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# Organizing For War: Past and Present

A Monograph
by

Major Morton Orlov II
Infantry

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The monograph begins with a historical examination of the triangular concept that was the foundation for the Army's reorganization and force design on the eve of World War II. Then the monograph examines the pentomic concept which developed during the early years of the Cold War and was the operational concept for the Army until 1961. The historical sketches provide a foundation for analysis using a three part methodology. The methodology considers the strategic requirements that shape the nation's needs for its army, the operational concept that determines how the Army will fight and the system processes that influence the size, shape and complexion of the force. The monograph continues with a discussion of Clausewitz' understanding of the nature of war in relation to the Army's view of military theory and doctrine. It concludes with an examination of the Army's current situation, identifying several problems the Army must carefully consider. First, strategic requirements that ought to help determine the shape of the force are, themselves, unclear. Second, the Army's definition and understanding of war, a central part of its operational concept, has become increasingly more complex. Third, the Army's force structure, the reality of the force, is a function of Congressional willingness to provide money for the Army's budget. Finally, this study of past experiences provides a framework from which force planners can approach the increasingly complex problem of future war and force design.

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## ABSTRACT

ORGANIZING FOR WAR: PAST AND PRESENT. by Major Morton Orlov II, USA, 62 pages.

It is 1994 and the United States Army is in the process of preparing itself for the 21st century. As part of that preparation, the Army must determine how it will organize its combat forces for future war. The Army has had experience with reorganization in the past. An examination of these past experiences is relevant to current efforts at reorganization.

The monograph begins with a historical examination of the triangular concept that was the foundation for the Army's reorganization and force design on the eve of World War II. Then the monograph examines the pentomic concept which developed during the early years of the Cold War and was the operational concept for the Army until 1961. The historical sketches provide a foundation for analysis using a three part methodology. The methodology considers the strategic requirements that shape the nation's needs for its army, the operational concept that determines how the Army will fight and the system processes that influence the size, shape and complexion of the force.

The monograph continues with a discussion of Clausewitz' understanding of the nature of war in relation to the Army's view of military theory and doctrine. It concludes with an examination of the Army's current situation, identifying several problems the Army must carefully consider. First, strategic requirements that ought to help determine the shape of the force are, themselves, unclear. Second, the Army's definition and understanding of war, a central part of its operational concept, has become increasingly more complex. Third, the Army's force structure, the reality of the force, is a function of Congressional willingness to provide money for the Army's budget. Finally, this study of past experiences provides a framework from which force planners can approach the increasingly complex problem of future war and force design.

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# I. Introduction

The United States Army is now in the process of preparing itself for the 21st century. As part of that preparation, the Army must determine how it will organize its combat forces for future war. The Army has had experience with reorganization in the past. An examination of these past experiences is relevant to current efforts at reorganization.

Since World War I the Army has had to transform itself several times. Significant transformations occurred on the eve of World War II and with the advent of the Cold War. In 1939 the new Chief of Staff of the Army, General George C. Marshall, faced the prospect of another world war, a war for which the Army was woefully unprepared. In the mid-1950's, the Army Chief of Staff, General Matthew B. Ridgway, was confronted with the challenge of a future war dominated by nuclear firepower. The Army, both before World War II and in the 1950's, reorganized its combat units in order to better fight future war. Examining these two periods of reorganization will determine if they offer a perspective on change that might apply to today's Army as it approaches the 21st century.

A relationship exists between the organization of an army's combat units and its ability to operate successfully at the operational level of war. A force operating at the operational level of war must successfully conclude its campaigns and major operations in order to achieve the nation's strategic objectives. Operational art is the linkage of

battles in campaigns to achieve strategic results. The organization of the combat units influences how the Army is employed in these battles and campaigns and what it is able to accomplish. For example, imagine what kind of campaign an army that had no logistical requirements could conduct. It would have a significant mobility advantage over any force in existence today. Organizational innovation will not solve the problem of combat logistics, but future force design will effect the ability of the Army to fight and win in battle.

The Army's reorganization prior to World War II produced the triangular concept while the pentomic concept emerged from the reorganization during the 1950s. After an examination of these concepts, the monograph will present a methodology for analyzing them. The analysis will provide a detailed examination, in each case, of the factors that influenced force design. Next, the monograph will consider the situation in 1994 and the Army's effort to design a force for the next century from the perspective of historical experience. There is no perfect force design, neither in the past, present, nor in the future. This monograph will not determine which force design the Army should adopt, but it can provide an insight into the challenges the Army has faced before and how it sought to meet them.

## II. The Triangular Concept

In 1939, at the start of World War II, the Army was less than 200,000 strong and could barely field two divisions. Its regiments and battalions were scattered across the United States in small garrisons and there was no field organization larger than the division in existence.[1] This was the start point for General Marshall and the leadership of the Army as they prepared for World War II.

One of the early decisions Marshall had to make concerned the organization of the Army's divisions. On September 16, 1939, fifteen days after the German invasion of Poland, he instructed all Regular Army divisions to reorganize in accordance with the triangular tables of organization. His decision came after years of discussion, planning and experimentation.[2] The roots of this decision reach back to World War I.

To understand the 'triangularization' of the Army, it is necessary to understand the experience of the American Expeditionary Force (AEF) in Europe during World War I. The static warfare of the Western Front was manpower intensive and required the combatants to organize units with enough size and structure to remain effective after heavy battle losses. In response to this demand, the AEF employed a square division composed of two brigades with two infantry regiments each and a total strength of 28,105 soldiers.[3] The American square division was considered the equivalent of two French or British

divisions and proved itself well suited for conditions along the Western Front in 1918. The arguments for the square division rested on its ability to remain effective, despite losses and thereby maintain the continuity of the battle. Additionally, its organization in four regiments allowed two regiments on the line to rotate with two in the rear. Finally, there was a severe shortage of trained staff officers; thus fewer, but larger divisions rather than many, smaller divisions conserved this limited resource.[4]

Immediately following the war two views developed concerning the future size and structure of the Army's divisions. The senior officers of the Superior Board recommended the retention of the large square division while General Pershing urged a smaller, triangular version. The Superior Board view prevailed.[5] Therefore, throughout the interwar period, the Army's divisions remained similar to their World War I square division progenitor.[6]

In 1920 the Secretary of War established the Lassiter Committee to reconcile the differences between Pershing and the Superior Board regarding the Army's organizational problems. Interestingly, the committee's vision of future war did not include Europe, as its members saw the post-war division operating in North America.[7] A decade later General Douglas MacArthur, the Chief of Staff, provided the impetus for increased readiness and reform. In 1933, Major General Charles E. Kilbourne, the head of the War Plans Division on the General Staff, recommended that the Army reexamine its

organization.[8] Under the next Chief of Staff, General Malin Craig, the momentum for continued organizational study increased, partly due to the increase in international tensions.[9] In 1937 the Army conducted its first test of the new triangular division and determined that the new formation compared favorably with the square division. The test demonstrated that it was more maneuverable, easier to control, easier to support with artillery, and generally more flexible than its square counterpart.[10] Even with these high marks, two more years passed before the Army officially adopted the triangular concept.

General George C. Marshall was a strong proponent for the triangular concept.[11] Nonetheless, there were powerful opponents who argued against the idea. One opponent was Major General Hugh A. Drum, Commander of the 1st Army and a direct rival of Marshall's for the position of chief of staff. Drum conducted a large-scale maneuver in the summer of 1939 and, as a result, determined that the bulk of the Army should be organized for prolonged and sustained combat through the retention of the square division.[12] Two years later, after the Carolina Maneuvers, a corps commander noted "a distinct need for both the triangular and the square division."[13] Some officers harbored reservations about the triangular division's suitability for sustained combat, indicating less than unanimous support for the new concept.

Army planners faced the dilemma of increasing the division's firepower and decreasing its manpower requirement,

while improving its overall tactical mobility. One method of addressing this problem was to move to mechanization and motorization of the force. J. F. C. Fuller, the British General and theorist, had developed a far reaching theory of mechanized warfare, though the American Army had shown little inclination to support such a radical departure from tradition.[14] The proponents of armored warfare were unable to gain the visibility and political support necessary to make their vision a reality. Still, there was growing momentum for change as many officers realized it had been over a decade since the Army had seriously considered its organization.

Within the Army there were officers who were thinking about change. Major E. S. Johnson wrote three substantial articles for Infantry Journal in 1937 about the need for doctrinal improvement and organizational innovation.[15] An Army attaché in Berlin, writing in 1936 to then Colonel Marshall, noted that the German Army's development and reorganization was producing the most powerful ground force in the world.[16] Within the officer corps there was a realization that the American Army was becoming obsolete and that the square division was at the center of its organizational problems. Better combat performance required enhanced mobility, improved command and control and a new organizational concept that was leaner at each echelon. Finally, in 1936, the Army motorized the infantry regiment and deleted all animals and animal drawn transportation, laying the foundation for the new division.[17]

The outbreak of war in Europe in 1939 was the largest stimulus for organizational change. The German defeat of Poland demonstrated to America and its Army how Hitler and his armed forces had capitalized on the technologies of the day.[18] General Marshall and the Army now had the political support for a larger force and more money, but political support alone could not overcome the damage of two decades of decay.

With the approval of the triangular division structure the Army immediately accomplished two tasks. First, the question of how the Army was to organize for war was resolved and, second, the Army gained more divisions. Moving from a square to a triangular organization reduced the manpower requirements of the division substantially, allowing for the immediate creation of new Regular Army divisions.[19]

The overriding concept behind the reorganization was to place the maximum amount of combat power in the unit, while holding to a minimum the amount of nontactical overhead. The combat unit was to have what it needed, while seldom needed assets were held in a reserve pool at the next higher echelon.[20]

Army planners envisioned that the division would operate as part of a corps and that much of the division's support would come from higher echelons. The triangular division would fight with three infantry regiments of three battalions each. This structure dramatically cut the overall strength of the division and eliminated an echelon of command as there were no brigade headquarters. Each regiment was

directly supported by a field artillery battalion and there was a single battalion in general support to the division.

This organization created a division that was smaller and more mobile than the square division. It supported the easy organization of infantry-artillery combat teams and had a reduced number of command echelons; facilitating the command and control of the force.[21]

General Leslie McNair, the Chief of Staff of General Headquarters and later Commander of the Army Ground Forces, felt that the tank threat to the infantry division was best handled through antitank guns and mobile tank destroyers. He claimed that one did not need a tank to kill a tank.[22] Therefore, an antitank company was allocated to each regiment and independent tank destroyer battalions were organized to support the division as necessary. The doctrinal and organizational alternative was to place armor formations within the infantry division. This prescription would have deviated from McNair's desire to keep the divisions as lean as possible, with only those capabilities that they absolutely needed organic.

The GHQ maneuvers of 1941 helped resolve some areas of the doctrinal debate and provided the empirical evidence that the Army needed to make several important decisions. The overall doctrine of triangularization was validated, though there were some dissenting voices. McNair, with Marshall's concurrence, ruled in favor of the anti-tank gun and, more importantly, the tank destroyer as the doctrinal solution to the

blitzkrieg problem. Anti-tank firepower was the key to defeating enemy armor formations and the bulk of the anti-tank capability was to reside at the corps and army level. The armor division, though validated, was seen as an exploitation force and not as a breakthrough force. Accordingly, armor divisions were designed to operate with infantry divisions in a standard corps configuration.[23] These decisions set the parameters for the organization of the American Army as it entered World War II.

During the course of the war, based on the lessons of combat, the Army continued to modify its doctrine and organization. The 1943 armor division, with its balanced component of six armor, six infantry and three self-propelled artillery battalions was considered a success. It did not have the triangular structure and was organized for maximum flexibility. Its battalions operated directly under the control of two combat commands.[24] The infantry division faired well, but suffered from a lack of dedicated armor support. To remedy this problem the Army Ground Forces, based on feedback from the field, recommended "the inclusion of a medium tank battalion as an organic part of the infantry division."[25] Furthermore, in January 1945, the Army Ground Forces recommended the expansion of the division with the addition of another infantry regiment. This recommendation was accepted in May 1945 as the War Department prepared for the redeployment of units from Europe to the Pacific Theater.[26]

The Army Ground Forces recommended expansion of the division at the end of the war, though predictable, was not an indictment of the triangular concept. The Army had intentionally limited the size of the ground forces as reflected in the ninety division decision.[27] This placed great strain on the fighting divisions and did not allow for unit rotation out of combat. Thus, the proposed internal expansion of the division reflects the constraints of a ninety division ceiling, and the need to give the infantry a respite from combat as the war approached its fourth year.

The end of the war showed that the tank had not displaced the infantry-artillery team, but had joined it. Professor Russell Weigley notes that "At the close of World War II the United States Army was the mightiest in the world....In every theater the American Army had faced enemies long trained in war and had speedily overcome them."[28] He goes on to point out that the most marked difference between the American Army and its adversaries was its immense advantage in mobility.[29] This observation is a reflection of the thinking that took place in the 1930's, the training and validation of doctrine that occurred in the early 1940's, and the results of combat during the war.

The triangular concept was more than a division structure. It encompassed a mechanical theory of war - based on the reliance on automotive vs. animal propulsion. It maximized the use of American manpower and, most importantly, it provided the doctrinal foundation for an

expanding army that contributed directly to victory against Germany and Japan.

## III. The Pentomic Concept

While the end of World War II brought victory for the Allies, it also brought the demobilization of the victorious army. By early 1946, the army that had won the war had vanished.[30] In its place was an army that was struggling to keep its ranks filled, while it transformed itself from a wartime force with over eight million men to a mainly constabulary force of less than three quarters of a million men.[31]

The Army studied the results of its victory through the creation of several post-war boards. These boards, taking input from the field, determined that the triangular concept was essentially sound. They also determined that the best way to beat a tank was with a tank and, recommended "that the tank destroyers as a separate force be discontinued."[32] Furthermore, they recommended the removal of the regimental anti-tank companies, equipped with the 57-mm gun, from the division structure.[33] The tank destroyers were replaced by a tank battalion at division level, while a tank company replaced the anti-tank company in the regiment. These changes reflected the importance of combined arms warfare to the Army's doctrine.[34]

Drawing conclusions from the past was easy in comparison to forecasting the future. The Army's strategic vision was unclear. There was substantial interest in missile technology, but the Army's doctrine focused on war at the tactical level; it did not clearly envision the context within

which the Army would fight its next battle. The assumptions the Army made about universal military training (UMT) and the time necessary to prepare for war reflect this faulty vision. The Army had assumed that the Congress would pass UMT. It further assumed that the next war would look something like the last two. This meant that the Army would once again mobilize and then deploy to war from the continental United States. What the military leadership failed to foresee was that the new Cold War would not provide the time necessary to prepare the force.

As a result, the Korean war caught the Army by surprise and demonstrated how unprepared for quick deployment and combat it really was. After the first year of combat the Army found itself fighting a stationary war more reminiscent of World War I than World War II.[35] The division organization used in Korea was based on the triangular division, which had been originally designed for offensive warfare. In Korea a typical division with an authorized strength of 17,629 men covered a front of 21,430 meters as compared to a front of 7,000 meters for the 14,561 man division of 1945.[36] The requirement to defend the United Nations-held portion of Korea from a relatively stationary line dictated a shift in tactical doctrine. The division had to rely on firepower from its organic weapons, supporting artillery and Air Force close air support to hold its positions and defeat the attacking forces. The resources of the division were stretched beyond what they

were designed to do. Following the war, this led to the opinion that

> the Korean campaigns demonstrated conclusively that the US triangular infantry division needed complete reorganization to enable the division to respond to any and all conditions of ground combat.[37]

This perception was not the only factor influencing doctrine and force design after Korea. Increasingly, there was an awareness that any vision of future warfare had to take into consideration the use of nuclear weapons, even though they were not used in Korea.[38]

Reaction to the Cold War included the substantial growth of the armed forces and the commitment of America to the policy of containment and the forward defense of Europe. President Eisenhower, elected in 1952, espoused the strategic doctrine of Massive Retaliation and the organizational doctrine of the New Look. Combined, these policies brought tremendous pressure to bear on the Army to prepare for a new form of war and define what role it would play in defending America and its interests.[39]

The Eisenhower Administration envisioned that the threat of strategic nuclear weapons, delivered by the Air Force, would obviate the need for extended ground warfare. The dilemma, for the Army, was one of mission.[40] In Korea the Army had been forced to fight a limited war in which measurement of success did not include battlefield victory. Furthermore, the commonly held belief in the omnipotence of

air delivered nuclear weapons allowed the Air Force to question the usefulness of the Army in any future conflict.

The Army faced a new challenge on two levels. At the strategic level, the Air Force was able to present the case that it deserved the majority of the defense resources, because it was the service with the capability of decisively destroying any threat to the country. At the tactical level, the Army had to acknowledge the potential impact of nuclear weapons. If used against concentrations of ground units on the battlefield, nuclear firepower could devastate either attacking or defending forces.

The Army, though larger now than before the Korean War, found itself ill-prepared for the defense of Europe. From 1949 until 1956 the Army flirted with the concept of mobile defense, as it attempted to develop a doctrine that would stop a Soviet attack. Incorporated into doctrine, the mobile defense concept never acquired the force structure to become a viable option.[41]

As the technological development of nuclear weapons progressed, so did thinking about employing them on the operational and tactical battlefields. Once reserved for strategic targets, nuclear weapons were moving closer to the tactical battlefield. Now that the Soviets had nuclear weapons, it was only logical to assume that they would employ them in combat. Additionally, the Soviets had a huge conventional arsenal poised behind the Iron Curtain to strike at Western Europe.

The tactical problem was one of unit dispersion. Nuclear weapons were so powerful that, when employed against a conventional force using a traditional linear defense, they could blow huge holes through which exploitation forces would flow, making the defense untenable. Therefore, a force defending in Europe would have to remain as dispersed as possible to avoid becoming a lucrative nuclear target.

The fundamental assumption was that the Soviets were going to use tactical nuclear weapons and the only way to attenuate their effects was to increase the distance between the defending units. The hybrid triangular division was not sufficiently flexible to do this.

The Army realized that its forces in Europe were insufficient in number to accomplish the mission, and at the same time, they understood that they must be prepared for action outside of Europe.[42] This led to a strong emphasis on deployability. This theme paralleled the development of the pentomic concept.

Finally, the Army was concerned about its overall role in the defense of America and its position relative to the other services in regard to the defense budget. To a certain extent, it had to prove that it was on the leading edge of technology and that it was adjusting to the times. The Army of 1954 was not the Army of 1939 or even 1945. Societal pressures and the need for a large standing force had changed the professional character of the force. The Army was mainly a force of two year draftees and was, in many respects, a reflection of the

society around it. This society saw itself moving into the advanced industrial age; it did not envision its sons as ground warriors. There were, however, some voices in opposition. S. L. A. Marshall, the journalist and well known Army historian, decried this belief in nuclear weapons and technology when he stated that "The belief in push-button war is fundamentally a fallacy."[43] General Ridgway did not complete a full term as Army Chief of Staff because he disagreed with the administration's position.[44] Clearly, the Army was not an autonomous organization, operating in a vacuum where it remained untouched by society's ideas. It was subject to many pressures, the least of which were reduced budgets and public apathy. These were the conditions that existed as the Army sought to define and reorganize itself.

The pentomic era, as A. J. Bacevich calls it in his book of the same name, can be officially dated from 1956 to 1961 when the pentomic concept guided Army doctrine and force structure.[45] The Army did not arrive at this concept by chance; it was a logical attempt to solve the operational and tactical problems of the time. It was revolutionary, not evolutionary in nature, in that it did not draw from the lessons of World War II or Korea and was meant to deal with the potential threat of nuclear weapons.

The goal of the pentomic division reorganization was to create a force that was equally effective in conventional as well as nuclear operations. The Army judged that dispersion was an important requirement on the nuclear battlefield. Dispersion

would protect units because the absence of a concentrated target would limit the effectiveness of a nuclear attack against a defensive position. Dispersion meant that units would have to operate more independently than in the past in order to cover greater frontages and depths. The hybrid triangular division, with its three infantry regiments, could not achieve the desired level of dispersion for force protection.

Previously, the battalion had been the building block of the division. A typical infantry division was assigned nine infantry battalions and one tank battalion. The battalions were subordinated to the regiment which controlled them in combat and provided cannon support with an organic cannon company. The division maneuvered the three regiments and augmented the regiments with additional assets to create regimental combat teams.

Under the pentomic concept, the regiment and the battalion were eliminated and five battlegroups were organized in their place. The battlegroup was smaller than a regiment and larger than a battalion. It consisted of five rifle companies and a combat support company. Furthermore, the division artillery was reorganized so that a single firing battery was available for each battlegroup. Finally, the division acquired the ability to deliver its own nuclear weapons with the deployment of the Honest John missile. Each division had an Honest John battery in its composite artillery battalion.[46] The intent was to make the battlegroup as self sufficient as

possible, yet not so large in size as to make it a profitable nuclear target.

With this new organization a whole echelon of command was removed. This increased the span of control of the division commander, because instead of three regiments he now maneuvered five battlegroups, as well as the other elements of the division.

Along with changes in name and in structure came changes in tactics. Penetration became the favored form of maneuver. The goal was to penetrate the enemy's defenses and rapidly advance to an objective deep in the enemy's rear. Liberal use of nuclear weapons were suggested, though the future commander was admonished to avoid the 'piecemealing' of nuclear fires. The commander was also in a position to succeed with a smaller reserve since he could rely on nuclear firepower to provide him flexibility in dealing with any unexpected threat.[47]

Defense in a nuclear environment posed the toughest tactical problem. Doctrine called for the use of battle positions that allowed for all around defense. The commander was told to plan on the threat coming from all directions rather than just one. The pentomic division was able to perform the two doctrinal forms of defense: the area and the mobile, though it was acknowledged that it was better suited for the area defense. The battlefield geometry depicted a division defending in a mobile defense on a front 10,000 to 25,000 yards wide and 10 to 20 miles deep with three of the five

battle groups deployed as mobile strike forces. In the position defense, the frontage was depicted as 16,000 yards, with the same depth of 10 to 20 miles. The distinction is that only two of the battlegroups were held back and they were designated as a reserve rather than as a strike force for a mobile defense.[48]

Operationally, the pentomic concept was never tested in combat. It was, however, used in operations short of war. In 1958 airborne battlegroups deployed from Europe to Lebanon as part of Operation Bluebat. During the operation there was considerable confusion over deployment of a Honest John battery. Admiral James Holloway, the commander of Specified Command, Middle East had requested that the battery deploy with conventional warheads. USAREUR, which owned the battery, felt that the battery should deploy with both nuclear and conventional warheads, if it was deployed at all. The issue was raised to the Joint Chiefs and they decided against deploying the battery at all. By this time the battery had already left Europe; upon arrival in Beirut it was immediately turned around and sent back. Later, the Department of Army, in its published lessons learned, stated that concerning the Honest John there had been a lack of "proper policy guidance" on what was "a political issue."[49]

The pentomic organization was considered a failure because it traded away conventional performance for theoretical nuclear performance. As the Army studied the problem of nuclear weapons it became increasingly clear that

neither side would benefit from their use on the tactical battlefield.

> Studies conducted by the Army...[demonstrated] that war fought with tactical nuclear weapons would not find the weapons offsetting Communist manpower. Rather, tactical nuclear war was likely to demand larger armies, not smaller: because the weapons themselves were extremely complex, because casualties were likely to be exceptionally severe, and because the depth of the combat zone would be greatly increased to make possible essential dispersal.[50]

Unit commanders considered the pentomic division too unwieldy and unsustainable, with the division commander's span of control stretched too far.[51] These criticisms emerged after the Army gained practical experience through numerous field exercises from 1957 to 1961. Additionally, by the late 1950s, many thinkers, in and out of uniform, were questioning the underlying assumptions of massive retaliation, the New Look, and the use of tactical nuclear weapons.[52]

In May 1961, the Army announced that it was going to reorganize its divisions based on a concept entitled "Reorganization Objectives Army Division (ROAD) 1965". This brought the Army back to an organization with which it was familiar and which had been proven in combat in World War II and Korea. The arrival of ROAD saw the return of the battalion as the building block of the division and the introduction of the brigade (missing since the square division) as its controlling headquarters. There were other changes, but fundamentally the experiment of the pentomic era was over.[53]

## IV. Methodology and Analysis

History is useful for theorizing about war, but it does not provide the answers to tomorrow's problems. The brief, historical sketches of the triangular and pentomic concepts are meant to provide a background for thinking about future war. Using a simple methodology will help clarify the issues in each case. The purpose of conducting an analysis with this methodology is to provide a common framework from which a discussion of each concept can flow that will lead to the formulation of helpful insights about force design. Hopefully, thinking about these insights will assist the Army in making decisions about its current force design program and future war.

The proposed methodology is based on the efforts of other soldiers who have addressed similar problems in the past.[54] The methodology consists of three parts: operational concept, strategic requirements, and system processes. Evaluating each concept provides a contextual analysis of how the Army considered force design in the past.

The operational concept defines how an army expects to fight. In the U.S. Army the operational concept is encapsulated in its written doctrine. An army's doctrine serves as the linkage between theory and practical execution. Doctrine is distilled from theory, but is heavily influenced by other, environmental factors. Technology is one of these factors and since the industrial revolution, it has played an increasingly

important role in the development and design of armies. Therefore, in analyzing an army's operational concept, it is necessary to determine the dominant technological issues that applied to warfare at that time.

The operational concept also includes the form of war. Clausewitz has said that there are two forms of war, the offense and the defense.[55] This second factor considers the balance between the two and assesses how it is reflected in the Army's doctrine. Over the years theorists have argued about which is the ascendant form of war. This component of the analysis determines how the Army, in each case, perceived the forms of war, because an army's perception and doctrine concerning the forms of war will heavily influence what type of force it designs.

The final consideration under the operational concept is called the tactical problem. This part of the analysis examines what the Army thought was the paramount tactical challenge of the time and how it sought to find a solution for it.

Strategic requirements deal with the variable conditions under which the vision of the future battlefield is defined. The requirements include the following: where (geographically) the Army will fight, when the Army will fight, what is the expected duration and intensity of the war, who is the enemy, and who will the Army fight with as allies or partners. Addressing these requirements sets the conditions for the development of the Army's operational concept and doctrine. General Sullivan has argued that the closer these conditions

approach certainty, the easier it is to apply traditional problem solving techniques. Conversely, the greater the level of uncertainty in these areas the more difficult it is to determine the operational concept and doctrine of the Army through the use of traditional processes.[56]

Systemic processes also influence the design of the Army. One example is how the Army recruits soldiers, who they are and how long they serve . A second example is the amount of money available to the Army; this factor directly effects its ability to pay soldiers, buy equipment, and train units. Finally, the Army relies on a series of operational tests and maneuvers to find answers to its tactical problems and test its doctrinal ideas. These processes support the Army's structure and determine the size, shape and nature of the organization.

Taken together, the operational concept, strategic requirements and systemic processes provide a useful set of tools with which to examine the triangular and pentomic concepts. This examination provides insights into how the Army might handle its current challenges in force design. The following section will apply this methodology to the triangular and pentomic concepts.

## Triangular

The dominant technology in the 1930's, as it applied to the Army, was mechanization. This effected the Army in two ways. It provided a new source of transportation mobility through motorization and it offered a new way to fight through the development of the tank. Motorization was adopted as the

Army withdrew all animal and animal drawn transportation from its maneuver regiments (except the horse cavalry). This laid the foundation for the creation of a highly motorized and mobile force during World War II. The tank issue was less easily resolved. The Americans were woefully behind the Europeans in tank development and never really caught up during the war.[57] As a result, the Army could move rapidly around the battlefield, as demonstrated many times during the war, but it did not fully develop, as an army, an armored operational concept. Professor Russell Weigley has noted that "American weapons had been designed first for mobility" and that they lacked the necessary power for the type of tactical engagements that occurred in Europe during World War II.[58]

The doctrine of the Army on the eve of America's entry into World War II was in the May 1941 edition of FM 100-5. The manual stated that "the *ultimate objective* of all military operations is the destruction of the enemy's armed forces in battle" and that the best way to destroy them was through offensive action.[59] Additionally, from 1943 on, the United States and its Allies were on the strategic offensive. When American ground forces finally met the Germans in Northwest Europe after D-Day they were fighting an offensive strategy and conducting offensively oriented campaigns.[60] Therefore, the emphasis in the Army, both immediately before the war and during the war was on the offensive form of war. To conduct offensive warfare the Army designed its units with mobility as the central objective. This requirement for

mobility was translated into lean combat units with limited supporting structure at the division level and below.

The principle tactical problem was to defeat the German Army as it was considered the most formidable threat.[61] The Germans had developed a form of offensive combat commonly called the blitzkrieg. The blitzkrieg relied heavily on tanks which caused the American Army to focus on how best to defeat them.[62] The American Army also had a legacy of thinking about open, mobile warfare, a legacy from General of the Armies John J. Pershing and from the Army's history of fighting the Indians in the West. Professor Weigley notes that this contradiction caused "mobility rather than power [to] become the outstanding characteristic of the American infantry division."[63]

The Army's operational concept at this time focused on offensive war. This concept was based on the idea of fighting with a mobile force that could defeat the German Army and protect itself from the blitzkrieg threat. Professor Weigley notes that the Army demonstrated inconsistency when executing this concept. Specifically, the concept caused the Army to design and equip its forces for tactical mobility, yet, in combat, firepower became dominant.[64] Thus the Army fought World War II with a disparity between force design, doctrine and tactics.

Furthermore, as America came closer to war the Army's strategic requirements became clearer. General McNair, who was responsible for the organization and training of the combat

forces knew that there would be war, he just did not know where and when.[65]

In 1939, when the triangular concept was approved, the Army had developed strategic plans to fight the Germans and the Japanese. Knowing how soon it would have to fight was more difficult. A photograph of Generals Marshall and McNair during the Louisiana maneuvers of 1941 shows them in front of a situation map and above the map there is a banner that reads "TIME IS SHORT."[66] The Army knew it would fight, and there was a feeling that the time was fast approaching.

The Army did not know how long the war would take and, until the Allied decision to require unconditional surrender, there was no way to predict how the war might terminate. The Army was thinking along the lines of a long war, a war of sufficient duration to require full mobilization. This is illustrated in the planned requirement for 213 divisions and in the final end strength of the Army, which was over eight million men.[67] These strategic requirements caused planners to seek efficiencies through leaner combat formations, which would allow the country to field a greater number.

The Army had little difficulty determining that its most likely opponents were the Germans and the Japanese. It was understood that the main ground effort would be against Germany which helped shape how the Army thought it would have to fight. The impact of Allies is harder to gauge. Certainly the Soviets tied down the bulk of the German Army, but it is difficult to determine how this or our partnership with

the British influenced force design. One consideration is that the requirement to support as many allies as we did, with equipment and supplies, prevented us from developing more combat units. The Army understood that its base of supply was the United States and that it would receive little host nation support once ashore in Europe. This probably influenced the development of a robust logistical structure at echelons above corps.

In the 1930s the Army was a professional force that did not rely on conscription. Nonetheless, the considerations of a mass army, built on conscription, were present in designing the triangular force. Many years after the war, General J. Lawton Collins commented that the triangular concept was effective because it considered the training component of a civilian army. He said that the theory behind triangularization was that each successive echelon was the same. Therefore, the doctrinal tools necessary to operate at one level could, with common sense, be applied at the next level and that the triangular concept of organization was designed to support this.[68]

The triangular concept developed during a period when resources were scarce, a situation that did not improve until just before the war. The triangular division was tested in the late 1930s and General McNair had been the chief of staff of the division conducting the tests.[69] The triangular concept was evaluated in more detail during the GHQ maneuvers of 1941. The Army used the maneuvers as the means to evaluate not

just troop and unit training, but also the soundness of its operational concept.

## Pentomic

Evaluating the pentomic concept illustrates how rapidly World War II transformed both the Army's strategic requirements and its operational concept. The dominant technology influencing military thinking was the atomic bomb, whether delivered by plane, missile or artillery piece. To many observers the arrival of atomic weapons meant a revolution in warfare. The Army felt certain that potential enemy forces would use atomic weapons against them. Additionally, the explosive power and secondary effects of atomic weapons created an order of magnitude change in the effects of firepower on combat units. Traditional norms for unit land occupation would result in the near instantaneous destruction of units attacked by atomic weapons. This dilemma largely shaped the Army's effort to reconfigure the divisions and redefine its battlespace.

In the first chapter of the 1954 edition of FM 100-5 the manual states that the "Army combat forces do not support the operations of any other component" and "the efforts of all components are directed toward insuring the success of the land force operation."[70] Additionally, the first unique capability of the Army is "Insure a positive defense against enemy land forces."[71] The offense is still acknowledged as the decisive form of war, but the manual notes that "political and strategic considerations may also dictate the assumption of the

defense."[72] The lack of ready ground troops in Europe dictated an initial defensive posture, in case of Soviet attack, until the full mobilization of NATO could effect the balance of forces.

The Army sought to solve the tactical problem of balancing the need for dispersion with the requirement to generate combat power. Dispersion appeared to be the best defense against the effects of nuclear weapons, but it complicated command and control. Furthermore, once dispersed, there were few practical ways to rapidly reassemble forces in sufficient strength to generate combat power to fight conventional battles. This paradox was never successfully resolved.

By the time the pentomic concept was announced in 1956 many of the strategic requirements of the Cold War were well understood. The most important potential theater of war was Europe, though the Army realized that it might have to fight elsewhere. When the war might occur was hard to determine, but the Army planned on having less time to mobilize and deploy than it had in the two previous world wars.

The duration of the next war was envisioned as shorter than in the past because of the use of nuclear weapons. The presumed use of nuclear weapons tended to shorten the war, but greatly increased its intensity and lethality. The Soviet Union and its communist partners were seen as the enemy and, at least in terms of Europe, the Army knew that it would be fighting with the members of the North Atlantic Treaty Organization (NATO).

These were the strategic requirements that helped shape the pentomic concept. Like the triangular concept, the pentomic structure was tested at division level and then again during large scale maneuvers.[73] From these tests the Army determined that the pentomic concept was valid. The Army used methods similar to what they had done fifteen years previously in shaping itself for the future. Bacevich points out that during this period the Army's budget could not maintain a large force structure, sustain modernization and support extensive participation in missile development.[74]

The pentomic concept was the result of these strategic requirements and the operational concept of defending in Europe against a Soviet threat. The pentomic concept was heavily criticized after the fact, but at the time it was the best the Army could do given the uncertainties it faced.[75] Lieutenant General James Gavin noted that the "monolithic" division of tradition had to be abandoned because it was too vulnerable to disruption from nuclear weapons.[76] What is unknown is how the pentomic concept might have worked in practice.

## Summary

Several trends stand out as a result of this analysis. The strategic requirements that influenced the triangular and pentomic concepts were remarkably similar. Both concepts recognized a large European based army as the principle threat. The focus for planning was Europe and the intensity of combat was anticipated to be high. In both cases, allies played a role

and the enemy was a well defined group of nation-states. These requirements, in turn, influenced the operational concept of the Army and how it designed its forces.

Operational concept is where the triangular and the pentomic concepts diverge considerably. The dominant technology in the case of the triangular concept was mechanization which, while significant, did not permanently change the relationship between fire and maneuver. This became evident later in World War II when the blitzkrieg no longer enjoyed its earlier success and operations settled down to the more traditional infantry-artillery struggle. In the case of the pentomic concept the dominant technology was extremely lethal, if immature. Nonetheless, this technology, when coupled with the ideas of such airpower theorists as the Italian Giulio Douhet, threatened the very existence and rational of the Army.

The examination of the systemic processes shows greater congruence than divergence between the concepts. Both the triangular and pentomic concepts were built on the premise of a large force sustained through conscription. Both struggled for resources and it was only the arrival of war that loosened the purse strings enough to allow the full development of the triangular concept. The pentomic concept never achieved this level of resourcing and, perhaps, that is a partial reason for its demise. Both concepts relied on division level tests and large scale field maneuvers for validation. At the time this was

probably the best and only way to do this, but the results are certainly subject to question.

The triangular and pentomic concepts were conceived within twenty years of each other and derived from similar strategic requirements and system processes. What defines them as separate and distinct concepts is the influence of technology in creating a tactical problem that caused a reassessment and change in the Army's operational concept and organizational design to execute that concept.

## V. Theory, Doctrine and Force Design

The Army experienced great success in Operations Just Cause and Desert Storm. This does not, however, guarantee success in future conflicts. Electing to change, to prepare for a future filled with uncertainty, requires great institutional courage. How the Army understands theory and defines its doctrine will determine how it goes about making those changes. It is useful to examine how the Army has traditionally thought about theory, as well as how it may need to adapt its thinking. It is also important to consider, in light of earlier historical examples, the impact this thinking will have on current force design issues.

Recent advances in science have provided military theorists and historians with a new way of interpreting Carl von Clausewitz' theory of war and, in particular, his concept of friction. Clausewitz (1780-1831) argued that war was not subject to deterministic analysis and that the difference between theory and real war was found within the concept of friction.[77] Chaos theory, a relatively new area of scientific investigation, is based on the premise that a system is sensitive to initial conditions, that these initial conditions are hard to measure, and that any change in conditions can lead to disproportionate effects anywhere in the system. Dr. Alan Beyerchen, a historian who has done research in chaos theory, suggests that "'Friction' conveys Clausewitz's sense of how unnoticeably small causes can become amplified in war until

they produce macroeffects, and that one can never anticipate those effects."[78] He goes on to suggest that Clausewitz' visual metaphor of the three magnets is "an emblem of contemporary nonlinear science" that correctly "convey[s] his insight into the profoundly interactive nature of war."[79]

Not surprisingly, Clausewitz' view of friction and recent advances in chaos theory conflict with our traditional methods of thinking about war. A former Air Force officer, Barry D. Watts, in his 1984 book The Foundations of U.S. Air Doctrine: The Problem of Friction in War, argues that the American military believes "that war can be reduced to engineering formulas and calculations."[80] He then goes on to point out that

> the essential impact of general friction is that the elemental processes of war are too uncertain, too riddled with chance and the unforeseeable to be wholly, or even mostly, captured by pat formulas and engineering calculations.[81]

He goes on to show that, at least within the Air Force, there was a tacit acceptance of a deterministic *Weltanshauung* that traces its origins back to the discoveries of Isaac Newton. In a more recent article he argues that

> The brute fact of non-linearity dooms the plausibility and adequacy of wholly linear approaches to operations analysis, policy formulation, procurement choices, systems analysis, military modeling, wartime planning, assessments of operational effects, comparative force assessments and the rest. These fields cannot be reduced to linear equations and predictive measures[82]

Both Watts and Beyerchen have demonstrated the relationship between Clausewitz' concept of friction and recent developments in chaos theory. They argue that war is non-linear in nature and that Clausewitz accounted for this through his theory of friction before his contemporary scientific community could fully sustain him. If they are correct in these observations then the Army must reevaluate how it understands theory and how this understanding influences doctrine and forces design. Failure to conduct this reevaluation will result in the use of old models of analysis which are based on old ways of thinking. These models are familiar, but are likely to lead to faulty analysis which will provide the wrong answers in the Army's search for a new force design.[83]

A possible solution to this problem of understanding is to adopt a new theory of war and then modify doctrine to capitalize on its advantages. A new theory is starting to emerge from the post Desert Storm military literature. It is based on the idea that knowledge can provide a significant advantage to the side that can exploit it and deny its benefits to the enemy. Proponents of this theory argue that successful application of information technology will allow the Army to become more effective in combat and more efficient in its noncombat activities. This increase in combat effectiveness and non-combat efficiencies means that some units will become unnecessary and others will require fewer personnel. These smaller units will still perform as well, if not better, than today's units, which means the Army will require fewer people.

Ultimately, these new economies translate to reduced defense budgets.

The Army's new forces will attain a higher degree of combat effectiveness through their ability to exchange information. Rapidly exchanging key battlefield information will result in better tactical decisions, faster response times from units providing supporting fires, and fewer cases of fratricide. Possessing superior knowledge of the battle space will provide the decisive edge over any future enemy.[84]

With greater combat effectiveness comes savings in manpower and size. For example, a brigade organized under this concept will possess the combat capability of today's division. A division today usually consists of three ground maneuver brigades and supporting forces. If a future brigade equals today's division, then the division of tomorrow could, in effect, equal the corps of today. This sort of reasoning, if realistic, would improve the Army's force projection and early entry capability. Potentially, there are many other advantages, but this serves to illustrate the thrust of current thinking.

This higher quality - leveraged technology - smaller cost, line of reasoning is not new. During the 1920's and 30's J. F. C. Fuller, the British General and theorist, used a similar logic in 'selling' his theory of future war. He argued that

> To-day every organized army is faced by the greatest revolution that has ever taken place in the history of land warfare,...the motorization and mechanization of armies reverse the whole of this process of organizing, fighting and thinking....the expense of raising mechanized armies will limit

> their size...for fighting purposes highly trained professional armies will replace the present-day short service conscript masses.[85]

World War II, still seven years away when he wrote these words, proved that he was right about mechanization, but wrong about the size and composition of future armies. Today, theorists face a similar dilemma. The information revolution is real, but it is difficult to determine what impact it is going to have on 'this process of organizing, fighting and thinking.'

To fully appreciate today's challenges it is necessary to evaluate the Army's current situation, using the three part methodology. Doing so demonstrates the difficulty in moving from theory to practice.

In 1993 the Army issued a new version of FM 100-5 that defines its operational concept. The manual emphasizes joint and combined operations and it assumes a position of technological superiority as this is a strategic principle from the national military strategy.[86] The dominant technology, based on the lessons from Operation Desert Storm is, as mentioned, in information related areas. The manual stresses the horizontal integration of technology to achieve increased combat power. What is interesting, is that this is one of the few examples of where the Army sees itself increasing its combat power from a distinctly non-lethal technological function.[87]

The Army's approach to the forms of war is balanced, with the understanding that the defense may be a necessary, but temporary measure. The Army is prepared to deploy rapidly and accepts the fact that it may, at least initially, find

itself at a disadvantage and hence on the defensive. In the end, as in past years, "the offense [remains] the decisive form of war."[88]

The tactical problem the Army faces today is two-fold. First, force projection presents a major challenge given the withdrawal of American forces from forward deployed overseas bases. Second, the Army is attempting to find a solution to the problems created by operations other than war (OOTW). This combination creates pressure for a rapidly deployable force that is capable of operating under conditions of war, conflict and peace. This requirement is more complicated than deterring war or winning in combat should deterrence fail. Operations of this nature are likely to take place under the auspices of the United Nations and the Army may find itself having to project power to places where little support infrastructure exists. An operation that starts under one condition could easily shift to one of the other conditions. Somalia, for example, started as a peacetime humanitarian mission, shifted to peace enforcement and then shifted back. Recognition of this requirement demands versatility from the forces in the inventory.

Today's strategic requirements are difficult to define. The Army cannot, with assurance, say where the next conflict will take place. Korea is a possibility, but so are several other spots around the globe. Furthermore, the Army has no sense of whether or not time is short. Since it is difficult to determine who the enemy will be, it is also hard to estimate the duration

or likely intensity of the war. The Army's recent operations in Panama and the Middle East have resulted in a perception that the conflict is going to remain short. Doctrine states that quick decisive victory is the goal.[89] However, the Army recently spent fifteen months in Somalia conducting OOTW and it can hardly be described as a victory.

The Army does not, with certainty, know who the enemy will be or, for that matter, who its allies will be. The coalition used during Operation Desert Storm is one example of an unlikely coalition of allies that worked. Increasingly, there are operations run in conjunction with the United Nations and other non-governmental organizations. Current doctrine recognizes these changes and says the Army has to prepare for these type operations in the future.

Today's Army is the product of twenty years of successful recruitment. It is not a conscript army, but rather an army of professional volunteers. This contrasts sharply with the Army experience in 1941 or in 1956. The Army is currently running a series of GHQ exercises under the Louisiana Maneuver (LAM) umbrella. In GHQ '94 the Army will test the concept of the Mobile Strike Force as a means to move towards Force XXI, which will lead to the next century's army. GHQ '94 will not take place in Louisiana and will not place any maneuver units on the ground. Instead, the Army relies on computer simulation as the basis for its large unit exercises and maneuvers. Originally, the computer simulation upon which GHQ '94 is based was intended as a training device. This intent

is remarkably similar to the stated purpose behind the original GHQ exercises in 1941. Now, as then, the training device, which is a simulation of combat, will also serve as the Army's looking glass into future combat.

The principle distinction that appears between today's Army and the past examples is the relative lack of certainty regarding many of the strategic requirements. It is difficult to design a future force when there are so many variables. Nonetheless, the Army will have to try to design a future force and it needs to do this with the best possible vision of the future.

## VI. Conclusion

This analysis demonstrates several problems that the Army must carefully consider. First, strategic requirements that ought to help determine the shape of the force are, themselves, unclear. This situation effects both the Army and the country's civilian leadership. Ideally, U.S. strategy provides 'top down' guidance to the Army concerning its requirements, however, currently there is very little guidance and it frequently changes. Second, the Army's definition and understanding of war, a central part of its operational concept, has become increasingly more complex. In recognition of this, the Army has devoted an entire chapter to OOTW in FM 100-5 as it prepares itself for different operational roles. The Army understands that it does not get to select its wars and must fight wherever and whenever it is directed to do so. Finally, the Army's force structure, the reality of the force, is a function of Congressional willingness to provide money for the Army's budget. Given the current conditions of uncertainty, the Congress should be willing to 'hedge its bets'. However, against the backdrop of the Cold War costs and fear of economic decay, this may not be the case, as the country's leaders look to domestic agendas and peace dividends to pay the way.

Furthermore, it is essential that the Army avoid the linear, predictive approach to future war that was so pervasive during the Cold War. Clausewitz recognized the non-linear nature of warfare and only now, through quantum theory and

chaos theory, is it possible to fully appreciate the depth of his understanding of war.

This better understanding of theory might lead to a better quality of doctrine, which in turn will help shape the Army of tomorrow. Appreciating these new views of science will allow the Army to become more comfortable with uncertainty, but only if the Army becomes a 'learning' organization.

Information technologies offer tremendous advantages to the side that can best exploit them. Nonetheless, there is friction at every point in the military machine and no amount of information technology will completely overcome it. In fact, information technology may ultimately overwhelm the force, becoming a source of friction itself.[90]

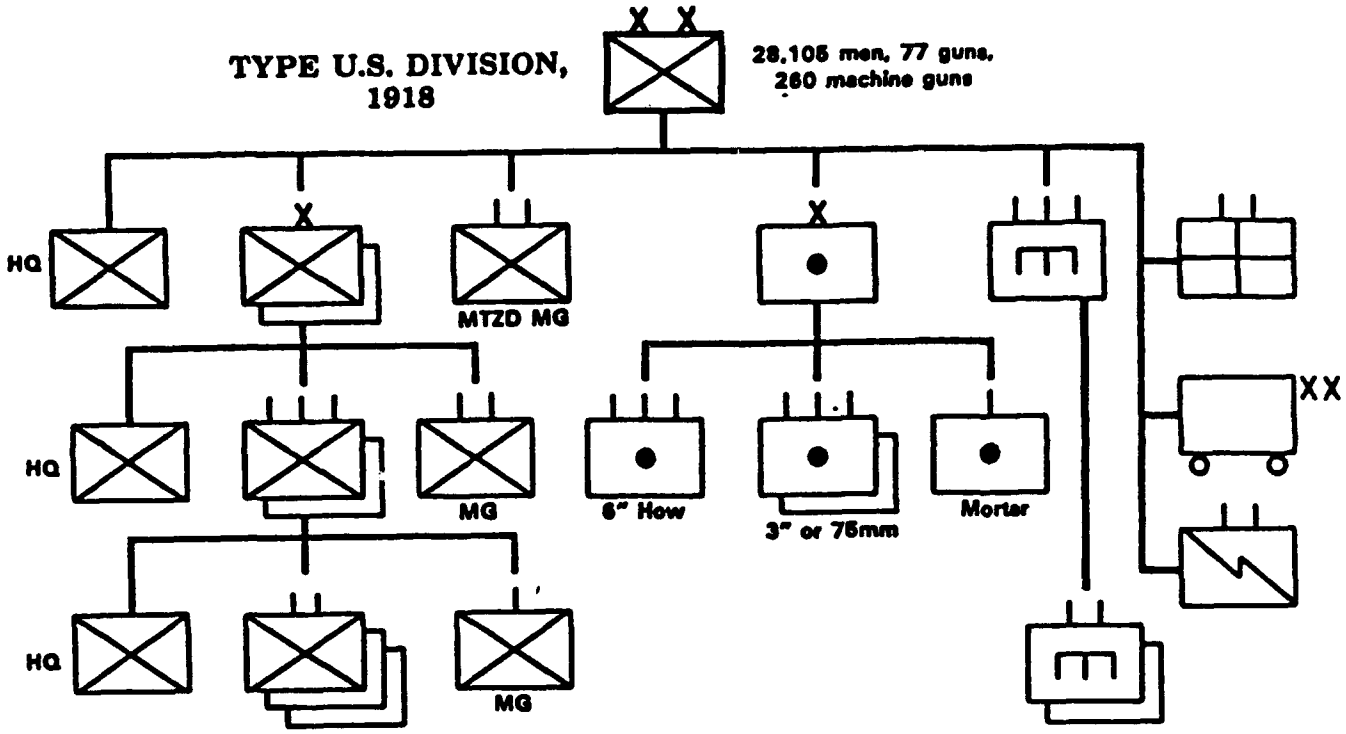
Mobile Strike Force and Force XXI are the current force design concepts under consideration. GHQ '94, the evaluation mechanism, is currently based on a Southwest Asia venue, which addresses only one set of strategic requirements and an operational concept that does not include OOTW. Like the evaluation mechanisms of the past, today's GHQ and LAM series of exercises have weaknesses which the Army must address. These weaknesses include a tendency to refight the last war (Desert Storm), limited joint considerations, poor intelligence integration and an overreliance on combat models that are dominated by the Lanchester equations.[91]

The Army has a much more sophisticated doctrine today than it had in either 1939 or 1954. Consequently, current

reorganization efforts are more difficult now than during those earlier periods. Doctrine today calls for a mix of forces that did not exist in 1939 and were embryonic in 1954. Furthermore, a significant challenge remains in addressing OOTW without losing any combat capability. The current situation parallels, in some ways, the nuclear - conventional issue of the pentomic concept. Creating a force that is dual purpose and capable of operating under different strategic requirements and operational concepts is difficult. The Army must attempt to bridge this gap if it is going to properly prepare for the future. Mobile Strike Force may represent the cutting edge of military lethality, mobility and combat power, but it also may turn out to be completely irrelevant under different circumstances.

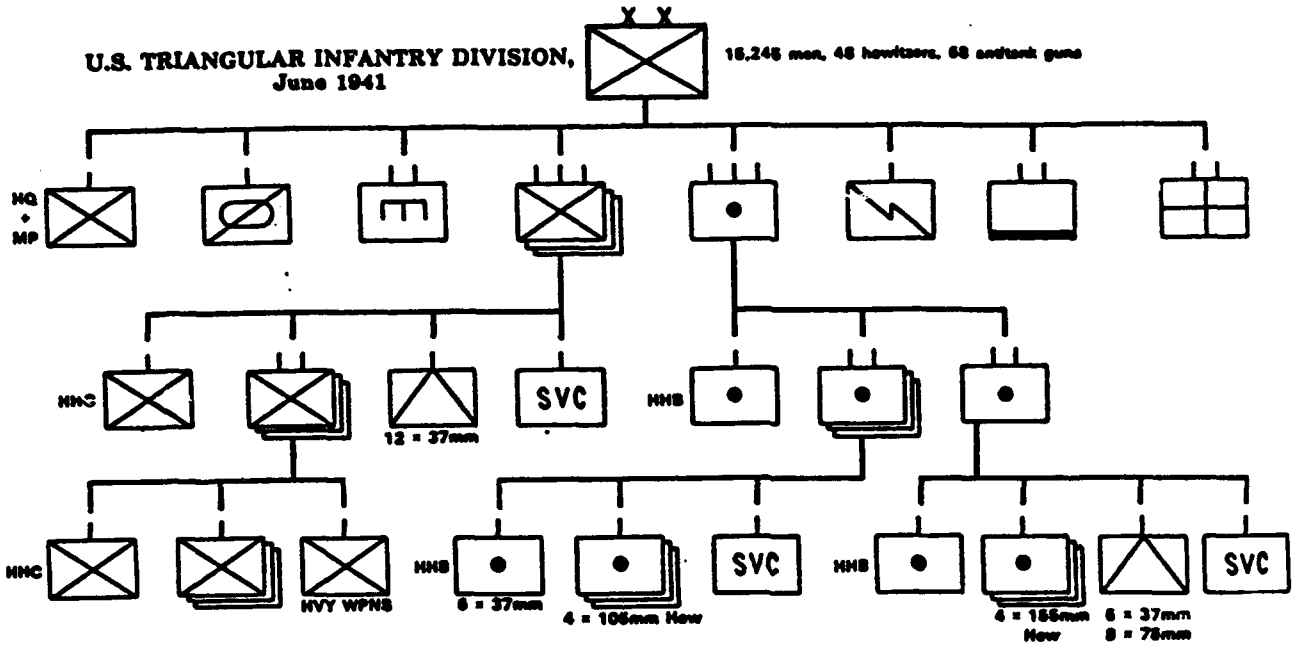
Michael Howard, the distinguished British historian, has written that "the capacity to adapt oneself to the utterly unpredictable, the entirely unknown" is an important quality for military organizations. It requires "flexibility both in the minds of the Armed Forces and in their organization, that needs above all to be developed in peacetime."[92] This study of past experiences provides a framework from which force planners can approach the problem of future war and force design.

## Appendix A: The Square Division




Source: Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization, Combat Studies Institute, Research Survey No. 2. (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College, 1984), p. 18.

## Appendix B: The Triangular Division

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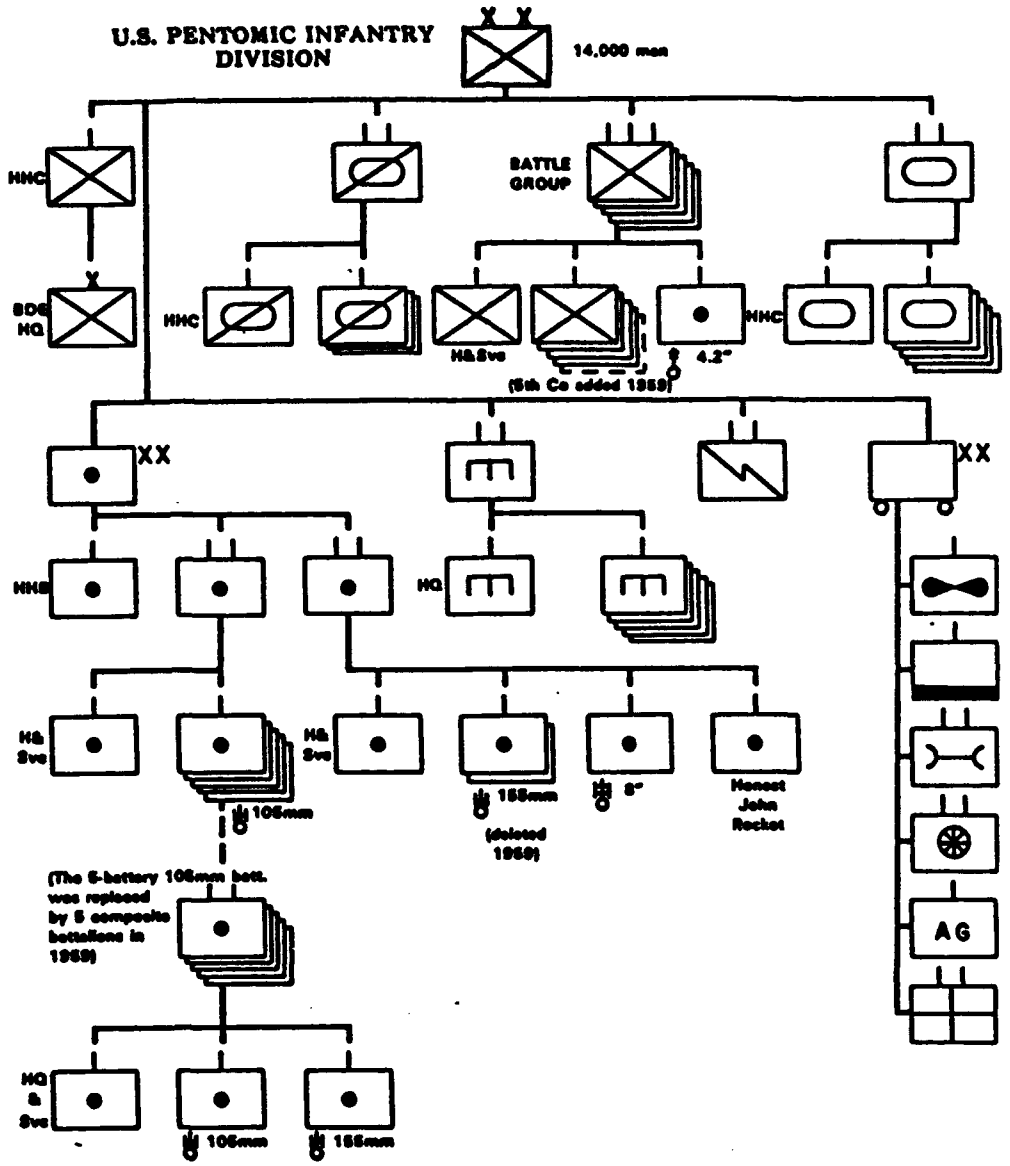
## Appendix C: The Pentomic Division




Source: Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization, Combat Studies Institute, Research Survey No. 2. (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College, 1984), p. 159.

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[39]A.J. Bacevich, The Pentomic Era: The U.S. Army Between Korea and Vietnam, (Washington, D.C.: National Defense University Press, 1986), pp. 19-48; and Weigley, pp. 525-526.

[40]Bacevich, pp. 16-18.

[41]Kevin Soutor, "To Stem the Red Tide: The German Report Series and Its Effect on American Defense Doctrine, 1948-1954," The Journal of Military History 57 (October 1993): 681.

[42]Mark Perry, Four Stars, (Boston, Massachusetts: Houghton Mifflin Company, 1989), pp. 49-50.

[43]S.L.A. Marshall, Men Against Fire: The Problem of Battle Command in Future War, (New York: William Morrow and Company, Inc., 1947; reprint ed., Gloucester, Massachusetts: Peter Smith, 1978), p. 19.

[44]Perry, p. 50.

[45]Bacevich, pp. 103-127; and Doughty, pp. 16-21.

[46]John H. Cushman, "Pentomic Infantry Division in Combat," Military Review 37 (January 1958): 21; and Moenk, p. 212. During Exercise Sagebrush, the large scale maneuver conducted to test the pentomic concept, 254 atomic weapons were used during the tactical play which lasted about 13 days.

[47]Theodore C. Mataxis and Seymour L. Goldberg, Nuclear Tactics, Weapons, and Firepower in the Pentomic Division, Battle Group, and Company, (Harrisburg, Pennsylvania: The Military Service Publishing Company, 1958), pp. 169-175; and Cushman, p. 24.

[48]Cushman, pp. 26-29.

[49]Roger J. Spiller, "Not War But Like War": The American Intervention in Lebanon, Combat Studies Institute, Leavenworth Paper No. 3. (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College, 1981), pp. 36-37.

[50]Russell F.Weigley, The American Way of War, (Bloomington, Indiana: Indiana University Press, 1977), p. 419.

[51]Bacevich, pp. 132-135.

[52]Weigley, pp. 419-425.

[53]Doughty, pp. 20-22.

[54]See James M. Dubik, and James J. Montano, "FM 100-5: Conceptual Models and Force Design," Military Review 64 (July 1984): 16-25; John W. Foss, Donald S. Pihl, and Thomas E. Fitzgerald, "The Division Restructuring Study." Military Review 57 (March 1977): 11-21 and Lewis I. Jeffried, "A Blueprint for Force Design," Military Review 71 (August 1991): 20-31.

[55]Carl. von Clausewitz, On War, Edited and Translated by Michael Howard and Peter Paret. (Princeton, New Jersey: Princeton University Press, 1989), pp. 357-369 and 523-528.

[56]Gordon R. Sullivan, "Ulysses S. Grant and America's Power-Projection Army," Military Review 74 (January 1994): 13.

[57]Russell F.Weigley, "Shaping the American Army of World War II: Mobility Versus Power," Parameters 11 (September 1981): 15-16.

[58]Ibid., pp. 18-19.

[59]U.S. Army, FM 100-5, Field Service Regulations: Operations, (Washington, DC: Department of the Army, 1941; reprint ed., Fort Leavenworth, Kansas: U.S. Army Command and General Staff College Press, 1992), pp. 22 and 97.

[60]Gable, p. 68.

[61]Whitaker, p. 13.

[62]Gable, p. 68.

[63]Weigley, p. 19.

[64]Ibid., p. 21.

[65]E. J. Kahn, Jr. McNair, Educator of an Army, (Washington, D.C.: The Infantry Journal, 1945), pp. 24 and 26.

[66]Kent Roberts Greenfield, Robert R. Palmer,and Bell I.Wiley, The Organization of Ground Combat Troops, United States Army in World War II, The Army Ground Forces. (Washington, D.C.: Department of the Army, 1947), p. 9.

[67]See "The 90-Division Gamble" by Maurice Matloff in Kent Roberts Greenfield, ed, Command Decisions, (Washington, D.C.: Office of the Chief of Military History, United States Army, 1960), p. 366; and Russell F. Weigley, History of the United States Army, (Bloomington, Indiana: Indiana University Press, 1984), p. 599.

[68]Gary Wade, Conversations With General J. Lawton Collins, Combat Studies Institute, Report No. 5. (Fort Leavenworth, Kansas: U.S. Army Command and General Staff College. Interview, 17 May 1983), pp. 14-15.

[69]Kent Roberts Greenfield, Robert R. Palmer,and Bell I.Wiley, The Organization of Ground Combat Troops, United States Army in World War II, The Army Ground Forces. (Washington, D.C.: Department of the Army, 1947), p. 271.

[70]U.S. Army, FM 100-5, Field Service Regulations: Operations, (Washington, DC: Department of the Army, 1954), pp. 4-5.

[71]Ibid., p. 4.

[72]Ibid., p. 113.

[73]The 1st Armored and 47th Infantry Divisions were selected to test the pentomic structure. (Military Review (September 1954): 63). Exercise Sagebrush was the largest postwar exercise held and was designed to evaluate the integration of atomic weapons on "military concepts and structures". (Army-Navy-Air Force Register 26 November 1955, p. 35).

[74]Bacevich, pp. 16-18.

[75]Bacevich pp. 134-135.

[76]Theodore H. White, "An Interview with General Gavin," The Army Combat Forces Journal (March 1955): 22.

[77]Clausewitz presents his theory of friction in two different forms. Chapter Seven, Book One is titled Friction in War and argues that friction "is the force that makes the apparently easy so difficult." He notes that unless one has experienced war it is impossible to fully understand the difficulties. More specifically, he notes that while an army consists of units, these units are made up of individuals who are vulnerable to the consequences of danger, physical exertion, chance and the fog of war. In its second form, friction incorporates the entire atmosphere of combat and includes the cumulative effect of the aforementioned list of factors. From this one sees that friction can accumulate and wear down the military machine. Beyerchen argues that "the concept of friction is not just a statement that in war things always deviate from plan, but a sophisticated sense of *why* they do so." This interpretation is based on an understanding of chaos theory and is fundamentally different from earlier

interpretations that are rooted in a 'systems analysis' or deterministic understanding of theory.

[78]Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," International Security 17 (Winter 1992/93): 77.

[79]Ibid., p. 69.

[80]Barry D. Watts, The Foundations of US Air Doctrine: The Problem of Friction in War, (Maxwell Air Force Base, Alabama: Air University Press, 1984), p. 47.

[81]Ibid., p. 53.

[82]Roche, James G. and Watts, Barry D. "Choosing Analytic Measures." The Journal of Strategic Studies 14 (June 1991): 194.

[83]Ibid., pp. 194-196.

[84]John Arquilla and David Ronfeldt, "Cyberwar Is Coming," Journal of Comparative Strategy 12: 1; Alan D. Campen, ed. The First Information War: The Story of Communications, Ccomputers, and Intelligence Systems in the Persian Gulf War, (Fairfax, Virginia: AFCEA International Press, 1992), p. vii; and Alvin Toffler and Heidi Toffler, War and Anti-War, (Boston: Little, Brown and Company, 1993), pp. 76-7.

[85]J. F. C. Fuller, Lectures on F.S.R. III. (Operations Between Mechanized Forces, (London: Sifton Praed & Co., Ltd., 1932; Combat Studies Institute, student text A699, Fort Leavenworth, Kansas: U.S. Army Command and General Staff College, 1993), pp. 1 and 6.

[86]U.S. Army. FM 100-5, Operations, (Washington, DC: Department of the Army, 1993), p. 1-4.

[87]Ibid., p. 2-3.

[88]Ibid., p. 7-0.

[89]Ibid., p. 1-3.

[90]John K. Stoner, "Energizing the Trinity: Operational Implications of Warfare in the Age of Information Technology" (Monograph, School of Advanced Military Studies, Fort Leavenworth, Kansas, 1993), pp. 38-41.

[91] Charles A. Kupchan, "Setting Conventional Force Requirements: Roughly Right or Precisely Wrong?," World Polictics 41 (July 1989): 570-574.

[92]Michael Howard, "Military Science in an Age of Peace," Journal of the Royal United Services Institute for Defence Studies 119 (March 1974): 7.

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