As we would prefer surrender to fighting, why individuals, units and nations decide to stop fighting must be modeled. Differences in troop proficiency, moral, and fatigue all must be modeled.

Time : Wargames must depict the entire conflict being examined and they must do so in a practical amount of real time. Not to do so invites a repeat of the German wargame of their invasion of Russia or the US wargame of Vietnam. This does NOT mean all wargames need cover large chunks of time, but wargames that depict battles should be played long enough to depict all the days of the battle, wargames that depict campaigns should simulate all the months of the campaign and wargames that examining entire wars need to depict the entire period from the outbreak of hostilities until the reestablishment of a stable state of peace.

The Fight for a More Peaceful Future

If the United States wants to fight its future wars quickly, with minimum casualties on all sides and at the lowest cost to all sides - in other words, if we want to fight so as to facilitate a better state of peace we will have to change how we wargame.

By advancing wargaming to its third generation we can develop strategists, develop forces and devise specific plans for achieving a better state of peace.

Franklin was right; playing chess could help a free people learn how to best fight to preserve their freedom. Now as heirs to Franklin we must use techniques descended from chess to preserve and extend the blessings he helped secure. Franklin also said, "If I make my enemy my friend have I not destroyed my enemy." It is in our national interest to fight our wars in such as way that the people of our former enemies are better off then before the war, as this gives then an incentive to preserve the peace.

Third generation wargames can help us develop strategies, technologies and force structures to win wars faster, with fewer casualties on ALL sides and at a lower cost, to all sides. Such wars will increase the chances we will be able to turn former adversaries into key military allies, important trading partners and major vacation destinations. (It worked for Germany.) Peace, prosperity and freedom around the world will help to secure peace, prosperity and freedom at home. With the right tools we can fight our wars so that governments of the people, by the people and for the people will inherit the earth.