Clash of Steel
A Closer Look at WWII Grand Strategy Simulation

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Introduction

The designer of a wargame is confronted with two conflicting goals. One goal is to design a game that is fun to play. The other is to design a game which is reasonably accurate. A little too much of the former and one builds a "beer and pretzels" game; fast and fun at the expensive of realism. A design based on the later often finds its way into the "monster" game hall of fame; big and slow with lots of stats. It is indeed rare when a design emerges which nicely balances the two extremes. The end result is a game which is relatively fast and fun while also embodying solid realistic modeling. SSI's Clash of Steel (COS) is one such game.

The purpose of this paper is to highlight some well-designed features of COS. On the surface, COS is a very simple and straight-forward game. However, under the surface one will find a magnificently designed and well thought-out model of WWII grand strategy. It is easy to confuse simplicity with a lack of realism. On the other hand, it is also easy to confuse complexity with accuracy. COS provides both simplicity and a measure of realism not found in other games which are much more complex. In my opinion, COS is simply the best WWII grand strategy game ever produced.

COS has blended most of the aspects necessary in a Grand Strategy game. The game's primary focus is on the ground war, but COS does a wonderful job weaving in the other aspects of grand strategy. These additional aspects include politics of neutrals, strategic bombing, research and development, naval actions, sub warfare, and naval convoys. These additional aspects have a bearing on the ground battles, yet they don't distract too much of a player's time from the ground battle focus. They must be attended to, but they

primarily involve quick decisions and only a little bit of user interface. Many other games sometime fall into the trap of complicating these peripheral issues, making them a game unto themselves. COS avoids this trap. COS lets you dictate grand strategy (i.e. what to research, what sea lanes to defend, what countries to negotiate alliances with, etc.), and the computer processes the results against the backdrop of the ground war. In fact, COS can play well if one ignores all the peripheral issues. This is not to say these additional issues are not important. A good player can use them to advantage. However, 90% of the focus is on the ground strategy, and COS does a good job at addressing the peripheral issues while not letting them get in the way of the ground war focus.

Third Reich vs COS

Before I get started with COS, I would like to mention a couple of things regarding COS and one of its other brethren, Avalon Hill's (Hasbro's) Third Reich. I grew up with Avalon Hill wargames and still have a good forty or so sitting on my shelf. Third Reich was one of my favorites. Now that Third Reich is a computer game, comparisons have been made to COS. Personally, I believe COS is hands down a much superior "computer" game than Third Reich. On the other hand, Third Reich is a much superior board game than COS could be if COS were ever ported to a board game. Basically, many of the features which make COS a superior computer game is the ability of COS to take advantage of the bookkeeping capability of the computer. If the player had to perform the bookkeeping, a COS board game would slow to a crawl, taking weeks instead of hours to play. As an example, imagine pulling out a calculator and running multiple equations to modify unit strengths after each battle and before each move. Or, try checking every hex on the board before every move phase to see who has the closest unit to each hex. In essence, one reason COS is such a good computer game is because it was designed as such. The battle equations and tables are much more elaborate and much more flexible than Third Reich. I don't mean to belittle Third Reich, but the computer version is primarily a port of a board game. There's nothing wrong here, and I'm sure it's fun for many players, but its design is based on the limitations inherent in board game simulations. Third Reich doesn't take advantage of all the computer has to offer. Although it has depth of play, from a computer game perspective, it simply doesn't match the depth of COS.

Ground Units

Make no mistake, COS is a grand strategy game of WWII. The units represent army groups, armies, and army corps. There's not many games where one swish of the mouse moves an entire army across the map. This keeps the unit count relatively small, making for quick play. Initially I thought the designer traded detail against simplicity, providing easier play by raising the abstraction level up to the army group level. After playing a number of games and examining the design, I found that such was not the case. Although the units show as only one unit on the map, their influence extends across many hexes. In this regard, the unit counter only represents the core, or center of gravity, of the unit.

The army group units represent the core of the army group, including not only internal divisions, but also the logistical, communications, and other support functions required by an army on the move. In this regard, the army group unit is not an army group unto itself. Rather, it represents those vital functions, apart from mere firepower, that are needed by an army group. In reality, the army group consists of the army group unit plus any Corp units and army units the player groups around the army group unit. This grouping of units will form the "real" army group. This encourages the player to divide objectives according to groups (i.e. Northern Group, Middle Group, Southern Group), which is correct from an historical perspective.

The armies and corp units do represent actual armies and corps. However, in the same manner that the army group represents the center of gravity of the army group, the army and Corp units only represent the center of gravity of the army or corp. The unit only takes up one hex, but the influence of the unit extends across many hexes. Thus, while COS may only have on-screen counters representing the core of the army group and Corp units, it is actually abstractly modeling, in a manner predictable by a player, down to the division and arguably the battalion level. This is explained next.

Where's the Front?

As noted previously, the units in COS represent only the center of gravity of each unit. Unlike other traditional wargames where the influence of a unit might end in the six surrounding hexes (i.e. zone of control), the influence from a COS unit can extend across many hexes. In fact, the influence continues to extend until met by the influence of an enemy controlled unit, city, water boundary, or neutral boundary. In essence, two enemy units which might be separated on the map by several hexes, are actually in contact! This contact isn't close enough to force a major engagement. The units must be adjacent to do that. Rather, the contact can be thought of as the interaction between the unit's division, battalions, reconnaissance units, or spearhead columns. This interaction defines where the front is really located. The beauty of the COS design is all this is handled entirely by the computer. In fact, players can play many games before realizing this is taking place. It is described in the rules, but the description is technical and takes numerous reads and games before the process sinks in. Although a player doesn't need to know "where the front is" to play the game, an experienced player will pay close attention to the true front. Those players who do pay attention to the "front" are abstractly considering the positioning of division-level units. There is depth here.

So, where is the front in COS? Figure 1 shows a German army poised to strike into Russia. Prior to the declaration of war, the boundaries between the armies is represented by the boarder between Germany and Russia. In Figure 1 this is represented by the dark vertical line separating the two armies. The division level units will not cross the boundary until war is declared. Of particular note, even though five hexes separate the Russian 2nd and 4th Corps unit counters, the units actually form a contiguous front. This front is weakest at the mid point, which is a good model since the hinge between two Corp is often the weakest point.
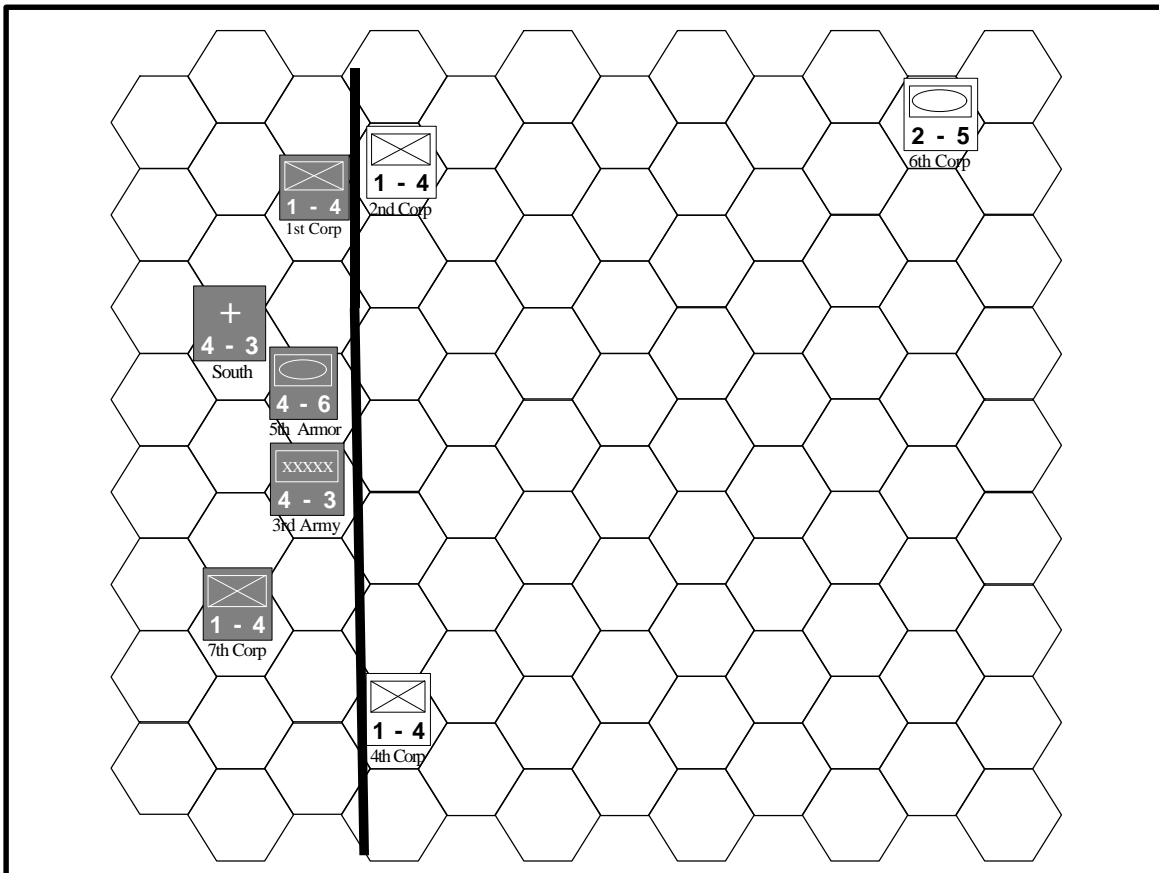

Figure 1: German Army Poised for Strike Into Russia

Now, let's assume the German player declares war, but decides not to move any units. Of course, a player would not normally do this, but this is an example to illustrate how each unit's influence works. Figure 2 shows the situation at the beginning of the Russian player's turn. Note that neither player has moved any pieces on the map. The arrows do not represent the movement of the unit counters. Instead, the arrows represent the automatic movement of division level units; the unit counters stay exactly where they are in the figure.
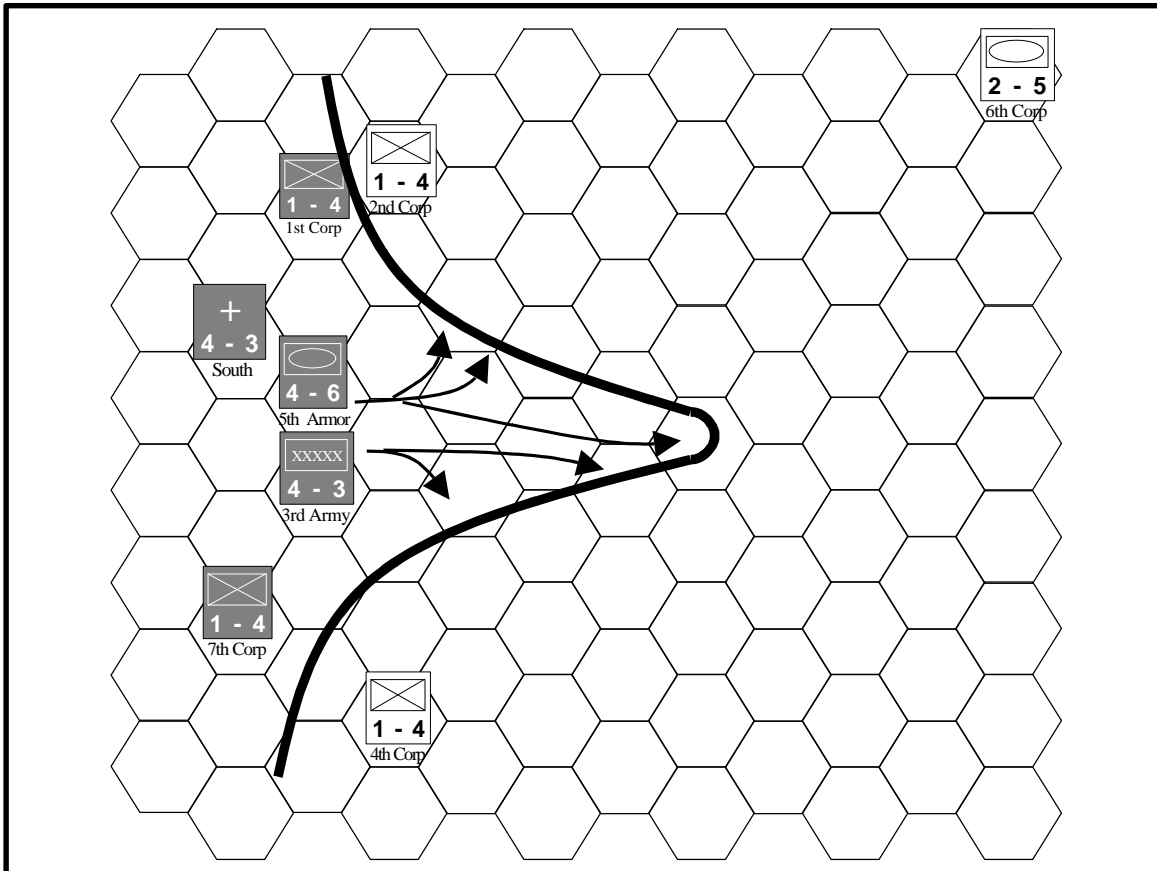

Figure 2: Division-Level Movement Executed Automatically By Computer

Note that units of the German 5th armored Corp and 3rd army have pushed several hexes into Russian. In essence, the division level units from the German 5th armored Corp and 3rd army have pushed back the front occupied by the Russian 2nd and 4th infantry Corps. Even though the Russian corps have been pushed back, they do contain the advance about 3 to 4 hexes into Russian. This is the true beauty of COS. Without even moving a counter, the attack has begun! As a grand strategists, it is not my job to be moving divisions across the map. My job is to dictate the grand strategic moves. Upon declaration of war, my divisions, on their own initiative, have already driven into Russia. However, these division level battles only go so far. It is up to me as the grand strategists to make the decisions on where the army and corps need to go. In this example I should direct the 5th armored Corp and 3rd army through the gap between 2nd and 4th Russian infantry Corps.

Figure 3 shows what would happen if I move the 5th armored Corps into Russia. As the grand strategist, I direct my armored Corp to the designated hex while my subordinate commanders branch out from there. The ONLY move made is the movement of the 5th armored Corp to the location shown in Figure 3. All

the arrows show the action of the Corp's subordinate units. Note that spearhead units of the 5th armored Corp have advanced over six hexes beyond the location of the unit counter, cutting off the 4th Russian infantry Corp in the south. The Russian 2nd Corp is spared a similar fate by the presence of the Russian 6th armored Corp, which blunts the German spearhead toward the north. Also, note the precarious supply line of the German 5th armored Corp. It would be severed by elements of the Russian 2nd and 4th Corp except for the efforts of the German 3rd Army, which keeps the supply routes open.
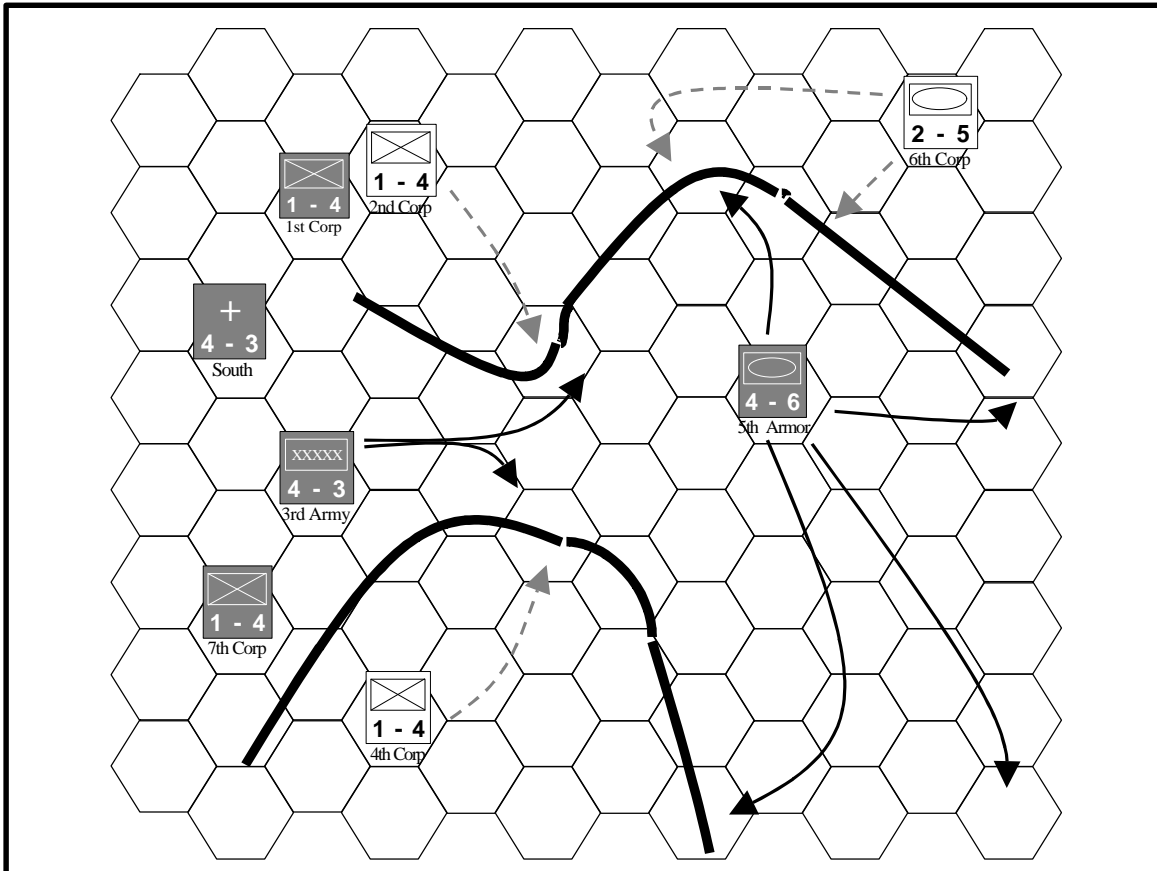

Figure 3: German 5th Armored Spear Heads

There you have it. There's a level of detail in COS that many players completely overlook. You're not just moving Corp and army units. Rather you are positioning Corp and army units, knowing that the subordinate divisions in those units will be doing their part to advance on the enemy. Understanding where the front is located is a vital ingredient to understanding where to place one's armies and corps.

Getting Cutoff

Now that we know where the front is, it is now easier to describe how units get cutoff and what to do about it. Figure 4 shows another strike into Russia, but this time let's assume the German 3rd Army is not on the map. In this example, our 5th armored Corp has driven between the Russian 2nd and 4th Corps. Figure 4 shows the "front" at the conclusion of the German turn. Figure 5 shows the front at the beginning of the Russian turn. Note that units from the Russian 2nd and 4th Corp have automatically filled in the hole made by the German 5th armored. All this has occurred when the only player movement was the German player's movement of the 5th armored Corp. The German 5th armored is now cut off. As we will see later, a cutoff unit does not receive supplies and can quickly lose combat capability solely due to lack of supplies.
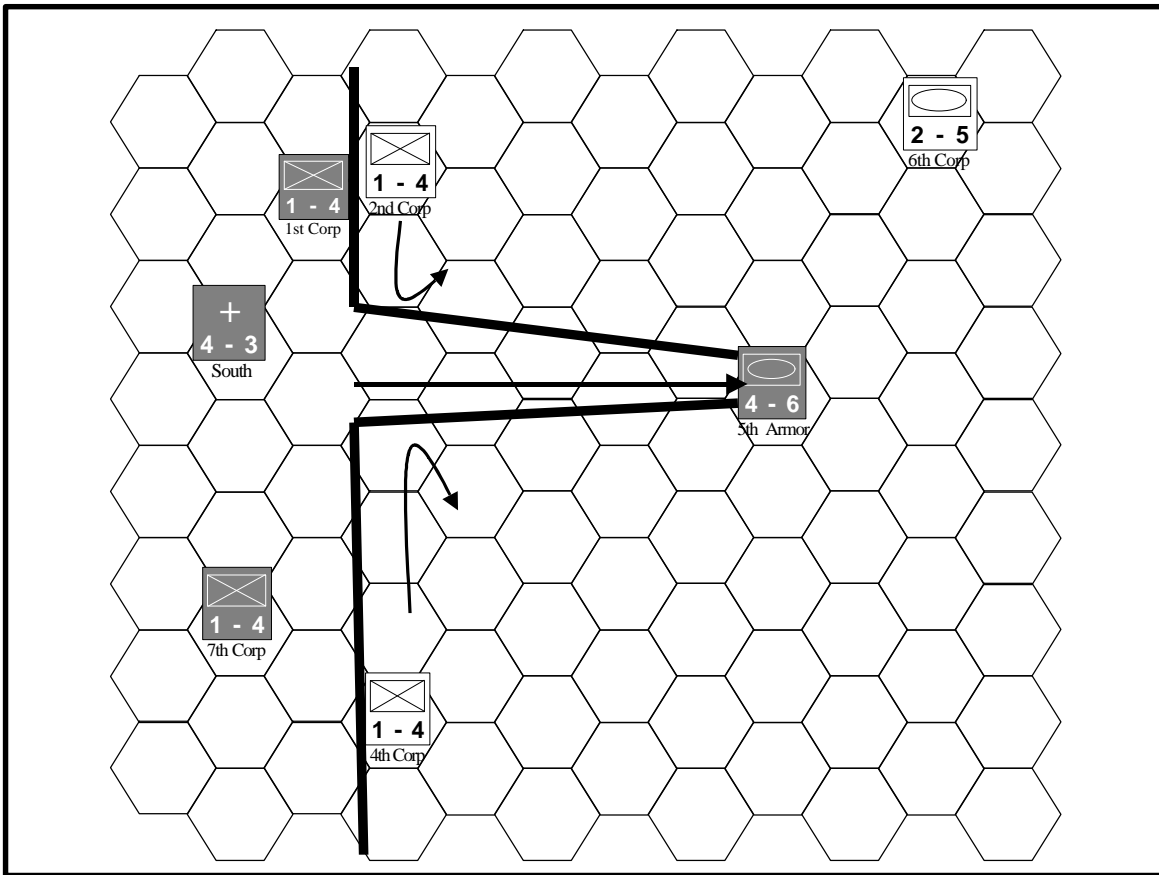
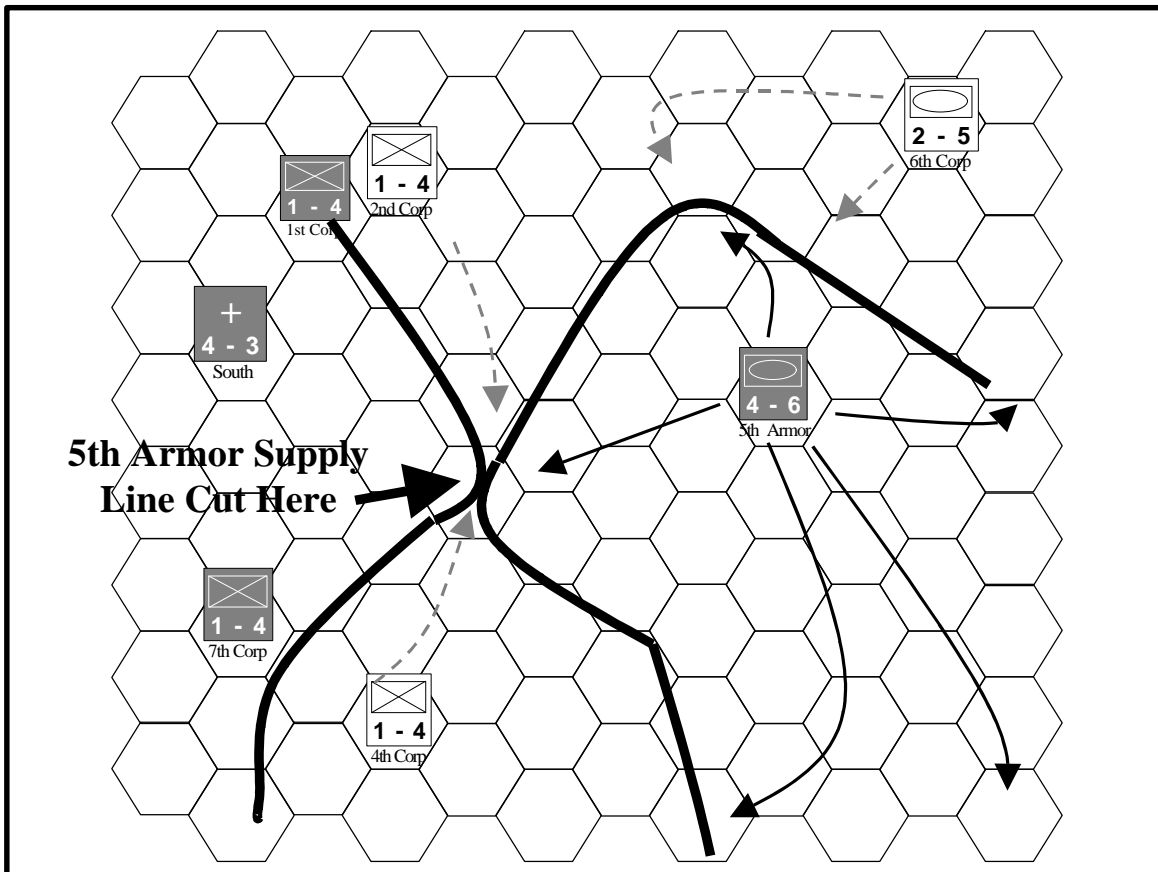**Figure 4: The German 5th Armored Drives Into Russia**

Figure 5: German 5th Armored Supply Line is Cut by Russians

At times, a player takes a calculated risk knowing a unit will be cut off. For even though it is cutoff, it causes severe disruption behind enemy lines. In Figure 5, the German 5th armored Corp is still able to cutoff the Russian 4th infantry Corp. It's the classic question: "Do I have you cutoff, or do you have me cutoff?" A savvy player will take this risk as long as the enemy cannot bring strong units to bear against the weakened (i.e. out-of-supply) spearhead. Similar events occurred in real life as the Germans invaded Russia. Eventually, a supply route is re-opened to the friendly unit. Often the disruption to the enemy caused by the extended spearhead unit fully justifies putting a unit temporarily out of supply. This neat little feature allows one to experiment with two of the major strategic decisions for the thrust into Russia. The panzer commanders, such as Guderian, wanted to strike deep into Russian before closing the pincers around the Russian armies. Others in the General Staff preferred smaller encirclement moves. The smaller moves are more conservative, as the panzers are less likely to get cut off. The long spearheads are more of a gamble, but can reap enormous benefits in certain circumstances.

Since the unit count is small, one would think that the loss of a unit can cause severe problems. In some cases this is true. However, the COS units are quite robust, especially the army groups. It takes a lot to eradicate an army group from the map. COS is very good at avoiding situations where one die roll decides the war (or game). In COS, units die gradually, with plenty of opportunity to extricate oneself from tight spots. The key is understanding how the units fight. To do this, one must understand strength, morale, efficiency and supply.

Strength, Morale, Efficiency, and Supply

The key to COS units is understanding four major factors: strength, morale, efficiency, and supply. Strength represents the weapons, material, and men. Morale represents the spirit of the unit as well as its cohesiveness. Efficiency represents troop quality. Supply represents how well the unit is supplied. One word needs to be said about morale and cohesiveness. The game really only uses a morale term. Basically, rather than adding one more level of detail (in the name of cohesiveness) to the design, the morale term gets to perform double duty for both morale and cohesiveness. However, throughout the game, it is always referred to as morale.

Having a high strength unit is simply not good enough to be an effective fighting force. The unit must have good morale, good efficiency, and must be supplied. Clash of Steel does a very good job at handling all the math and bookkeeping for the player. All this information is summarized by a single whole number on the on-screen counter. Further details (i.e. Strength, morale, efficiency, supply status) are provided in a window when the player clicks on the unit. This type of user interface is very good. COS makes it simple for the novice and detailed for the experienced gamer. Above all, the mechanics are very good at modeling reality.

The really nice part is how the game models a unit that still has lots of weapons, material, and men, but has a low combat value because of low supply or low morale, or low efficiency. A low supply or low morale unit is particularly vulnerable. However, once the morale or supply starts to flow, its strength increases rapidly. On the flip side, a unit placed out of supply for long periods becomes virtually useless, even without taking any loses. It doesn't disappear from the map, but one small push from an enemy unit, and it can fall apart. Interestingly, if the unit is not faced with a viable enemy (i.e. another unit), it can still be quite effective at taking empty territory or empty cities. Once the supply line is re-opened, the unit gains back morale and strength. The unit isn't brought back to full strength instantly. Higher efficiency units get it back the quickest (this makes a lot of sense and is a good design feature). Also, the closer one is to the supply source, the faster it all happens.

In many attacks (or defenses), a unit does not take a physical loss from its strength point, but instead takes a hit to morale. This reduces the computed combat strength, making it more vulnerable to future attacks. One part I really like is this morale hit lasts through the next player's move. So, attacking units which take a morale hit become vulnerable to enemy counter attack. This is a nice touch of realism as history has shown units to be particularly vulnerable in such situations. When I first played the game I though the units were taking strength hits as I saw the combat strength on the on-screen unit drop a number of points. It took me a while before I realized this drop was solely due to the morale hit. This moral hit represents the

loss of cohesiveness a unit suffers during an attack. COS is able to do this without the unit itself suffering any strength point loses. The decision one is often faced with when attacking is not whether a unit will survive the attack, but whether the unit will be so "tired" following the attack that it cannot survive the enemy counter-attack. If it survives the next round of combat while not getting cut off by the enemy, it can recuperate most of its morale (get formed back up) and be ready to go at it again. Of course, in some instances a unit may lose a strength point.

Sometimes a unit is required to retreat from combat. Here is where efficiency (quality) comes in handy. The higher quality units are more likely to maintain order when retreating. Lower quality units often get dispersed or eliminated. This is another touch of realism. Elite and Veteran units hold together better, especially during periods of adversity; COS models this. In one game, the allies trapped a high efficiency German armored Corp in the mountains of Algeria. The Corp was out of supply, with morale dropping. However, due to its high efficiency, it would just retreat without dissolving. It couldn't mount any kind of offensive, but it kept the allies busy for half a year before finally succumbing.

When in enemy territory, the supply depot is centered on the army group. In essence, army groups represent not only a number of internal divisions but also the administrative bureaucracy of a big (very big) supply depot. Other units draw their supply from the army groups. The model for this is handled in a very simple way; simplicity is not always at odds with realism, and the method used by COS is very simple and quite realistic. Without an army group (i.e. a logistic support center), an offensive into enemy territory doesn't maintain momentum for long. Initial gains may be made, but units quickly find their supply levels (and morale, and subsequent combat strength) fall rapidly. This compels the player to ensure army groups form the core of any major offensive. As an aside, the army group supply method helps provide a nice model of the offensive capability of the Allies in 1939. Neither the British nor the French have an army group at the start of the war (i.e. neither have established the logistical process to maintain sustained military operations in enemy territory). So, while the Allies can take the offensive in 1939, they are hampered by not having the logistical support requirements for a drive into Germany (this is quite true in the historical context). Of course, a player does not have to have an army group to drive into enemy territory. However, a unit runs out of supply (and morale) rather quickly when separated too far from an army group (or friendly city).

The interesting fact about army groups is they are slow compared to most other units, especially when compared to the tank units. This nicely models the relatively slow movement of supplies. There is a tendency of the tanks to thrust way beyond the army groups during some attacks. As the tanks extend too far, their supply levels drop solely as a result of getting too far ahead of the supply depot. The end result is a lower effective combat capability and slower movement. The tanks extend too far at their own risk. When one considers the enemy tends to fall back on the supply source while the attacker extends from their source, the defenders tend to gain strength and the attackers tend to lose strength solely from the movement. Sometimes one can even entice an opponent to overextend only to launch a crushing counter blow (remember Karkov in 43). There are numerous battles in WWII to draw examples from, and COS provides a nice model which allows players to apply such strategies.

Furthermore, the slowness of the army groups (and supplies) also create a need to take cities in order to gain access to the rail heads there. Remember that the cities form the rail heads from which army groups can get supply. In addition to this, army groups can use Railroads (strategic movement) to get placed at the rail heads.

Another nice supply feature is that if an army group is cut off, it still provides supply to units which can trace a supply path to the army group. This represents stockpiles of supply. However, the supply is significantly reduced, so having a cutoff army group is not a desirable situation.

Air Units

Air units are primarily used in the role of a tactical air force. They can attack any enemy unit within 7 hexes, and can often do so multiple times. The best way the units are used is to soften up an enemy unit prior to ground attack. The neat part of COS is air units don't actually "damage" the unit, but instead they

reduce a unit's morale (cohesiveness) making the unit more susceptible to attack. Basically, an air unit can't eliminate a unit, it takes the ground troops to do that. Properly applied air attacks, combined with well executed ground follow-up attack, are a deadly combination. And, such combinations are historically accurate as well. As for defending one's own units against such attack, aircraft can also intercept enemy air units attacking friendly units.

Some may think that air power should at least be able to reduce a unit's strength point. However, I tend to agree with the approach to reduce morale (i.e. cohesiveness) instead. The reason is due to the scale of the game. Let's face it, the air power of the day could not destroy an entire army. But, when applied to the right battle at the right time, air power could play a decisive role. Hence, the reduced morale caused by air strikes represents the ability of air power to play a decisive role at the crucial point of attack. The approach used in COS seems to make sense in this regard. Air power to soften up (represented by morale reductions) and ground troops to mop up.

The availability of tactical air also follows historical trends. The Germans have a lot of it early on and the Allies and Russians get a lot toward the end of the war. True to the historical record, Allied tactical air power is a significant part of the Allied ground offensives. It helps the Russians too, but is not quite as crucial. By the way, the Allied and Russian tactical air is available for production early in the war, but typically must take a back seat to the production of much needed ground units. However, COS does give you the opportunity to build them early if you wish.

Another touch of realism is the need for German fighters to be returned to Germany to stem the allied bombing effort. This is only true if the allied player develops a strategic bombing strategy. History shows that most German fighters were used for the defense against strategic bombing. COS makes this an option for the player. Just about the time when the fighters are most needed to stem the increased Russian and Allied tactical fighters, they must head home to defend the skies of Germany. Of course, COS doesn't make the player do this. COS provides the same dilemma as faced by the Germans in WWII. How many fighters stay at the front to help the tactical war and how many to bring home and help stem the Allied bombing effort. In COS, it's your choice.

Naval Units

Only capital ships, subs, and transports are represented in the game. The war at sea is modeled very simply, but its simplicity belies its ability to accurately model the war at sea. A key grand strategic aspect of WWII was the need for the Allies to maintain the sea lines of communications and the need for the Axis to disrupt the lines of communications. Britain was extremely dependent on overseas resources, and the Royal Navy was the only way to keep the supplies coming. The one problem is Britain had too many tasks to accomplish, spreading the fleet out. Britain needed to protect the convoys in the Atlantic, chase after German raiders (i.e. Bismarck) and subs, and maintain the sea lines in the Mediterranean. All this, and also protect the home isles from German invasion. COS provides the same dilemma to the Allies. How many ships to place in the Atlantic. How many to send chasing after Bismarck and subs? What if the Italian Navy sorties in the Med? Players find themselves striving for the same things as their historical counterparts: Can I force a major action and defeat a large part of the Italian Navy? The Italians often opt for the "fleet in being", which is a good tactic if the British are strong in the Med. When the Germans send out raiders, the British player goes to great effort to hunt them down. Failure to catch a raider means a reduction in convoy resource points. The dilemma as to where the fleet needed to be and in what strength was a constant decision for the British. It goes without saying that a strong navy is virtually a pre-requisite for any type of invasion. One can take some risks with small raids, but trying to force a major invasion with sea inferiority can be catastrophic. All in all, the war at sea is a simple, yet realistic portrayal of the importance of the sea battles to the ground campaign.

Let's take a look at an historic encounter and see what the statistical probabilities are in COS. Take the Hood and Prince of Wales versus Bismarck. In COS, the Bismarck has about an 8% chance of achieving something near the historical result, assuming the British disengage after the Hood is sunk. The chance of the Bismarck taking down both the Prince of Whales and the Hood is less than 1%. Of course, once the rest of the British fleet arrives, the historical outcome is a virtual done deal. These look like pretty

reasonable percentages to me. A similar analysis using some of the British/Italian actions in the Med would yield percentages which appear to conform to expectations.

Action Points

Action point simply represents how many things a unit can do in a turn. Each hex traveled takes at least one action point and sometime more than one. Each attack also takes an action point. The more dynamic units (i.e. tank units) and mobile infantry have higher action points and the larger units (army and army groups) have lower action points. When the weather is good, the AP are high. In winter, and especially muddy conditions, the APs get low. In fact, in the mud in the mountains, army groups can get downright stuck! Try moving an army's supplies across a mountain range during the rainy season. That's a nice touch to COS. Unlike most games where you can move "at least" one hex per turn, in COS if you don't have the action points, you don't make the move. Suffice it to say that bad weather can bring a fast moving army to a slow crawl. Again, this is a good model of reality. Given that the distance from the supply base is measured taking terrain into account, bad weather can cause supply problems. It is very difficult to supply units far away over muddy roads.

Troop Quality (Efficiency)

COS enables the modeling of troop quality by simply adjusting the efficiency factor. A low efficiency reflects a low quality troop and a high efficiency represents high quality troops. The game reflects the capability of the weapons or the size of the unit by the strength number.

One part I like about the game is the way the differences are modeled between the Russian and the German armies. Piece by piece, particularly with respect to armor and army groups, the German army outclasses the Russian army throughout the war. This is true in terms of strength, quality, and mobility. However, there are lots of Russians. By the time 1943 rolls around, the Russians have a mass of infantry in a continuos front across Russia, backed by a few elite armored units and shock troops. The Germans can gain superiority in any sector they desire, but the Russians simply attack along the entire front. Even better, the Russians just cram units through any holes in the German line and drive unrelentlessly toward Berlin irregardless of the danger of counter attack. The objective is to create breakthroughs faster than the German armor can plug them. True, the Russians will take a beating, but the mass of men and material available from 1943 on can easily be replaced. The end result is the Germans have trouble maintaining a continuous front. The Germans may counter attack and throw back the Russians in one sector only to find themselves outflanked in two other areas. One finds themselves creating mobile reserves to quickly attack and cutoff Russian penetrations; this was the recommended strategy for the German army in 1943 and onwards. However, once the red juggernaut gets rolling, its hard to stop. At times it must slow down and consolidate (i.e. infantry and army groups move slow), but it tends to roll steadily forward, a splendid model of historical events.

Ground Combat

During combat a unit can take strength loses (men, material, etc.) or it can take morale loses (morale and cohesiveness), or both. In all cases, loses in strength and morale reduce the effectiveness of the unit. During some combat results a unit is dissolved. Dissolved doesn't mean all the men and equipment are destroyed. It only means that the units is no longer an effective fighting force. The men and equipment retreat and regroup, and get re-equipped. The player doesn't see all this. All the player sees is the unit disappear off the map. However, next turn, the player is allowed to re-purchase this unit at 40% cost. This may seem somewhat trite. Yet, it is a good model. Typically a units is considered to become ineffective once it loses about 30 to 40% of its force. The 40% cost to refit the unit represents the cost of putting the 40% of men and equipment back into the unit. Basically, when the unit dissolved, it was assumed to lose about 40% of its units. The unit retreats, reforms, gets refitted (i.e. the 40%), and is back ready to go in about 2 months.

There is one major exception to the 40% rule. If the unit is dissolved without being able to trace a supply route back to a home city (within a valid supply partition) or supplied port, it is "eliminated". The

elimination occurs because the men and equipment have no where to retreat because all routes (i.e. avenues of retreat represented by supply routes) are cutoff. In essence, the men must surrender! Now the unit must be reconstituted from scratch. This requires brand new equipment and men. This takes time. Thus, a unit which is eliminated cannot be built until one year later at full cost. The ability to cutoff and destroy units is a very important aspect to the game, especially on the Russian front. Dissolved units can reappear to form a defense deeper into Russia. Eliminated units are gone for at least a year! The reverse is also true. If the Russians can isolate and destroy a German army group, it can unhinge an entire offensive (remember Stalingrad?). Not only is the army group lost, but the supply base represented by the army group is gone too. Hence the supply, morale, and effective strength of all units supported by the army group are reduced as well.

From a strategic point of view, the ability to surround and destroy units is a critical aspect of COS. This strategic objective is more easily achieved when the player pays close attention to "where the front is". Figure 6 shows a situation at the beginning of the German player's turn. The German Manstein army group, supported by the German 9th and 11th armies, 7th Corp, and offensive air power (off map), is preparing an all out offensive against the Zhukov army group, including the Russian 2nd, 4th, and 8th Corps. If the German player does not pay attention to where the front really is, then the player may overlook a golden opportunity. If the Manstein army group and supporting units attack the Zhukov army group and supporting units, Manstein will most likely knock out most of the Russian units. However, as the units break (dissolve), the men and material have an escape route. The German victory will be short lived as the Zhukov army group and supporting units will refit and reform further east.
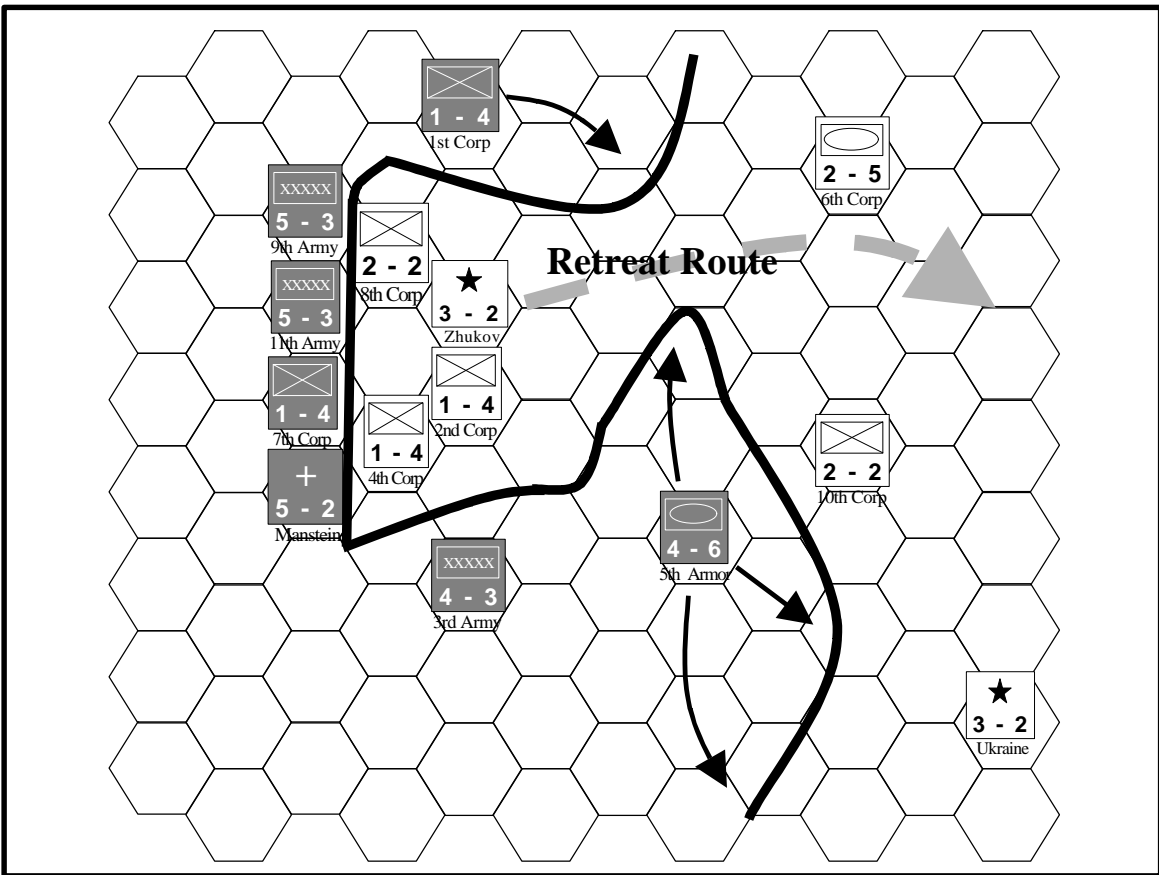

Figure 6: Zhukov and Supporting Units can Escape if Defeated

A savvy player will notice that elements of the German 5th armored division and 1st infantry Corp have almost closed the retreat route for the Zhukov army group. The divisions of the Russian 6th armored Corp and some divisions from the Zhukov army group are keeping a narrow supply and escape route open. The grand strategist will immediately focus on the bottleneck. Can this neck be closed before the main attack begins? Yes. The grand strategist directs the 5th armored Corp to close the retreat route. This is shown in Figure 7. Now it's time for Manstein's army group to attack.. The simple move of the 5th armored Corp makes sure that none of the Russian units can retreat when Manstein attacks.
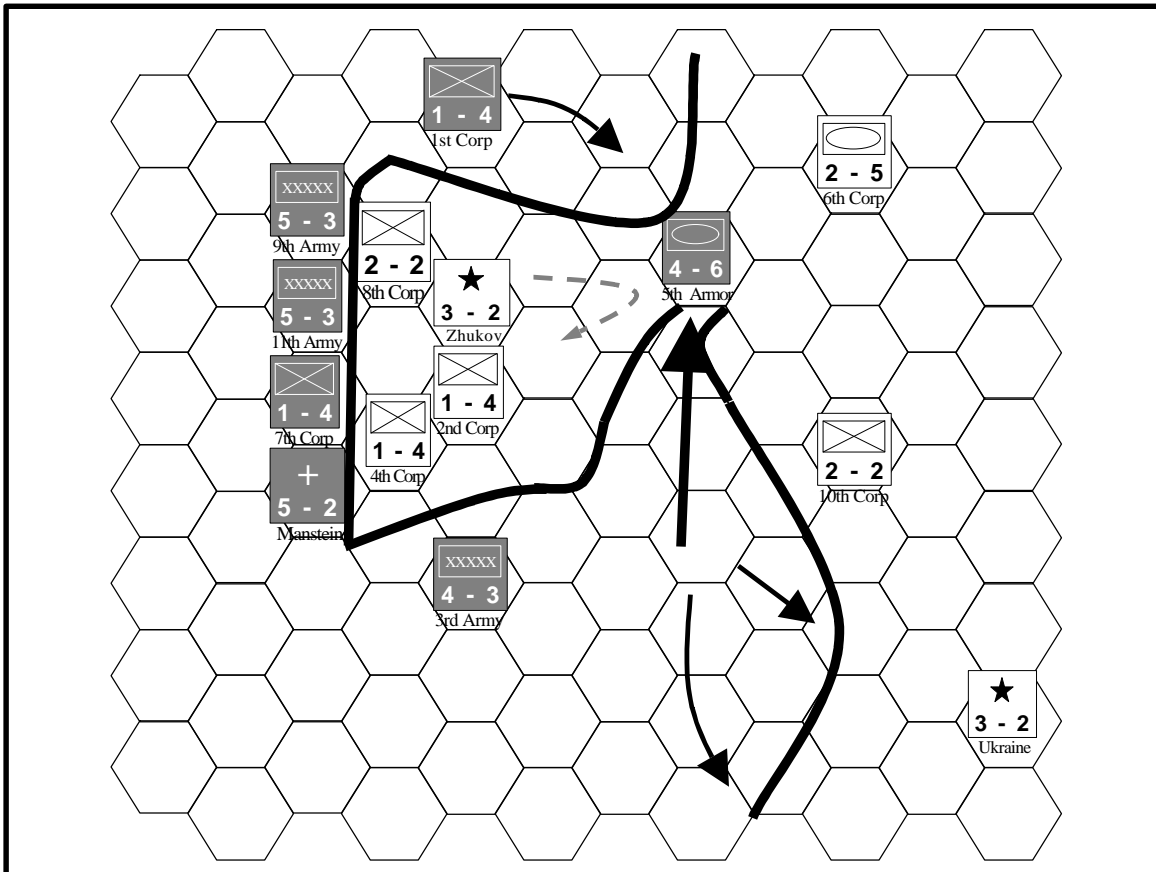

Figure 7: The German 5th Armored Closes the Gap Before Manstein Attacks

The big rule of thumb in COS is don't let your troops get surrounded and eliminated. And from the other perspective, look for opportunities to cutoff and eliminate enemy units.

Weather

I already touched on weather during the Action Point discussion. Here's some additional features. First, weather is computed for four different regions. A region can be clear, muddy, or frozen. Clear weather is typically needed for a good offensive. Muddy and Frozen conditions hamper the attack and favor the defender. Air units also perform poorly in bad weather. All of these feature are realistic and require the player to compensate for them. In general, mobile warfare tends to be fast and furious in the clear weather of spring and summer and tends to get bogged down in the mud and snow of autumn and winter. Offensives are possible during bad weather, but the gains are usually very small. Players usually use this time to consolidate and prepare for the spring/summer offensive (or defense), which is another realistic quality to the game.

Supply

The concept of supply has already been covered under other topics. However, the way COS models supply is such a wonderful combination of both simplicity and realism it deserves some additional comment. All ground and air units (and indirectly even ships) rely on supply. In its most basic sense, supply represents the beans and bullets of war. Without it, a unit quickly deteriorates in combat capability until the unit is virtually useless until a supply line is re-opened.

Where does supply come from? COS models supply as coming from one's home country. Specifically this is modeled by requiring a line of hexes (free from enemy influence) be traced from at least one home city either directly to a unit, to an army group, or to an occupied city in enemy territory. Getting supply to a unit deep in enemy territory straight from the homeland is very inefficient. The railroads and trucks can go to each unit, but the supply drops to nothing after about 10 hexes. A better way to get supply is via distribution centers. Such centers tend to congregate at rail heads. Rail heads tend to congregate around cities. Hence, when a unit traces supply to a friendly occupied city in enemy territory it isn't really getting supply from the occupied city, it is actually getting supply from its home base which is using the enemy rail heads at the occupied city. Yet, even this is inefficient. What is really needed is the logistical and bureaucratic support of a dedicated supply base. This is represented by the army group. In practice, a unit traces supply to an army group, the army group gets it from a rail head, and the rail head gets it from the home country. This is pretty transparent to the player, and the rules only give the "rules" needed to stay in supply. For example, the rules say "a city is referred to as isolated if it is not in a partition with at least two other cities and one of those cities is in one of the player's home countries". The rules also show that an isolated city in enemy territory provides no supply. The rules only show the simple mechanics of play. However, if you examine the rules with a little thought, the railroad concept described above is what the game actually models.

Occasionally an enemy city may become isolated from home (i.e. the rail lines get interdicted by enemy troops). When this happens a unit can no longer get supply from the rail head. What's neat is an army group can still support units with a reduced amount of supply even when a city, army group, and unit are isolated. This represents the stockpiling of supplies by the army group. COS models it by just reducing the supply factor of the army group. Changing one number associated with an army group (i.e. the army group's supply number), automatically reflects the reduced supply for all units drawing supply from the army group. It's a nice, simple, and neat approach. One particular point of importance is that an isolated supply depot (army group) is not sufficient to prevent elimination (i.e. capture) if a unit is dissolved while unable to trace a "retreating" supply route. Hence, an isolated army group can provide supplies to keep a unit fighting, but cannot provide an escape route for a dissolved unit. This too is a realistic piece of modeling.

Now, when in one's home country, isolated cities still provide some supplies to the surrounding troops. This represents the efforts of the friendly civilians and also the fact that one's home cities naturally supply the beans and bullets of war. Some of the major cities, such as London, Berlin, and Moscow are never considered isolated in the supply sense. This represents the large industrial aspects in and around these cities and the ability to better support and supply troops. However, if encircled and isolated (in the communications sense), any unit defending in these cities, which become dissolved, will be eliminated (go into captivity). In other words, the city is treated like two cities for supplying the troops, but is treated as one city when computing retreat routes. This makes a lot of sense.

As noted previously, cities and the units in them provide "influence". This makes an enemy occupied city behind friendly lines very dangerous. The player is forced to either capture the city, or screen it. If the player screens it, the player must be careful and not let the screening units become too depleted. This can happen when the supply depot in the name of the army group moves forward with the advance. If the enemy unit breaks the siege, it can play havoc on the ever important supply paths. This is a nice realistic touch. Numerous times during the war the leaders decided to bypass a city in order to maintain the momentum of the advance. In many cases, the by-passed city proved the proverbial thorn in the back, such as Tobruk in Africa, Leningrad in Russia, and Bastogne during the battle of the bulge. In Russia, one is faced with bypassing Sevastopal or attacking it. An attack depletes units moving east as they must be

diverted to the Crimea. If you screen, it may come back to bite you. If you attack, you may blunt your advance. You're faced with the same dilemma as the leaders of the day. And lets not forget Stalingrad. Remember, Stalingrad could have been taken relatively easy during the first part of the 42 offensive, but was bypassed in order to maintain the momentum into the Caucasus.

Another factor is sea supply. COS models this nicely as well. Units across the sea can be supplied via a friendly port if the port is in sea supply (i.e. has a friendly ship present). It also shows how important ports are to an army in hostile territory. This is very important in Africa as well as on the beaches of Normandy. Until a port is captured, the army is very vulnerable. The supplies landed during an invasion only hold out for two turns. If a port isn't secured by then, the entire invasion is in jeopardy. Even if a port is secured, one still must keep it supplied from the sea. This creates some interesting situations. Games have occurred where the Germans are able to slip some units past the Royal Navy into Britain (this can happen when the Brits are busy guarding all the other sea lanes). However, once alerted, the Royal navy shows en mass in the North sea. Even if the Germans capture London or Liverpool, they still must get supplies to Britain. I've seen the Germans invade Britain, capture a port, and then lose their entire navy trying to run supply convoys past the British. The British get the upper hand, and eliminate out-of-supply weakened German forces in Britain. The invasion, which was an initial success, ended with the best German units captured (i.e. eliminated) and the German fleet destroyed.

Railroads

The term "railroad" is not mentioned anywhere in COS. The player doesn't have to fool with them; they are not on the map and they are not mentioned in the rules. However, the impact of railroads is subtly modeled in the game. I've already hinted at railroads in the discussion on supply. Railroads also play a role in terms of movement. There is a simple little feature the game provides called "reserve" movement. The "reserve" movement allows the player to place a unit in reserve status and then immediately place the unit next to a city in the same supply partition. Actually, the term immediate is somewhat of a misnomer as each turn is two months. What's really happening is the player is loading the unit up on trains and transporting it to its destination. The player is limited in reserve points, reflecting the limited amount of rail transportation. The unit must also have a certain morale level and be supplied to a certain level. This reflects the fact that the unit must be organized and supplied enough to get to the train in the first place. The rules say the destination must be in the same "supply partition". This is a fancy way of saying the player has to be able to connect starting and ending locations with a rail line. You can't jump across oceans, violate neutral boundaries, or travel over enemy controlled hexes. Also note the ending location has to be adjacent to a city. In other words, the unit has to get dumped at the rail head. Pretty neat. Furthermore, the unit loses cohesiveness (takes a morale hit) when arriving at its destination. The army which had a "10" combat strength before reserve movement might be a mere 4 when dumped out of reserves (i.e. off the train). This reflects the fact a unit cannot simply drop off the train and be ready to fight. It also discourages dumping units too close to the front, lest the enemy attack before the unit gets mobilized.

Mechanized Infantry

Contrary to much of what we see on TV, at the beginning of WWII the large majority of troops, soldiers, and equipment were transported by foot or horse. The ideals of a fully mechanized army took a number of years to come about and only the US and Britain reached that goal by the end of the war. As for Germany, it was never fully mechanized. What we see on TV is a small percentage of units which were mechanized. For example, a typical German infantry division had 6000 horses. At the beginning of the Barbarossa invasion of Russia in 1941 Germany used three quarters of a million horses. All in all, the armies of the day were not as mechanized as many would be lead to believe today. True, there were some dedicated mechanized units, but they were almost always in the minority.

COS does a nice job of modeling the facts of the time. Virtually all US infantry armies and corps have action points of 4. Some of the British have 4 while others have 2. Most Russian army units have 2 action points early in the game, but increase to 3 action points (American lend lease trucks?) later in the conflict. They also have some elite units with AP of 4 and 5. German infantry army units have 3 action points, while most corps have 4. All of these number map very nicely into what we know about the mechanized

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nature of the armies. The US is the most mechanized and has the most mobility. British are next, followed by Germany and then Russia (Russia reaches parity with Germany around 1943).

By the way, there is a significant difference between an action point of 3 and an action point of 4. This is because it takes two action points to move through a zone of control of an enemy unit. A unit with 4 APs can move two hexes past an enemy while a unit with only 2 or 3 action points can move only one hex. This represents a significant advantage related to the mobility of American army units and plays a crucial role in the advance across France after the Normandy invasion.

Most of the time the mechanized nature of each unit is intrinsic to the unit (i.e. action points). However, COS provides the grand strategist the ability to pool these resources to support the critical thrust. COS calls it "operational movement". Each turn, the player is allowed to move one (and only one) army or Corp (not an army group unit) up to 10 hexes. The hexes must be connected and controlled (i.e. you must control the roads). This models the pooling of transportation resources to achieve the rapid movement of a very large body of troops. However, it takes the 4 Star General (you) to make it happen.

Conquering Countries and Victory Points

I've always been a bit upset over games that focus on "capture the capital". Does anyone seriously believe Britain or Russia would completely capitulate if their capital fell into enemy hands? Not likely. In fact, history shows that the fall of Paris did not spell the end of France. In COS, the fall of a capital can hurt, but it is not necessarily the end of the war. British units can continue to fight in England (or Egypt), Russian units continue to fight in Russia. And yes, German units continue the fight even if Berlin gets captured. In most cases a number of critical cities must be captured before a country capitulates. Britain stays with it until London, Liverpool, and Alexandria all fall. Russia hangs on for a while even after Leningrad, Moscow, and Stalingrad fall. The act of capturing cities in and of itself is not the prime driver for success. Rather, it's the erosion of resources that eventually leads to capitulation. In short, most countries are conquered because their economies are shattered and they simply cannot wage war anymore. This is as it should be, and COS does the best job of any WWII game I've ever played in highlighting this fact.

I'd like to take a moment to talk about victory points (VPs), either from capturing a victory hex or destroying enemy units. VPs have been used in wargames for quite some time. Usually they are used in order to emphasize the importance of a place on the map, or the value of a particular unit. The reason VPs are needed is the map and units themselves do not accurately portray intrinsic importance. Thus, VPs are used to abstractly establish the importance of a particular place or unit. Having said all this about VPs, it's refreshing that COS doesn't have any! Players are not driven by the need to acquire VPs, but are driven by the same needs and desires that existed in the historical sense. The Germans don't drive into the Caucasus to capture VP hexes. Rather, a drive into the Caucuses is motivated based on the economics of the region. The need to destroy the opposing army is based on the need to win the war, not establish a VP record. When conducting amphibious invasions, there are no victory points allocated to the capture of a particular port city. Instead, the player is driven to capture a port in order to supply the army. The capture of cities don't create VPs, they serve as rail heads for supplying the army. Ships are not placed in the sea lanes to gain VPs, but are needed to secure the communications and supply routes for the ground forces and to protect convoys. COS does not need VPs in order to artificially drive events along historical lines. Instead, COS players develop strategies based on the needs and desires similar to their historical counterparts. This is very good design feature of COS.

Economies

COS does a good job at modeling the emphasis on resources and the decisions necessary to maintain or defend vital strategic interests. Each city in COS provides one resource points. There are also "industrial zones" which supply two resource points, and convoys which supply varied resource points. The industrial zones are properly placed on the map, such as in the Ruhr valley for Germany, and in the south east of Russia. The economics are simple: If you control the city or industrial resource, you get the resources. We will look at Britain, Russian, and German economies and see how the economic side factors into the game.

Great Britain

Great Britain is very reliant upon its colonies. The home isles only produce 3 resource points! Three additional resource points are obtained due to ownership of Gibraltar, Malta, and Alexandria. Of course, the resources obtained from ownership of Gibraltar and Malta are not derived from those locations, but represents the value of those locations in ensuring resources make it to the home isles. Convoys account for 9 more resource points, from Asia and Canada (I'm sure the Canada resources also represent some level of US aid as well). Thus, when Britain stands alone, it has only 15 resource points per turn, and 12 of these resources come from overseas!

The ability to keep the resources coming in depend on two strategic factors; the British Fleet and the defense of Northern Africa and Gibraltar. The ability to receive the Asia convoy resources requires the British fleet to maintain a Mediterranean presence. Without the fleet protecting the "line of communications", these convoy points quickly succumb to Axis raiders. The fleet must also protect the convoy from Canada, as well as defend the isles from possible invasion. The British fleet is indeed a mighty force, yet it must be split between three different missions. Thus, it gets spread pretty thin. As the U-boats and German surface raiders roll out of the docks and the Italian navy enters the fray, things can get very difficult. This leads to the British desire to quickly crush any German surface raiders, U-boats, and the Italian Navy. The ability to neutralize any one of these threats makes the British lifeline much easier to guard. In fact, COS even models the ability to "split" the Royal Navy into separate hunter fleets within the same sea zone in order to increase the ability to find raiders and subs. This is another touch of realism as such "splitting" of groups occurred for both the chase against Graf Spee and the chase against Bismarck. Of course, splitting the fleet makes it more vulnerable as it makes the odds better for the Axis. Look what happened to Hood and Prince of Wales against Bismarck.

The British want to force a major engagement, but it is desirable for the Axis to keep the "fleet in being" until favorable odds can be achieved. The game models the ability of the Axis player to place single ships in "raider" mode. Ships in raider mode attempt to hide from the searching fleet while seeking to attack convoys. Of course, if found by the British fleet, it is usually one against many, with typical results. Both of these strategic decisions are drivers in Clash of Steel. Most importantly, they are not artificial requirements placed on the players. Rather, they correctly reflect the real reasons behind the strategy: The British must protect their sea lanes and the Axis needs to disrupt them. In fact, in real life the British were so concerned about the Italian navy that they launched the first pearl harbor like attack against the Italian battleships in Taranto. It was a great success and became a case study for the Japanese a year later. Well, COS doesn't let you do a raid like that, but it does put you in the same mind set as the leaders of the day, both Axis and Allied.

The nice play value here is the computer handles most of the bookkeeping. The player decides which sea zones to protect, how many ships should go in each zone, and the disposition of the ships in those zones. The computer "rolls the dice" to determine when the British spot a raider or when a raider takes a few points out of a convoy. If a raider is spotted, an engagement screen appears for the player. After the first round of combat, additional ships and aircraft can enter the fray and players have the option to try escape. Thus, once engagements occur, the player has some tactical control over the result.

Russia and Resources

The Russian resources are derived from five areas: Six points derive from cities located west of a line running from Leningrad in the north to Odessa in the south; I'll call this the Western District. Four more come from cities, including Moscow, located to the north and east; I'll call this the North East District. Five are derived from industrial centers located in and north of the Crimea; I'll call this the Ukrainian Industrial District. Six are derived from cities south of Moscow and North of the Caucasus; this district will be called the Eastern District. The Eastern District is also the focus point of supplies from the Urals, maintained at Saratov; I'll call this the Urals Support. Eleven points are obtained from cities and resource centers located in the Caucasus; I'll call this the Caucasus. If we remember, as the Germans closed on Moscow, the Russians uprooted a lot of the factories and relocated them to the east. The game map appears to model this feat by focusing most of the industry in the Eastern District and Urals Support.

When all is laid out, the Russians have a whopping 40 resource points. Compare this with the German total of 26 after taking France! Even if you throw all the Axis countries and occupied territories into the German mix, the full production might of the Axis barely matches the "potential" industrial strength of mother Russia alone (i.e. not counting the English and Americans)!!. I say "potential" industrial strength because until Russia is at war, or prepares for war, her industrial output is cut by 75% (Marxism wasn't working too well). On the other hand, once geared for war, Russian industry tends to be even more efficient than Germany. Thus, when efficiency is taken into account, Russia has a significant industrial advantage over Germany once Russia is geared for war.

COS does a good job at showing how the German invasion of Russia slowly saps Russian industrial strength and bolsters German strength. In most invasions, the Germans can take what I earlier referred to as the Western District. That's six points from Russia and six points to Germany. Players can take most of the Ukrainian Industrial District, netting another five. Realistically, either Leningrad in the north or Sevastopal in the south can hold out during the first part of the German offensive. Assuming one does hold, the totals at the end of the first invasion year are about Germany 45 and Russia 30. As mentioned previously, Russia is more efficient in production than Germany (historically Russia did more with less and the game models this with a 20% Russian efficiency advantage over Germany), so the adjusted numbers come out to be about 45 vs 36. Considering that Germany must apply some resources to keep the British at bay, the Russian front is pretty neutral at this point. Everything now hinges on the 1942 offensive. If the Germans can take either the Eastern District (14 points including cutting the Urals support) or the Caucasus (11 points), the numbers go to something like Germany 58 and Russia about 20 or so (after production adjustments) This is a sufficient margin to win outright. However, anything in-between can spell stalemate. A stalemate which becomes threatening to Germany as the Allies build up for the invasion of France.

Historically, the true turning point on the eastern front is still difficult to pinpoint. Some identify Stalingrad as the turning point. Others say it was a year earlier at the gates of Moscow. Still others argue it was in the battles after Stalingrad, such as Kursk. Certainly at the time it was happening, one could not identify the turning point. COS nicely portrays this "unknown". During the height of battle in the east, there is a big "gray" area during which one is not sure if they are winning or losing. This is true both on the Russian and German side. Even at the conclusion of the game, regardless of the victor, it is often still difficult to determine where the "turning point" occurred.

The nice thing about the resource centers and cities is the capture of any one is not a deciding factor in the War. The capture of Moscow may be a great feat for the German Army, but in terms of industrial production, only reduces the Russian output by one resource point. The same is true for Leningrad. Many war games have the entire country surrender once the capital falls. As stated before, I've always thought this to be overly simplistic and very unrealistic, placing way too much emphasis and value on one city. The true value of the cities like Moscow and Leningrad was more in terms of lines of communications, such as railheads, and defensive positions. Loss of either or both can mess up the Russian defensive position, not to mention the loss of a few resource points. On the flip side, the survival of bastions like Leningrad can put a damper on German offensives as troops must be devoted to siege duty. In any case, Russia can recover from such a loss and remain a significant threat to the German army. If the computer is playing the Germans against a human Russian opponent, the fall of Moscow can cause an efficiency drop in Russian units (i.e. the fall of Stalin's power base causes a drop in Russian efficiency). Thus, when playing against the computer, Moscow takes on slightly more significance than normal.

It is clear now from most historical accounts that Russia was the foremost reason leading to the defeat of the German army. COS does a really good job at modeling both the Russian economy and the shear mass of the Russian army. As Germany advances into Russia, the Russian economy is hurt. COS models the fine line between German victory in 1941/42 and Russian victory in 1945. If the Germans achieve historical gains, Russia will survive and eventually defeat Germany. In this case, the Allies may be a deciding factor in winning the game, but will probably not be a deciding factor in winning the war. If the Germans do somewhat better than history (i.e. take the majority of the Eastern District or Caucasus), then a stalemate and attrition battle may result. In this case, Germany will probably win the game and the Allies

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in the west will be the deciding factor in winning the war. If the Germans significantly exceed the historical result, Russia may collapse. In this case, Germany will win the game and will most likely hold off the Allies in the west as well. The line between the three results is often in question during the battles in 1941/42, and is determined completely within the confines of the existing game model. That is, there are no artificial rules which are applied to the game to achieve a particular result. The model provides the stage and the player's moves and battles decide the result. All in all, COS does an excellent job at portraying the anxiety and uncertainty of the time.

Germany

In the beginning of the game, Germany (including Czechoslovakia which is already absorbed into Germany) only has 16 resource points. Eight from cities (including Helsinki which starts aligned with the Axis), six from resource centers (four points from the Ruhr and two from Romania) and two from convoys (from Sweden). Note that Romania, although not allied with Germany, provides its resource center points to Germany. This is consistent with historical accounts. It also opens a political aspect of the game as the allied player, via the political model, can apply diplomatic pressure to Romania. If successful, Romania will stop supplying Germany with the resource points. Germany can then turn around and apply pressure of their own. These actions are kind of minor, but COS does provide the model to try these things.

Compare Germany's 16 resources with the Allied 26 and the Russian 40 (after taking Riga). Suffice to say, the Germany industry is severely outmatched on the eve of September 1939. The quick Blitz through Poland yields 3 resource points (a swing of 6 since it drops from the allied total and enters the German total). Following Poland, Germany must make quick work of the Low countries and France. This nets about 9 more resources. So following the fall of France, Germany has about 30 resource points and the Allies are down to about 15. If Britain loses its convoys, its down to only 6. This gives a good picture of the foe Britain was up against in late 1940, as well as the drastic turn of economies caused by the fall of France. It's not a pretty sight for the Allies. However, that big British navy is often too tough a nut to crack. In most cases its just too difficult to get the big army across the channel where the industrial might of Germany can make good. COS lets you do it though. I've been successful before, but I've also seen the Royal Navy show in mass and following the slugging match, watched the Wermacht's finest fall to the bottom of the cold North Sea. Usually Germany must try to strangle Britain and maybe hope German air and subs can wither down the British navy. In the meantime, what to do with this big army and strong industry? Russia's 40 resource points look awful attractive. Even more so considering it won't take long before Russia turns that industry into a big war machine. A quick German strike at Russia will eliminate the Russian threat while gaining even more resource points (lebensraum) for Germany. It's a natural strategy, and COS makes it attractive for many of the same reasons faced by Germany. Of course, if the German player wishes, he can go after Britain's Mediterranean assets. The fall of Gibraltar and Alexandria will put Britain in a tough bind too. However, this takes time, and the Russian bear is looming in the East. Furthermore, while such attacks will weaken England and help secure a more sound strategic defense in the west, from an industrial standpoint, Germany gains very little. On the other hand, Russia is rich in resource and weak in troops in the early stages of the war. A quick strike will serve two purposes: Eliminate the Russian threat and provide much needed industrial resources.

The Industrial Modifier

Each country is assessed an industrial modifier for each year of the war. This modifier reflects how well a country is able to use its production points to manufacturer the tools of war. The modifiers steadily increase over the years reflecting the mobilization of industry to support the war. Interestingly, the German modifier doesn't increase as quickly as the Russian and U.S. modifiers. This is a nice model since historians have noted that Germany had problems gearing up for mass production assembly lines. It wasn't until Albert Speer took over before production picked up again in 1944. Of course, by then, it was too little too late. For the middle years of the war, U.S. and Russian production is simply more efficient than German production. British production is somewhat hampered, reflecting the stress the economy was under in the early years of the war. By the end of the War, German, Russian, and British multipliers even

out. In 1944 and 1945, the U.S multiplier blows everyone else away. This nicely models the rapid rise of US industrial might.

<u>Production</u>

Production requires long range planning in COS. One cannot simply build a new unit and place it on the map next turn. Instead, one must allocate resources, and then wait. Small Corp units can be assembles in about 4 to 6 months. Army groups can take close to a year. Capital ships take over a year. Basically, the production decision one makes today will determine the strategy options available to a player over a year away. Do you apply resources to building ships, ground forces, subs, aircraft, research, etc? These are all decisions for the player and they closely approximate the decisions faced by the leaders in WWII. This production technique also provides an "intelligence" aspect to the game. A good player will closely scrutinize the production priorities of the enemy. A close look at an enemy's production and research queue will often foretell the future strategic options available to one's adversary.

Strategic Bombing

COS give the player the option to try strategic bombing. The player must expend resource points to buy bombers and then must decide what strategic targets to focus on. There are three strategic targets: harbors, industry, and oil. Harbors are a good option against the British early in the war if the Germans want to try a naval assault on Britain. Either industry or oil is a good target for the Allies. In fact, historically, the Allies couldn't decide which one to go after and vacillated between industry and oil. The game models the effectiveness of this strategy simply but nicely. Industry hits increase the production costs for units. Oil hits slowly reduce the action points allocated to enemy units.

Research

COS provides the player the option to concentrate on certain avenues of research. Some deal with offensive and defensive ground capabilities, some deal with anti-sub warfare, and others deal with the air campaign (i.e. jet development). These research efforts map directly into the strategic battle. If your tanks are better than the enemy, then your troops tend to fair better in battle. The player's job is simply to set priorities for research and the computer "rolls the dice" and lets you know if you've made any breakthroughs. During most of the game, the research runs in the background and takes very little time from the player. This keeps the focus on the ground war where it belongs.

When research break-throughs are made, the player is given the opportunity to upgrade their units. The upgrade can cost quite a bit of resource points, but is usually worth it. Upgraded units gain increased combat capability. This enables even outnumbered units to defend (or attack) quite effectively against a superior "number" of less capable units. These research features model the continual balance between offense and defense during the war. A superior or equal research capability is a virtual must have when on the offensive. This is particular true if the enemy's anti-tank capability increases faster than your new tank research. One can find their panzer army strength "halved" during some battles. Basically, if you're on the offensive and the enemy has the upper edge in technology, the attack can become too costly and the front can stagnate into a trench warfare type situation. This is particularly true in the mountain regions of Italy or Spain. It can also happen on the eastern front if the Germans don't attack Russia and Romania stays out of the war, lessening the frontage. I've seen the Germans forgo an attack on Russia in 1941 while beefing up technical research. When the outnumbered German army was on the receiving end of a Russian attack in late 1942, the technical advantage was too great for the Russian numerical strength to overcome. Two years later, the Russians had made some advances, but were still east of Warsaw. The Germans, while outnumbered, had gained enough of a research advantage to stalemate the eastern front. Interestingly, in this stalemate situation it was the Russians, not the Allies, conducting the massive strategic bombing campaign.

While most research activities help the ground units, there are a few that affect some of the peripheral actions. Two such areas involve U-boat antisubmarine warfare (ASW) and another involves rocket development. These two will be discussed below:

The U-boat War ASW

COS provides a good backdrop for the changing fortune of sub warfare. Historically, the subs started slow in 1940, picked up steam in 1941/42, and then were quickly depleted once Allied anti-submarine warfare (ASW) techniques and technology were applied in 1943. In COS, the Germans begin with one sub unit (a slow start). Three more can be built in rapid succession. When deployed, these four units can do a really good number on the British convoys. Finding the subs can be difficult at first, but COS models ASW research capability. If British intelligence identifies subs in the German production cycle, it's often a good idea to devote more resources to the ASW research effort. Once the ASW advances are made, the subs are easier to find and destroy. Note that COS doesn't artificially make this happen. The Germans must decide to build the subs and the British must focus on ASW research in order to lessen the effects. Amidst it all, there is still a touch of fate (and chance). However, the player helps control how the fate and chance evolves. For example, given the default research mode for ASW, the Allies have a 3%, 15%, 31%, and 46% cumulative probability of achieving an ASW breakthrough by mid 1940, 41, 42, and 43 respectively. In this case, the Allies have a less then 50% chance of getting ASW rolling according to historical accounts. If the Allies rearrange research priorities toward ASW, those percentages change to 10%, 42%, 68%, and 83%. This is probably more in line with historical achievements. And, if the Allies want to spend some precious resource points on research, they can tip the scales to 18%, 62%, 86%, and 95%. This can easily spell the doom to the subs even prior to historical accounts.

Subs can still be found and sunk without advances in ASW. Before the ASW advance, a fleet has about a 10% chance of engaging the subs each turn. Once engaged, the fleet still has to sink the sub, which is not always a done deal. The ability to engage subs goes up to 28% after the ASW advances. It goes up to close to 50% after the ASW breakthrough if the British fleet is divided into separate fleets in each sea zone. All together, it's a nice grand strategy model of the U-boat war.

Now, heavy ASW research is not without cost. Those efforts focused on ASW could be better focused on research areas that upgrade the ground units. It's sort of a trade off. Do you focus on upgrading the quality of the ground forces and sacrifice convoy resource points, or do you try to protect the convoys and sacrifice on ground upgrades? It's your choice.

Rockets

The V-1 and V-2 (grand dad of the Scud) missiles first debuted in WWII. COS lets the player research these systems in an attempt to significantly increase the long range striking power of either the Allies or Axis bomber fleets. The rocket breakthrough triples bomber damage. Of course, this doesn't mean the bombers are three times more effective. COS simply uses the bomber metric to assess the impact of the rocket technology.

Historically, the German rocket program was deemed a failure from a cost/benefit standpoint. Most historians agree that much of the resources expended on the rockets probably could have reaped better benefits if expended in other areas. COS models this quite nicely. If only a moderate research attempt is made, Germany only has an 8% chance to get rockets in mid 1943 and only a 19% chance by mid 1944. Any time after this and it probably doesn't matter (even 1944 may be too late). If a dedicated research attempt is made in this area, the numbers go to 27% in mid 1943 and 50% in mid 1944. As in the historical case, a player can expend many research points on rockets and fail to reap the expected benefits. In both cases, it appears the resources are probably better spent somewhere else. A rare exception is when some lucky breakthroughs occur early in the war. If you get lucky early on, it might pay to pump additional research into rocket development. Even then you may come up short. In almost all cases, dedicated rocket research is not an effective use of research dollars. However, it's all up to you.

Politics

COS allows one to meddle in some of the political intrigue of the day. Like the other peripheral aspects of COS, this political model provides the player with the ability to convince other countries to ally with your cause. There are many neutrals at the start of WWII. Norway, Sweden, Hungary, Romania, Bulgaria, Greece, Yugoslavia, Spain, Morocco, Persia, and a few others. Italy enters automatically on the German side as soon as Germany is on the verge of taking France. The game even factors in the Balkan Pact. The political game is quite simple, but has far reaching consequences. Each country has a pre-disposition of alignment with either the Allies or the Axis. However, this is not enough to cause the country to declare allegiance. Each player can "press" a country into joining the cause. This simulates negotiations and even political pressure. Sometimes it works and sometimes it doesn't. It can even backfire. The success is based, among other things, on prestige points which are awarded when a player conquers a country (sound familiar Panzer General fans?). There are also political events which increase the likelihood of certain things happening. For example, as Germany declares war on more and more states, the chance of US intervention increases. The game plays great without even delving into the political scene. However, it's there if one wishes to try their hand at global politics during WWII.

Grand Strategy

Perhaps one of the greatest challenges for a grand strategy game like COS is to accurately model the "what if" scenarios. What I feel is one of the pinnacle achievements of COS is its ability to allow the players to do just about anything without restrictions. And, having deviated from history, sometimes significantly, the outcome one achieves is very reasonable.

France can attack Germany in 1939 if they wish. Germany can forgo an attack on Russia and keep after Britain. Russia can attack Turkey. The Allies can re-enter Europe from virtually any point (i.e. Persia, Greece, Turkey, Albania, Yugoslavia, Italy, France, Norway, Spain, and even directly into Germany). The result obtained is usually within the realm of reason.

There are no "guaranteed" victories in COS. The player is given pretty much the same tools as history and placed in a position to wield the tools in an open ended manner. Of course, the game does model the natural restrictions experienced by the adversaries of the day. If Germany wants to invade Britain, a fleet must be built. If a player wishes to place units in a neutral country, they must persuade the neutral to join the cause. Having failed in the persuasion, they must either declare war on the country or give up the ability to place units in the country. We must remember that in real life, Britain barely missed being labeled the aggressor in Norway in 1940, British forces engaged French forces in Madagascar and US/British forces engaged Vichy French forces in Tunisia in 1942.

As an example of a deviation, look at a what if scenario where France attacks Germany in 1939. This example really happened.

<u>What if Scenario</u>

What would have happened if the French and British went all out against Germany as soon as the Poland campaign began. The German western front is particularly weak in September 1939. Even against human opponents the French can make a quick grab for part of the Ruhr industrial resources and possibly even Cologne. Sometimes this victory is not all it's cut out to be because the French can find themselves over extended, which a competent human opponent can take advantage of. On the other hand, a bid to conquer Germany is a realistic option, especially versus the computer opponent. Basically, as the Germans hit the Poles, the French army moves into the Ruhr. The British send over as much as possible. As Warsaw falls in September, the French surround and defeat the German garrison in Cologne in early October. The French also capture the industrial capability of the Ruhr valley, bolstering the allied resource levels. Technically, the Germans should lose the points, but in what may be a minor software bug, they still reap the benefits of the Ruhr even when French occupied. French armored spearheads reach deep into Germany. However, the French army quickly loses momentum as it extends beyond its supply base.

The Germans quickly re-deploy their units to north west Germany around Kiel, threatening a thrust through Belgium. They also bring up an army group to face the Maginot line. It is winter now and the overextended French thrust is now in serious jeopardy of being cut off in a German pincer thrust south from Hanover and north from Munich. The French withdraw back to France using a skillful rearguard delaying action. French troops still hold part of the Ruhr and Cologne. This withdraw prevents the Germans from cutting off the French armies in Germany. However, the German army group, supported by panzers, throws the French out of Cologne. The Ruhr industry remains contested. The German and French army now hunker down for the winter.

In the Spring of 1940 the Germans take back the Ruhr valley, drive down through Belgium to the gates of Antwerp, and batter the Maginot line. The French are definitely on the defensive. The Germans desperately throw their army group and panzers against Antwerp and attempt to drive through the Ardennes. Time is against the Germans as the combined industrial might and mobilization of the allied armies will eventually be too much to bear. Some of the Maginot Line defenses are breached and the Germans spearheads reach a short way into France. French reserves halt the spearheads and a stalemate ensues during the summer and fall of 1940. The German army is stretched along the coast, through the low countries and are holding at the outskirts of Antwerp. French and British forces begin an enveloping move through Belgium and drive northwestward toward the coast in an effort to cutoff the German army facing Antwerp. The Germans are forced to vacate the low countries in the Winter of 1940. By Spring, the tide has turned. French and British units are fully mobilized and the DeGaulle army group, which began mobilization in early 1940 arrives ready to fight by the Spring of 1941. A combined British and French Thrust takes Cologne, then turns north to take Hanover. The German army tries a desperate jab once through the Ardennes to cut off the allied armies, but the French hold. In the Summer of 41 the allied armies drive into Hanover and then turn East toward Berlin. The Germans put up stiff resistance, but Berlin falls. The core German units now take up a defense around Munich. A small Garrison force still holds Prague. As the allied armies descend from the north and advance from the Maginot fortress, the German army defending around Munich surrenders in late summer, 1941.

All in all, a completely plausible outcome given the right set of circumstances.

Equations

If you're squeamish about algebra, you may want to skip this section. Otherwise, sit back and watch how COS computes combat strength and morale. The first equation we will look at is the attack strength equation. It's pretty straight forward:

$$A = (U + T) \times M \qquad\qquad (1)$$

where

> A = Combat Attack Strength
> U = Unit Strength
> T = Terrain Bonus
> M = Morale Percentage

Nothing magical here. Just take the unit strength and multiply times morale. Basically, a unit's morale is the scale factor for combat strength. A morale of 100% means the unit applies its full unit strength in combat. A morale of 50% means only 50% of the unit strength is applied to combat. The terrain bonus gets thrown in as well.

Now comes the somewhat more complicated, but quite fascinating morale equation:

$$M_{new} = (0.7)(M_{old}) + [E - (0.7)(M_{old})][S] \qquad\qquad (2)$$

where

```
Mnew = New Morale
Mold  = Old Morale
E       = Efficiency
S       = Supply Level
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The equation is simple, yet realistic. When a unit is fully supplied, the equation drives a unit's morale to the unit efficiency level. As supplies are reduced, the equation drives morale below the efficiency level. When the supplies go to zero, the morale drives to zero. For example, a fully supplied, 100% efficient unit which is placed out of supply will degrade in morale as follows: 100%, 70%, 49%, 34%, 24%, 17%, 12%, 8%, 6%, 4%, etc. Within two moves the unit is below 50% capability and after 7 moves is down below 10%. The morale rapidly rises once re-supplied. For example, a unit with 80% efficiency which goes from 0 supply to 50% supply will increase in morale as follows: 0%, 40%, 54%, 59%, 61%, 62%, etc. With higher efficiency units and higher supply levels, the rise is even more rapid.

One interesting part of the equation is it provides deterministic convergence points as a function of efficiency and supply. In other words, regardless of the current value of a unit's morale, if efficiency and supply remain constant, the equation will converge to a specific morale value. This convergence is described by the following equation:

$$M = ES/(.3 + .7S) \tag{3}$$

where

```
M = Morale Convergence
E = Efficiency
S = Supply Level
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Note that in the previous example we showed how a unit recovered with 80% efficiency and 50% supply. The convergence for this situation was 62%. This 62% is the convergence number for 80% efficiency and 50% supply regardless of the current morale value of the unit, either high or low. The only difference between high and low numbers is how long it takes to converge. In our example, it took 5 moves to converge from the low end. If the unit were to suddenly drop from 50% supply down to 20% supply, the new morale convergence number would be 36. Equation 3 allows a player to compute the morale convergence for any combination of efficiency and supply. Equation 2 allows a player to see how the morale changes on a per move basis as it converges.

Now let's take a look at some of the depth of COS as it relates to the topics we've discussed previously and the equations discussed above. Take an armored Corp roaming behind enemy lines. Remember the armored Corp has influence which extends many hexes around the unit. This influence disrupts or extends the enemy's supply routes, which in turn reduces a units morale (Equation 2). A reduction in unit morale, in turn, results in a reduced combat capability (Equation 1). The opposite is also true. A carefully moved army group can shorten a supply route, sometimes doubling the effective strength of multiple units tracing supply to the army group. This is true even though the army group may be 8 hexes away! Hence, a unit precisely placed several hexes away from the main battle can have a decisive effect on the outcome of the battle as a result of influence, supply, and morale. An experienced player is fully aware of this interaction and can reasonably figure out the optimal placement. The really nice part is the computer handles all the math. This makes for quick and simple play while also providing depth of play. The equation appears to do a good job at modeling reality as well. All around, that's simply good design.

Combat Tables

I had them once, but now they're gone, the victim of a flooded basement. They were published in a two series article in Computer Gaming World (CGW) a number of years ago (I think it is was 1993). I've asked SSI and CGW if they still have them and neither can come up with them. I've seen some information published on the Grognard's web page under the Clash of Steel topic, but it sure would be nice to get a hold of those CGW articles. Until then, the only thing I can say is I remember the tables looked pretty forgiving. Basically, one die roll wouldn't lose the war (or game).

Versions

There are currently two version of COS. Version 1.0 and Version 1.1. I've played both and have concluded that Version 1.0 is the preferred version. In a nutshell, Version 1.1 is simply crap!!! That's not to say that Version 1.1 didn't correct some flaws found in Version 1.0. However, Version 1.1 introduced a bug that pales in comparison to the fixes made.

The bug is quite insidious as it affects the Artificial Intelligence (AI). The Version 1.0 AI played a pretty good game. The computer AI even had various strategies to pursue, from the invasion of Britain to the sweep through Spain to Gibraltar. The Version 1.1 AI is brain dead. Units that would make decent moves under Version 1.0, either make really stupid moves or just sit back and do nothing. SSI crippled the AI when they put out Version 1.1.

I believe Version 1.1 is the version shipping under the SSI collector series' these days. That means most folks will never appreciate the true COS AI. How sad.

Rule Book

Quite often today's computer games don't even come with a manual. The manuals that do exist are poorly written and rife with errors. Even the so called "strategy guides" usually contain only superficial fluff. In fact, as the computer gaming industry grows, it seems the manual is headed for extinction.

Although not the best I've seen, the Clash of Steel manual is well above par. It's a full 72 pages in length and packed with solid information. It describes "how" the game works, including just enough statistics and equations to enable me to figure out the methods behind the models. My conclusions in this paper would not exist without the manual. Many a game developer can learn a lesson or two about manual design by taking a look at the Clash of Steel manual.

COS II

As of this writing, SSI has no plans to produce a Clash of Steel Two. The original designer has moved on. I doubt SSI even has the source code anymore. However, if someone does decide to go forward with COS II , here are some suggestions for the new version.

Multi-play

Provide a multiplay system. This system would allow players to create not only country players, but also allow players to assign subordinate players to command army groups. The grand strategist for each country assigns the groups and then the group commanders move the units.

Allow Players to Assign units to Army Groups

Assigning units to Army Groups allow players to better follow which units belong to which group. Also, for multiplayer games, player group commanders can only move those units assigned to the player's army group.

Provide Combat Tables and Show Odds

Give players the option view the combat tables. Provide attack odds if players desire.

Dedicated Air Attack against Ships

Allow players to "assign" aircraft to engage shipping. This would increase the odds of aircraft attacking ships in adjacent sea areas. Allow friendly aircraft to defend against these attacks. This change would allow the German to execute a "Battle of Britain" approach.

History Text File

Have the game build a history text file. Unit names, engagement dates, places, results, major events, etc. It would be fun to read how history was changed. Also, unit histories can be tracked too.

Allow Player to Name Units

Players like to name things. Allowing players to name their units will personalize the game and make tracking units easier.

Change Sea Supply Rule

A transport fleet supplying a port should be more susceptible to interception than a generic transport fleet. Or, fleets should be able to "blockade" selected ports to prevent sea supply. The victim of the blockade has the option to engage the fleet and lift the blockade.

Norway

German occupation of Norway gives submarines added hiding advantages.

Allow Optional Carrier Engagement

Fleets with Carriers should have more latitude in choosing surface or air action.

Computer Casualties and other Statistics

Based on the outcome of the battles, it would be interesting to compute the statistics. Shipping lost to subs and raiders, industry graphs, bombing effects, battle results. These numbers would go nicely in the history file.

Show Front Lines and Division Movement

Allow players to "see" the true front. As an added "eye candy" feature, show the movement of subordinate units (divisions) with arrows. Maybe even provide a bit map option to go in the history file.

Why Did I Write This?

Why did I write this paper about a game published almost ten years ago? One reason is to preserve the memory of a design which to this day is still unparalleled in its description of WWII grand strategy. Computer operating systems and their languages may come and go, but the essence of a sound design is eternal.

It is unfortunate that much of the current software market is driven by glitzy graphics. Solid designs which embody sound models tend to take a back seat to pretty pictures and arcade action. Clash of Steel is one of those rare gems that got most of the modeling right. But like the ever so elusive gem stone, it is now almost buried beyond sight. This paper is a siren's call to all who read it. Want a good game covering

WWII grand strategy? Here it is! It is ironic that COS does such a good job at making the game accessible to the neophytes that the depth is easily overlooked, even by veterans. Many players simply miss the depth because it is transparent. Most unfortunately, I do not believe SSI is cognizant of the beautiful gem sitting on their archive shelf gathering dust.

If ever a game existed which screamed for a face lift, COS is it. As stated throughout this paper, with the exception of a few tweaks here and there, the meat and potatoes models are still solid. All COS needs is an interface update to the 21st century. And, of course, the original AI of version 1.0.

Why did I write this? I'm hoping someone will read it and say "Hey, he's right. COS is a great game. Let's update it under a new operating system and publish it again". If I fail in my efforts, at least I've articulated a vision of the model. Clash of Steel is indeed a rare gem in the war gaming genre. Only time will tell whether that gem is buried in history, or polished and published anew. Happy gaming.

JTP 24 May 2000