STRATEGY RESEARCH PROJECT

THE WORLD IN 4 M'S: A STRATEGY PRIMER

BY

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ABSTRACT

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To help today's leaders make the best decisions under the circumstances, organizational and strategic planners have developed a variety of analytical decision-making tools. This article proposes one such decision-making tool we call the "World in 4 M's" because of the way it defines and graphs human systems by four basic components: mind, morale, muscle and materiel (the "4 M's"). We believe this 4 M approach offers a unique way of analyzing nations and geographic regions for the purpose of assessing relative power and possible threats to national security.

The article first discusses the concept behind the 4 M approach and then illustrates sample applications of the 4 M process.

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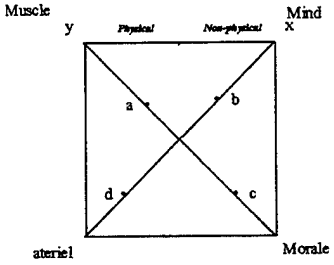


Winston Churchill, during the critical decade leading to World War II, saw the threat that Hitler posed and called for early military intervention to stop the ambitious Aryan. But his words found little support from countrymen and allies desperate to avoid more war.[1] That concession and appeasement only insured greater destruction later is ironic and an historical example for ages to come of good-intentioned leadership making bad choices. Leaders through history have worked very hard at trying to make the right choice. To help today's leaders make the best decisions under the circumstances, organizational and strategic planners have developed a variety of analytical decision-making tools. This paper proposes one such decision-making tool we call the "World in 4 M's" because of the way it defines and graphs human systems. We believe this 4 M approach offers a unique way of analyzing nations and geographic regions for the purpose of assessing relative power and possible threats to national security, so that a future Hitler cannot again go miscalculated and therefore unchecked.

The paper first discusses the concept behind the 4 M approach and then offers illustrations of possible applications.

Summary of the 4 M Process

While there is a wide range of planning and decision-making tools already available, we believe the 4 M process is unique in its approach and in the wide range of its possible applications.

The 4 M approach defines a human system into four basic components--mind, muscle, materiel and morale. Two of these are physical components (muscle and materiel) and two are nonphysical (mind and morale). Nations, militaries, regional powers (or any type of human systems) are analyzed not only along their physical characteristics, but also their nonphysical ones. This captures for analytical purposes not only those qualities one can see, but also intangible forces that can't be seen, but which are sources of national or regional power nonetheless.

The result is a 4 M graph—a polygon within a box--that can be used uniformly with any system as a uniquely informative and flexible method of analysis, whether analyzing one human system internally, or comparing across a set of systems, such as in a regional analysis. The graph reduces even extremely complex calculations into an instant picture of the system. Furthermore, the graph becomes the basis for further calculations, comparisons and "war-gaming."

The graph can be used alone to depict the fundamental nature of a system (much like a "snapshot") or to track its internal changes (much like a video game keeps score). Or a number of boxes can be drawn to depict nations and (much like a chess game) be placed geographically over a topographical map and "played" to analyze, among other things, regional relative strengths and weaknesses, centers of gravity, and future fault lines.

Finally, because this approach to studying the human world around us is designed to accept, interpret, categorize and summarize large amounts of information in a simple manner, it is a way to alleviate the problem of information overload, i.e., too much information, too little time.

This is a fundamental change from the way we do strategy planning now but is consistent with traditionally accepted views on human systems, particularly as pertaining to one of the oldest of human activities—war.

Other Decision-Making Tools

There other analytical tools available to assist planners and policymakers in making better-informed decisions. There are such popular devices as "trend analysis" (statistically forecasting future trends based on historical data),[ii] "expert judgement" (the reliance on individual expertise or knowledge and intuition),[iii] and "multi-option analyses."[iv] An example of multi-option analysis is the alternative scenario, a collection of possible futures that give decision-makers an appreciation for the full range of possibilities in coming years.[v] These techniques are widely accepted and used, but each has limitations.

Statistical trends are best applied in areas where a high degree of stability exists, such as with "stable customers, market conditions and business procedures."[vi] Multi-option analysis, such as alternative scenarios or assumption-based planning, is preferred when working with a high degree of uncertainty.[vii] Because of the significant level of unpredictability assumed to be present, the same degree of reliability is attached to "expert judgement"[viii] as to more mathematically rigorous methods.[ix] New groups of individuals would likely result in new groups of findings,[x] making the work less credible. Also, expert judgement tends to be conservative rather than expansive or comprehensive.[xi]

The difference in our process is not only in the way it handles information and depicts the findings, but also in the way it sees the world and the human systems that inhabit it.

The World in 4 M's

Every human system, be it a nation, an organization, or a regional power, is composed of human beings and all human beings live in two dimensions. One is the *physical* dimension composed of *muscle* (human flesh and blood) and *materiel* (non-human equipment, systems, infrastructure and the physical geography). The other is the *nonphysical* dimension composed of *mind* (reason, logic and strategy) and *morale* (instincts, morals, and emotions).[xii] To adequately measure a human system, both of these dimensions and their respective components--*mind, muscle, materiel and morale* (the "4 M's")—need to be taken into account. This concept of analyzing a human system in both its physical and nonphysical dimensions is consistent with the thinking of three preeminent military theorists of the late 18th and early 19th centuries when describing the fundamental components of one of the oldest human systemic pursuits—war.

War is organized human activity at its most violent. Whole human systems—nations, armies, regional factions, galvanize into concerted acts of survival or advancement. And just as when individuals are drawn into physical contests, it is not just the stronger fist that determines winners, but also the smarter stance and the braver heart. Carl von Clausewitz (1780-1831)[xiii] distinguishes between physical force and moral force[xiv] within an army in terms of the power that it brings to battle. "If war is an act of force, the emotions cannot fail to be involved."[xv] Ardant du Picq (1821-1870),[xvi] also distinguishes between two sources of power in an organization: physical ("material") and moral.[xvii] "In the last analysis, success in battle is a matter of *morale*. In all matters which pertain to an army, organization, discipline and tactics, the human heart in the supreme moment of battle is the basic factor."[xviii]

Clausewitz further divides the moral component into two qualities: (1) "reason," ("brilliant qualities of the mind") and (2) emotion (such as "despair," "calmness and firmness")[xix] and recommends a necessary balance between the two.[xx] In a similar "mind"/"morale" dichotomy, du Picq believes the nature of the moral component is the result of the relationship between leaders (i.e., "mind") and their followers (i.e., "morale")—emphasizing determining factors of leadership, organization and discipline on resulting morale.[xxi] ("Mediocre troops like to be led by their shepherds. Reliable troops like to be directed, with their directors alongside of them or behind."[xxii])

Du Picq emphasizes that it is not only the moral component of armies that affects the outcome of present and future wars, but also that of the nation, in terms of "national vanity" or "national pride."[xxiii] Antoine Henri Jomini (1779-1869),[xxiv] also recognizes that the strength of a nation relies on the temper of the government and its citizens. He encourages the cultivation of a "military spirit" and "civic virtues" in

the population at large, as a necessary ingredient to continued national power. He suggests bestowing "social and public recognition" on the army and its personnel, as well as recognizing the preference for "heroic" virtues, such as courage and "faithful attention to duty" over the desire for personal gain.[xxv] Clausewitz summarizes these composites of power within the total entity in his famous triad of "people" ("a blind, natural force"); army ("the instrument of power") and the government ("reasoned" political aims).[xxvi] Within our 4 M description of a human system, Clausewitz' government would correlate to *mind,* the people's passion would correlate to *morale* and the instrument of power in terms of men and equipment in the army would translate to *muscle* and *materiel.*

Having discussed the theory and reasoning underpinning the 4 M process, it is time to discuss in greater detail the steps to be taken in individual studies of specific human systems, beginning with observing the world around us.

STEPS TO BUILDING A 4 M GRAPH

There are six steps to building the 4 M graph. They are:

1. Identify the Study Focus and Purpose
2. Choose between Absolute and Relative Standards
3. Select Variables
4. Simulate Variable Interrelationships within the 4 M's
5. Procure and Process Data
6. Determine Index Range of 1 and 0
7. Plot 4 M Graph

Each is discussed in turn.

Step1: Identify the Study Focus and Purpose

No system is studied unless someone first realizes an interest. Man looks around and notices things. Pretty soon he begins to wonder why things are the way they are. Questions lead to speculation about probable causes. As evolution and technology advance, speculation gives way to more methodological investigation to find the answers. Finding the answers becomes the purpose of the study. Today within the "hard sciences," such as astronomy, chemistry or biology, questions include "how big is the universe?" "How small are atoms?" "Is there a cure for cancer?" The questions lead to the objects for study: space, matter, or the human body.[xxvii] On a less exact, but no less important level, are questions regarding human systems. How can an organization increase readiness? What keeps a nation prosperous? Can historically unstable regions be made more peaceful? Again, the question leads to the object for study: an organization, a nation, or an ethnic enclave.

A study begins on a human system for the purpose of better understanding it and thereby better controlling it. The challenge to planners and policymakers is how to best intervene for the desired effect. Determining the best method of intervention—if at all—becomes the purpose of the study.

Step 2: Choose between Absolute and Relative Standards

The 4 M process is a comparative analysis, measuring either current status against some standard, or a group of systems to one another. The process of comparison requires first identifying the standard of comparison to be applied. The standard can be universal (absolute), or relative, with rank order determined from the field of entities studied.[xxviii]

Absolute standards are those generally recognized as applying equally to all human systems, such as international law or commonly accepted codes of moral conduct.[xxix]

Relative standards compare a system to a limited set of other systems and judge their relative status in comparison to that limited set. Being the tallest building in Kansas is not the same as being the tallest building in the United States. Being the strongest power in the Balkans is not the same as being the strongest power in the World. The comparative range is determined by the qualities and quantities of the group of systems selected for study. These qualities or quantities are obtained by measuring selected variables within the system.

Step 3: Select Variables

The human experience operates within an environment of space, time, matter and the forces of the universe, from vast galaxies overhead to the tiniest of atoms. But man is also an intellectual processor and a spiritual brooder. The human "character" is a product of an uneasy balance between the ability to reason logically and deeper motivations—intuitive feelings, ingrained morals, natural instincts, and human frailties. He creates for himself intricate man-made environments of societies, governments, economies and technologies[xxx] that he works hard to build and sometimes works hard to tear down. All these influences on man's environment are called variables.

Variables are "any measurable conditions, events, characteristics, or behaviors, that are controlled or observed in a study."[xxxi] They are the backbone of all scientific inquiry—selected for their influence, then tested, measured, manipulated and tested again. They work in relationships of independent and dependent variables. Independent variables are those influences, such as "exposure to sun," which are the *cause* of certain *effects* (i.e., the dependent variables, such as "skin cancer").

Within each of the 4 M's of a system, are variables in differing quantities and combinations of relationships that influence the system in some way. Some variables may have more influence on the system than others. Some may work in interrelated "bundles" of variables, which influence each other as they influence the system, either concurrently or sequentially.

To study a system adequately, its physical and nonphysical traits and processes must be captured in some way that imitates--"simulates"--the reality of the system. Therefore, once the purpose of the study has been defined and variables identified, the system is simulated by hypothesizing about the interrelationships of these variables and their various influences on the system.

Step 4: Simulate Variable Interrelationships within the 4 M's

Simulations are "elaborate games for the purpose of understanding and testing" relationships between selected variables within a system.[xxxii] Properly constructed, a simulation can test hypothesized relationships (predictions) between independent and dependent variables (i.e., cause and effect), bringing greater understanding[xxxiii] of the system studied. Greater understanding brings a greater ability to predict how a system will react under varying circumstances. Once relationships are established and understood, measurements of variables behave like gauges (much as thermostats measure room temperature as well as control the furnace). Too cold and the heat can be turned up (by manipulating influencing variables). Too hot and the heat can be turned down.

Simulations can be achieved at any level of complexity and detail—from simple conceptual word descriptions to advanced mathematical applications that take into account the coupling of variables,[xxxiv] cycles,[xxxv] developing theories of chance, chaos,[xxxvi] fractal geometry,[xxxvii] and so on. The more complex form of mathematical simulations have been significantly discouraged (and discouraging) until recently because of their reliance on large amounts of data and advanced computer technology,[xxxviii] too difficult and complex to apply with any regularity or efficiency. However, recent developments—particularly in the growing understanding of certain types of mathematics and the increased capability of computers and their software--have brought new opportunities to better and more reliably study human systems. The concept of chaos is particularly intriguing because, despite its misleading name, it is the study of "determining" events, "a time evolution with sensitive dependence on initial condition."xxxix.

Chaos theory is the opposite of chance (statistics and probability). While statistics provides an educated guess regarding developments, chaos theory strives to determine the outcome. While chance guesses about the most likely, chaos traces causes of the unexpected, in the process giving it a sense of order in its turbulence and an ability to determine—not speculate on—its future course.[xl] "Nothing occurs without a cause or, at least, without a determining reason.[xli] Turbulence can be explained in connection to its origins and future turbulence determined by following the natural course of original conditions.xlii This is charmingly called the "butterfly effect," suggesting that even the gentle flapping of these fragile wings can set in motion eventual monumental changes in the atmosphere.[xliii]

The more technical and complex the mechanics, the more the resulting simulation of the system resembles reality and the greater the potential for "determination"[xliv] rather than speculation. The

challenge is to backtrack from the big events to their small beginnings--the butterflies of the world. Meteorologists use chaos theory to greater or lesser degrees of success. But there are literally too many butterflies, not enough time, people, or money to track them all—but technology is advancing every day, bringing more and more of the little creatures into sight. This is important for our purposes because human behavior is thought to exhibit chaotic traits[xlv] but further study may reveal order in the apparent chaos, leading to greater knowledge. However, because such calculations require capabilities and resources still not widely available, complex mathematical notions must still be augmented by less perfect statistical probabilities[xlvi] or other less complicated simulation techniques, such as word concepts.

Selecting the method of simulation goes hand in hand with selecting the variables whose interrelationships will be simulated within a system. But no matter how sophisticated the variable selection and simulation process, the findings are only as good as the data collected within each of the variables studied. Moreover, with the advances in science and technology, data that previously might have been discounted as statistically insignificant, now can have an important role to play.

Step 5: Procure and Process Data

Sources for data can be historical or contemporary, collected by whatever means and whatever form deemed appropriate, such as personal accounts, census findings, interviews or surveys. Because computers increasingly have a greater capability to handle larger amounts of data, this not only bodes well for procurers and processors of large amounts of data, but also for procurers and processors of unique or less impressive data that would previously have been discounted as statistically insignificant. This is particularly important when trying to collect information not only from large populations, but also from individual observers. A wonderful source for data is at ground level. Every worker in a shop and every soldier in the field become a valuable source of information.

The right data, though otherwise statistically uninteresting, can become a critical piece of the information gathering and processing structure. Rather than wait for problems to become obvious (or statistically significant), if data is available and highlighted at the first sign of turbulence, developing issues can be addressed before they become big problems. Employer discontent would not necessarily lead to a labor dispute; a humanitarian effort might not end up a military conflict.

Individuals at critical points within the system should be selected as information procurers, to facilitate updates as determined best for the analysis. This is particularly true in internal studies well as certain types of external situations where there is the capability to observe first hand.[xlvii] Information procurers and processors should be trained to control the process methodically and therefore be able to account for any shifts in subsequent findings. Data received should be "tagged" by the processor according to the variable it reflects and properly positioned within that variable for analysis.

If information is systematically tagged and processed by variable, which in turn is properly weighted within the model in terms of its potential influence, it alleviates the problem of "information overload," i.e., too much data, too little interpretation of what it all means. Information is packaged for the leadership in multiple levels of detail, so that the overall summary of data as depicted by the 4 M graph can be easily peeled back to reveal the multiple levels of detail that influence it. Leaders can view the overall picture or dig deeper to see the process of variable interrelationships that lead to it.

Once variables are selected, simulations erected, and measurements are taken, they still mean little on their own. It is when they are compared against some yardstick—an index—that they take on meaning.

Step 6: Determine Index Range of 1 and 0

Minimum and maximum index values for each of the 4 M's are set as dictated by the purpose of the study. For instance, if the purpose of the study is to monitor a system's adherence to some universal standard, then adherence to the requirements of the standard determine the value of 1 within each of the 4 M's and noncompliance recorded as failures to meet that standard in varying degrees. International organizations monitor, for instance, records of human rights abuses, by reference to international sensibilities or laws pertaining to unacceptable conduct. In such instances, all failures to meet that standard would be duly noted along a sliding scale away from 1 (i.e., ideal behavior).

Within an organization keeping track of progress at achieving readiness goals, 0 could depict total failure in achieving goals and 1 could depict total success, as visualized by the organization. Or, 0 could

signify the starting point from which the organization is departing. For instance, if the goal is a 600 ship Navy, and only 300 ships have been procured thus far, the goal has been achieved by only half, if the starting point were zero ships. If the starting point, however, were 250 ships, the resulting value would be closer to 0 because there has been proportionately less progress achieved.

When comparing systems relationally, i.e., to one another, values would be determined by the traits of the systems studied. Maximum values for *mind*, *muscle*, *materiel* and *morale* would be determined by the largest quantities or strongest qualities displayed by one of the systems within the group. For instance, in a regional analysis of relative power, the system in the region with the greatest value in the *muscle* category, as determined by the variables selected for measurement, would be given the maximum value (preferably a little below 1).[xlviii] Once minimum and maximum values have been determined, the measurements taken in the 4 M categories need to be converted to indices that can then be plotted on the 4 M graph.

The indices of the rest of the nations in the set, with lesser measured quantities within their studied variables, would be calculated by "normalizing"[xlix] the numbers to achieve a rank order, thereby providing a relational picture of "muscle" for the group. When larger does not indicate stronger or better but only weaker or worse, as in size of famine or epidemic, the numbers are inverted, making the largest the smallest. The nation with the smallest numbers of deaths from a starvation would achieve a value of 1 and all those with greater numbers of deaths would be normalized, resulting in index values decreasing in order relationally from 1.

The exercise to this point has been one not unfamiliar to social scientists, who have generated various types of simulations in an effort to understand and further predict humans in their environment. The difference has been in the framework of the analysis—the 4 M concept. Up to this point, variables have been selected much as others might select them, based on their influence over a system. The difference has been to further group the variables by their relationship to one of four fundamental characteristics of human systems—mind, muscle, materiel and morale. This ensures that the human system is observed in its entirety. But it also sets in place the necessary components for the next step—plotting the measurements, as converted into indices, on the 4 M graph.

Step 7: Plot 4 M Graph

Once measurements along each of the 4 M's are computed and converted to four indices, depicting the gap between status and standard within each of the 4 M's, the results are plotted onto the 4 M graph. Additional calculations are made to obtain even more insights.

The 4 M graph consists of a box containing two diagonal lines which crisscross at the center of the box to form an "X." The scale for each M, 0 to 1, radiates along the axes from the center. 1 (maximum) is positioned at the box's four corners, each corner representing one of the M's. Mind and morale, the two nonphysical human dimensions, are located, respectively, at the top and bottom corners of the right half of the box. Muscle and materiel, the two physical dimensions, are located respectively at the top and bottom corners of the left half of the box. 0 (minimum) is positioned in the center. After plotting the system's values for each of the 4 M's on their respective axes, the points are connected to draw a polygon.

Plotting the 4 M Graph

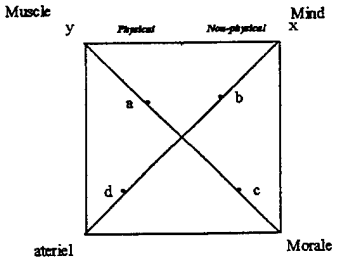


Figure 1

While the values of the M's within a system are certainly of interest, particularly when determining which variables to manipulate, depending on the desired effect, the resulting polygon, its location and shape, provide even more information, after some additional calculations.

The polygon shape seems to take on a life of its own. In model building, such creations are called "elegant," because the resulting product yields more than the sum of its parts.[l] It points to stronger values and contracts at weaker ones, providing a clear picture of areas of strength and weakness, big or little, etc. It is a malleable shape, which transforms into a limitless variety of possible identities, to better determine individual quirks or broad impressions regarding the system drawn. Calculations on the polygon can yield even greater insights, to include relative power and center of gravity. Mathematical concepts and formulas developed especially for this polygon are summarized in the footnotes.[li]

The greater the reliability of the simulation and the data collection, the greater the significance of these calculations. But the results can lead in the right directions, even though they still sit within a band of probable error. One doesn't have to know precisely how cold it is to know it is time to put on a coat. General Buford didn't have to determine the exact size of Lee's army at Gettysburg to know it was time to find good ground.[lii]

APPLYING THE 4 M GRAPH: SNAP SHOTS, VIDEO GAMES AND CHESS

The purpose of the 4 M process is to achieve a 4 M graph that by design compares system status against some predetermined standard. The graph yields a picture of the system, much like a snap shot captures certain traits of the object photographed. But also the graph can serve as more than a snap shot capturing one moment in time. Much like a video game, as the system grows, shrinks, progresses, deteriorates or otherwise changes, the graph can keep score by the changing size and shape of the polygon as it depicts these changes. And, finally, 4 M graphs, drawn to represent nations or ethnic powers, can be placed on a topographic map in their geographic location, much like pieces on a chessboard. Each graph "piece" possesses unique qualities, strengths or weaknesses, as captured by the data and depicted in the polygon. Strategists can play the pieces in regional scenarios, comparing relative power and determining probable outcomes.

Snap Shots

Nature of Systems. Winston Churchill deplored the huge losses suffered in WWII[liii] all the more because he believed it was the most preventable war in history. Contrary to others in England, who tenaciously clung to the hope of "appeasement," believing that it was important to treat even dictators "as honorable men,"[liv] Churchill was convinced of the inevitability of war unless immediate action were taken to curtail Hitler's aggressions. [lv]What was Winston Churchill seeing as he challenged the overwhelming sentiments of his countrymen and his allies?[lvi] Churchill seemed to see the future logically unfolding from the progression of current events; and not only in the rapid rearmament of Germany, and its steady path of aggression, but also by what he saw in the nature of Hitler and the nature of the country that Hitler led.[lvii]

Just as individuals have identities that are observable to those around them--rich, poor, strong, weak, peaceful, violent, etc., human systems, such as nations, also have identities observable and classifiable by those around them. They may be stable and prosperous or warring and poor. They may be democratic with strong participation by the population, or a dictatorship able to retain control through ruthless military enforcement. A nation may once have been powerful, but now is crumbling, with no strong leadership and little support of the people, but with much in the way of war materiel, albeit aging. Or the nation may have a strong leadership and the full support of the people, but little in the way of resources.

As strategists attempt to bring peace to regions seemingly predisposed to violence, what variables influence instability and violence or peace and prosperity? Are some systems so fundamentally dangerous or unstable as to warrant avoidance altogether, rather than attempts at positive intervention? Moreover, what can we learn about intangible combat multipliers that result in seemingly impossible victories against overwhelming odds?

Centers of Gravity. We make much of our nation's superpower status, the richest nation in the world backed by the strongest army in history. The Soviet Union once shared our military strength. But even when it did, it was drawn into a conflict that would embarrass and confound it—Afghanistan. Afghanistan was not nearly as large, well equipped, or technologically advanced, but managed to confound

its superpower adversary all the same in a prolonged and frustrating conflict that lasted over eight years and killed 15,000 Soviet troops.[lviii] What are the sources of strength and power that enable a physically inferior power to fight so hard or so long?

In military terms, this source of power is known as "center of gravity." "It is that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength or will to fight," and therefore become the primary target for attack.lix Centers of gravity are not always physical targets, such as armies and transportation hubs, they can also be "abstract" notions, such as national will or resolve.lx Leadership is one such notion.

In his memoirs, Field Marshall Montgomery defined leadership as "The capacity and the will to rally men and women to a common purpose, and the character which inspires confidence."[lxi] Good leaders provide not only their intellectual expertise, but also the inspiration they bring to the soldiers who fight for them and the population that roots for them—"moral and political" power," rather than physical.[lxii] A link between leader and follower, government and its people can bridge gaps in physical deficiencies and bring a better and stronger fight to an otherwise superior foe.

The 4 M graphs can greatly aid planners by providing a snapshot of the nature of a system as well as its source of power—its center of gravity. Below are natures of systems and centers of gravity as they might be depicted for hypothetical political powers.

War in 4 M's

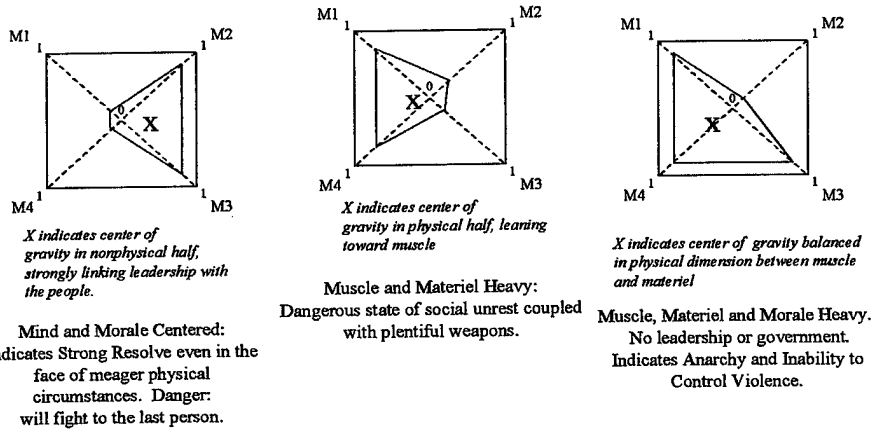


Figure 2

Perhaps the nature of a system can also cast light on its center of gravity. If a nation is unstable, the planner knows it is in a weakened state. If a nation is stubborn in its dogged pursuit of an ill-advised path, it may reveal not only the problem, but also the possible solution. Knowing the power base is knowing the best target to hit, or depending on the circumstances, the best reason to avoid a conflict altogether.

Meeting Organizational Standards or Goals. Using the 4 M graph, not only can systems be compared relative to one another, but also sub-systems, such as departments or units within an organization. An organization may want to assess its internal status as compared to a predetermined standard, such as readiness goals. The organization can illustrate its success at meeting goals, clear as a snapshot, in a 4 M graph. In addition to a total picture of the organization, as represented by one all-encompassing graph, the organization may also want a greater level of detail, down to selected sub-systems. A snapshot can be taken, for instance, by department within the organization and the relationship

of each department in terms of meeting its portion of the organizational objectives. This would be depicted by a cluster of 4 M graphs (each representing one sub-system), arranged to reflect their position or relationship within the total system. This can be done by positioning the 4 M graphs of the sub-systems on an organizational wire diagram (or a work flow chart by function), in the following manner:

4 M Organizational Diagram

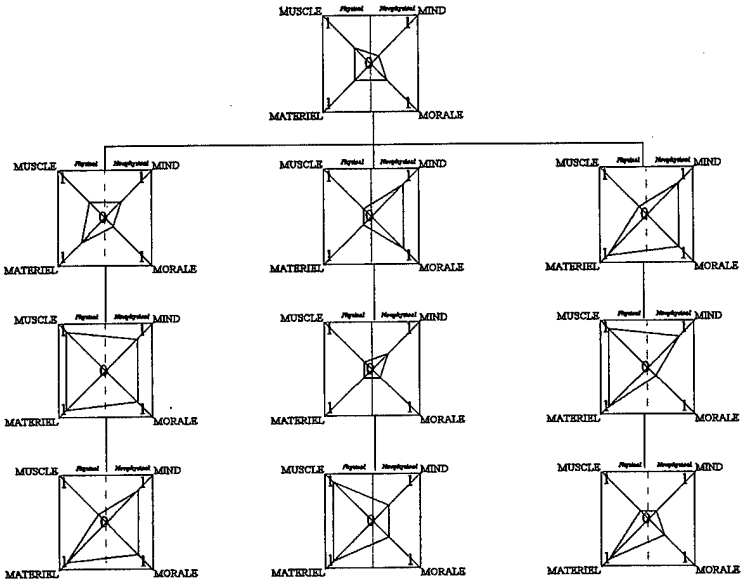


Figure 3

When a system is divided into sub-systems (such as departments in an organization, or units within an army) for the purpose of creating 4 M graphs for each of these sub-systems, the same seven-step process detailed in this paper needs to be performed. Goals for the organization at large are not the same goals for each department, but only the sub-goals (such as objectives, action plans, etc.) the department can affect and for which it is responsible. Measurements specifying success in meeting sub-goals are not the measurements designating success at meeting the system's overall goals. As each sub-system goes through the process of identifying their unique goals and measurements of success, in relation to overall goals, each sub-system better understands its contribution to the larger system and its responsibility for improving the overall organization.

If data is linked to an interactive computer system, much like a video game, the data becomes a living organism and decision-makers at all levels can keep track of developments as they occur.

Video Games

Once snapshots have been taken, they can also be converted into scoreboards for further work, much like video games keep score of the player's performance. The 4 M graphs are comparative displays, the result of much initial work in terms of identification of influential variables and simulation of their interrelationships, the cause and effect on the system. These variables, already identified for their influence over the system, may be manipulated to achieve desired outcomes (i.e., push the index value closer to 1). The changes to the system will cause changes to the measurements and therefore changes to the shape and size of the polygon in the 4 M box and resulting follow-on calculations. These changes in polygon shapes and calculations record progress, much as video games keep score. This electronic dispenser of information can be linked in real time to the procurers and processors as they take in and manage the data, displaying to the viewer the living organism of the polygon as it grows, contracts and otherwise alters its shape reflective of changes to the system.

Chess Games

For military planners, use of maps in combination with the 4 M graphs increase the understanding of geographic regions and their political dimensions. 4 M graphs can be plotted for every nation or significant ethnic power within a geographic region. These graphs are next positioned on a topographic map representing their location geographically to create a 4 M map. We now have a chess game, with graphs as pieces and the map as a board. Armies can be played against one another in different courses of action. This gives a fuller illustration not only of comparative probabilities of winners and losers, but also positions of weakness and positions of strength. If the contrast is great enough, or further assisted by advantageous geography, likely enemy movements can be quickly spotted. Knowing the probable routes and the spillover into third countries that might result ("future fault lines") the planner now knows which allies need to be reinforced and how; which adversaries need to be confronted or avoided.

4 M Map

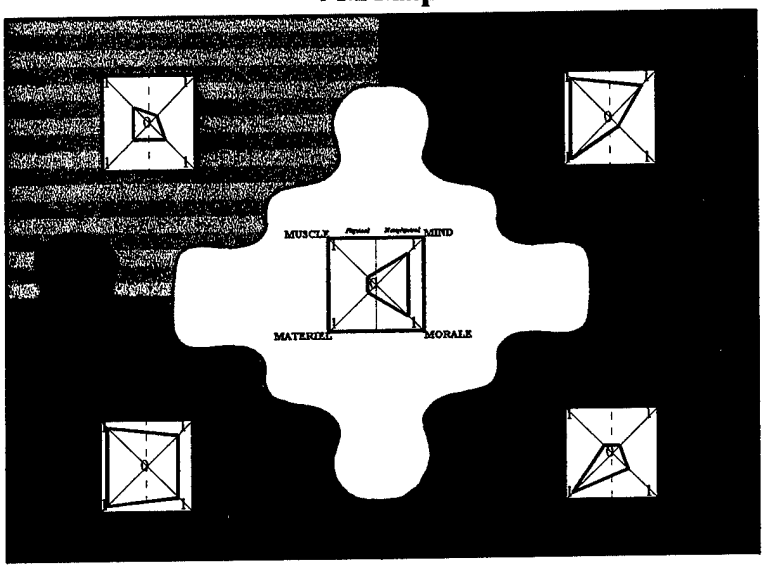


Figure 4

By plotting historical battles and historical powers planners can gain an even better understanding of relative polygon shapes and what the likely outcomes are when they meet in a field of battle. What are the secrets to success or the omens of failure, the determining factors between victory and defeat? And, as with the days leading to World War II, what can we learn about situations that resist peaceful solutions as they head stubbornly toward their violent destiny.

Future Fault Lines. As planners begin to survey the ground around them analysis emerges not only in terms of contemporary relative strengths and weaknesses, but also in unfolding eventualities ("future fault lines"). Not only do obstacles reveal themselves in terms of victory or defeat with current adversaries, but also in terms of escalation of effort and potential involvement of neighboring powers. The planner is not limited in scope to the four walls of the nations currently locked in conflict. The 4 M map lays all the ground before the planner, allowing him to better consider the broader implications of military action, like a chess board reveals all the pieces and not just the one being moved or the one most threatened.

Further, this 4 M map, this play of chess, would warn when a decisive commitment of force is necessary, as in Churchill's time, to prevent a greater catastrophe in the making. Even in the absence of a current important or vital national interest.

Notes

[i] Winston Churchill, The Gathering Storm (Boston: Houghton Mifflin Company, 1948), p. 209.

[ii] Stephen M. Millett and Edward J. Honton, A Manager's Guide to Technology Forecasting and Strategy Analysis Methods (Columbus: Battelle Press, 1991), p. 7. See also Master Sergeant Susan Holmes, ed., Process Improvement Guide (Maxwell Air Force Base, Alabama: Air Force Quality Institute, 1994).

[iii] Millett and Honton, p. 43.

[iv] Millett and Honton, 63. See also Army Command, Leadership, and Management: Theory and Practice (Carlisle Barracks, PA: U.S. Army War College, 1995-1996), "Planning is defined as the continuing process by which the Army establishes and revises its goals or requirements and attainable objectives, chooses from among alternative courses of actions, and determines and allocates its resources (manpower and dollars) to achieve the chosen course of action," p. 10-5.

[v] Charles W. Taylor, Alternative World Scenarios for Strategic Planning (Carlisle Barracks, PA: Strategic Studies Institute U.S. War College, 1990), "Scenarios are narratives or outlines that depict pre-selected environments at some near or far off time. They usually consist of knowable things, conditions, and situations in new relationships that when projected into the future evoke new concepts and ideas about change. Although they are neither predictions nor forecasts in themselves, they provide insights which allow today's policymaking and decision-making to influence the future..." p. 2.

[vi] Millet and Honton, p. 63.

[vii] Millett and Honton, p. 63.

[viii] Perry M. Smith, Jerrold P. Allen, John H. Stewart II, F. Douglas Whitehouse, Creating Strategic Vision (Washington, D.C.: National Defense University Press, 1987), p. 72.

[ix] Millett and Honton, p.43. "Expert judgement, to define it the best we can, is the assertion of a conclusion based on evidence or an expectation for the future, derived from information and logic by an individual who has extraordinary familiarity with the subject at hand. ...(It) becomes particularly important in the analysis of highly uncertain and complex topics, such as the future." See also Field Marshall Erich von Manstein, Lost Victories (Chicago: Henry Regnery Co., 1958, English translation by Methuen & Co., 1958), pp. 274 – 277. Field Marshall Erich von Manstein, who served under Adolph Hitler during World War II, wrote a scathing post-war assessment of Adolph Hitler's capabilities as a military leader. Manstein wrote that Hitler's initial successes as well as his ultimate defeat all flowed from the same fundamental flaw—an overblown sense of his own powers and capabilities. Reality to the contrary, Hitler relied on his intuition because he lacked "military ability based on experience." While he had an easy grasp of "technical matters and problems of armaments," he lacked the sense of judgement of what could and could not be achieved that would have been gained from a "real training in strategy and grand tactics."

[x] James A. Dewar, Carl H. Builder, William M. Hix, Morlie H. Levin, Assumption-Based Planning: A Planning Tool for Very Uncertain Times (Santa Monica, CA: The Rand Corporation, 1993), p.12. Consider the following contradictory advice that can, in the wrong hands, serve to stymie creative thought: "Identifying (planning) assumptions well requires a good deal of judgement and creativity, because some of the important assumptions an organization makes are obvious; others are very subtle and hidden... The definition of important should be tightened and the less-important assumptions deleted...To prevent loss of important assumptions in such a winnowing process, senior officials can help identify the truly key assumptions (emphasis added) that should be carried on the... process."

[xi] See Smith, Allen, Stewart, Whitehouse et al., "There is a general tendency in developing long-range plans to put constraints on plans related to budget, technology, and time, for example. Although these constraints can help make the plan look more realistic, they also tend to restrict the vision of the planners, and, in turn, the vision of the decision-maker..." p. 19.

[xii] Radoslav A. Tsanoff, PhD, The Nature of Evil, (New York: Macmillan Company, 1931), p. 76. "In every human entity there is the constant tug between mind and morale--logic and morals, science and religion, knowledge and faith, facts and passion, the governing and the governed, the leader and the followers, the action and the reaction."

[xiii] Carl von Clausewitz, "Principles of War," trans. and ed. Hans W. Gatzke, Roots of Strategy: Book 2, (Mechanicsburg, PA: Stackpole Books, 1987), p. 305. General Clausewitz, much studied and revered by military officers today, was a Prussian general and "spiritual father of the German army."

[xiv] Carl von Clausewitz, On War, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), p. 75.

[xv]Clausewitz, On War, p. 76. See also, Clausewitz, "Principles of War," p. 316, "The theory of warfare tries to discover how we may gain a preponderance of physical forces and material advantages at the decisive point. As this is not always possible, theory also teaches us to calculate moral factors: the likely mistakes of the enemy, the impression created by a daring action,...yes, even our own desperation."

[xvi] Ardant du Picq, "Battle Studies," trans. John N. Greely and Robert C. Cotton, Roots of Strategy: Book 2, (Mechanicsburg, PA: Stackpole Books, 1987), p. 27. Colonel du Picq was a French army officer, and veteran of many battles, who eventually was mortally wounded by a Prussian.

[xvii]du Picq, p. 149. "The material effect of an organization is in its power to destroy, the moral effect in the fear that it inspires."

[xviii]du Picq, p. 135. However, Colonel du Picq then added, "It is rarely taken into account; and often strange errors are the result."

[xix]Clausewitz, "Principles of War," p. 316, 317.

[xx]Clausewitz, On War, pp. 85, 86. "The highest of all moral qualities in time of danger is certainly courage. Now courage is perfectly compatible with prudent calculation but the two differ nonetheless, and pertain to different psychological forces."

[xxi]du Picq, p. 146, 147. "He who does not feel strong enough to keep his heart form ever being gripped by terror, should never think of becoming an officer. The soldiers themselves have emotion. The sense of duty, discipline, pride, the example of their officers and above all their coolness, sustain them and prevent their fear from becoming terror...The Romans were not mighty men, but men of discipline and obstinacy...A Roman general who had as little coolness as we have would have been lost...Napolean said, ""wo Mamelukes held three Frenchmen; but on hundred French cavalry did not fear the same number of Mamelukes; three hundred vanquished the same number; one thousand French beat fifteen hundred Mamelukes. Such was the influence of tactics, order, and maneuver."" In ordinary language, such was the great moral influence of unity, established by discipline and made possible and effective in battle by organization and mutual support. With unity and sensible formation men of an individual value one-third less beat those who were individually their betters. That is the essential, must be the essential, point in the organization of an army."

[xxii]du Picq, p. 145.

[xxiii]du Picq, p. 161. "If national vanity and pride were not so touchy about recent occurrences, still passionately debated, numerous lessons might be drawn from our last wars. Who can speak impartially of Waterloo...Had Waterloo been won, it would not have profited us. Napoleon attempted the impossible, which is beyond even genius....Why do not authorities acknowledge facts and try to formulate combat methods that conform to reality?"

[xxiv] Antoine Henri Jomini, "The Art of War," ed. J.D. Hittle, Roots of Strategy: Book 2, (Mechanicsburg, PA: Stackpole Books, 1987), p. 395. A native of Switzerland, he rose to full general in the Imperial Army of the Russian Czar.

[xxv]Jomini, pp. 457-459.

[xxvi]Clausewitz, On War, p. 89. "The passions that are to be kindled in war must already be inherent in the people; the scope which the play of courage and talent will enjoy in the realm of probability and chance depends on the particular character of the commander and the army; but the political aims are the business of government alone." My thanks to COL Gregory Gardner for leading me to this concept and its relationship to the 4 M's.

[xxvii] Wayne Weiten, Psychology: Themes and Variations, 4th ed. (Pacific Grove, CA: Brooks/Cole Publishing Company, 1998), p. 37.

[xxviii] For a discussion of 'absolute" v. "relative" standards, see, for instance, David R. Williams, "Mr. Delay Had it Right," The Washington Post, Sunday, March 7, 1999, B2.

[xxix] Bill Shaw and Art Wolfe, The Structure of the Legal Environment, 2d ed. (Boston: PWS-Kent Publishing Company, 1991), p. 9.

[xxx] Army Command, Leadership, and Management: Theory and Practice (Carlisle Barracks, PA: U.S. Army War College, 1995-96), pp. 4-1 to 4-5. "Environment consists of those forces, priorities, and pressures that affect or maintain the potential to affect the climate and achieve the goals of an organization," p. 4-1.

[xxxi] Weiten, p. 38.

[xxxii] Millet and Honton, p. 72. "All simulations...have two common elements. One is the model of a past, present, or future situation. This model is a representation of a more complex reality...The model might also be a set of very complicated mathematical equations that can be handled only with a computer. The second element is the "playing," and or the repetitious routines that demonstrate that changes in inputs produce changes in outputs (as long as the model itself remains constant). Therefore, simulations can provide a safe, analytical learning and testing experience that cannot be directly replicated in reality."

[xxxiii] Weiten, p. 37.

[xxxiv] Foster Morrison, The Art of Modeling Dynamic Systems: Forecasting for Chaos, Randomness, and Determinism (New York: John Wiley & Sons, Inc., 1991), p.104.

[xxxv] Morrison, p.110.

[xxxvi] David Ruelle, Chance and Chaos (Princton: Princeton University Press, 1991), p. 3-7, 66-72.

[xxxvii] Nina Hall, ed., Exploring Chaos (New York: W. W. Norton, 1991), p. 122-148.

[xxxviii] Millet and Honton, p. 73. See also Smith et al., p. 85.

[xxxix] Ruelle, p.67.

[xl] Hall, pp., 8,9.

[xli] Alexandre Favre, Henri Guitton, Jean Guitton, Andre Lichnerowicz, Etienne Wolff, Chaos and Determinism (Baltimore: The Johns Hopkins University Press, 1988), p. 15.

[xlii] Ruelle, p.74.

[xliii] Ibid.

[xliv] Hall, pp., 8,9.

[xlv] Favre, Guitton, Guitton, Lichnerowicz, and Wolff, p. xi.

[xlvi] Favre, Guitton, Guitton, Lichnerowicz, and Wolff, p. xii.

[xlvii] David A. Lange, "The Role of the Political Adviser in Peacekeeping Operations," Parameters, Spring 1999, Vol. XXIX, No. 1, p. 107, "The most important value added to a peacekeeping operation by any political adviser is the ability to recommend strategies on how to shape the political environment. This task requires *synthesizing advance information* and analysis of political developments at the various levels in a way that relates to the commander's intent. If, for example, the commander's goals are to maintain a sercure enviornment, promote the creation of democratic institutions, and assist refugee returns, the political adviser must be able to recognize how everything from tactical developments on the ground to political maneuvering at the international level could help or hinder achievement of those goals."

[xlviii] Visually, the polygon would be hidden within the lines of the box if the value were exactly 1. Further, for comprehension's sake a 1 may look like it indicates a nation has peaked in its population (i.e., is at maximum) when it grows every day.

[xlix] Normalizing numbers is achieved by finding the largest measurement or score within an M and dividing the other systems' measurements or scores within the same M by this largest number.

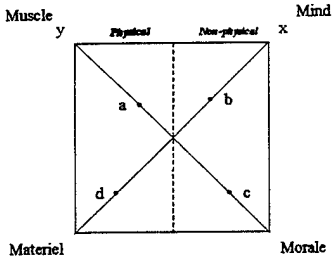
[l] E.S. Quade, Analysis for Public Decisions, 2d ed. (New York: North-Holland, 1982), p. 151, "...a model is *nontrivial* if it permits inferences to be drawn that are not obvious or readily perceivable by direct observation; it is *powerful* if it offers a large number of such nontrivial references; and it is *elegant* if a minimum of carefully selected analytic tools are used to produce a model of great power."

[li] The 4 M mathematical concepts are:

- *Area of the polygon* indicates the size of the polygon, as determined by computing the collective values of the system's 4 M's. It gives a composite value that can be used comparatively with other polygons, as a ruler to measure relative size overall, when considering physical and nonphysical traits together.
- *% Area of the polygon* indicates relative collective value of 4 M's compared to the area still needed to be included within the box to achieve maximum values along all four axes. This is a method of conceptualizing and articulating how much still needs to be accomplished. This can be particularly useful to organizations attempting to affect positive change to reach their goals, as depicted in the graph by "pushing" the values closer to 1 (success).
- *Centroid* is the center point for the collective value of the polygon. Its position within one of the four axes indicates which "M" or combination of "M's" is strongest for the entity measured—and whether it is a physical or nonphysical strength. In military terms, this is the "center of gravity," the center of strength for a nation, ethnic group, or military, depending on the system studied.

- *Centroid distance* from the origin, i.e., the center of the box (an application of the Pythagorean Theorem—familiar to those who survived high school math, or remember the Scarecrow's dialogue in the "Wizard of Oz"). Balance of strength among all four M's is depicted by the centroid positioned over the "0" (i.e., the point at which the diagonals intersect). A balance would be achieved by all four M's having the same or very similar values, which would cause only a slight deviation from center. The larger the distance from center, the more indication the polygon is relatively stronger in one dimension (physical or nonphysical) or within one M. When used in combination with the position of the centroid within one of the four M's, it provides useful information—where the system is the strongest and to what degree. For organizational purposes, knowing where the relative strengths are is very helpful. These strengths can be exploited to the benefit of the whole, or more energy can be focussed on the areas of weakness to bring the system more into balance, if that is what is desired. For military purposes, the greater the distance from center, the surer the indication of where force has to be massed to defeat an enemy.
- *Average axis segment* indicates average length of 4 M segments, another tool that can be used to compare relative strengths and weakness across a group of systems studied, or internally to assess comparative progress in meeting goals. It levels strong and weak into an overall value by averaging the 4 M values into one overall value. In this way, a strong area will be balanced by its weaker components for a clearer picture of relative health or power across a range of systems. Internally, it helps to keep an organization humble by leveling the positives to be more in line with the negatives.
- *Shape Coefficient* is similar in concept to standard deviation and indicates the degree of deviation of the polygon shape from 90 degree angles. This is another way to determine "balance" among the 4 M's, without reference to area size or location of the centroid. The larger the number, the greater the degree of deviation from balance, illustrated by an ever more lop-sided polygon. This signals either a disproportionately strong or weak M within a system without having to refer to the graph. When used in conjunction with other concepts, such as average axis segment and area of the polygon, it can compare degree of balance with degree of relative strength. A comparatively larger shape coefficient, coupled with a larger average axis signals an overwhelming power from one of the M's to a greater degree of detail than simply viewing the position of the centroid, or its distance from center.

4 M Calculations



Area of Polygon $= \frac{ab+bc+cd+da}{2} = \frac{(a+c)(b+d)}{2}$

(Area of box = 2)

% Area of Polygon $= \frac{ab+bc+cd+da}{4} x100 = \frac{(a+c)(b+d)}{4} x100$

Centroid $\bar{y} = \frac{(a-c)}{2}$ Plot point on y axis, draw line through it 90° to axis.

$\bar{x} = \frac{(b-d)}{2}$ Plot point on x axis, draw line through it 90° to axis.

Centroid is point where these two lines intersect.

Centroid Distance from the Origin (y) $\bar{r} = \sqrt{\bar{x}^2 + \bar{y}^2}$

Average Axis Segment (Ave) $Ave = (a+b+c+d)/4$

Shape Coefficient (s) $s = \sqrt{\sum (a-Ave)^2 + (b-Ave)^2 + (c-Ave)^2 + (d-Ave)^2}$

[lii] Michael Shaara, The Killer Angels (New York: Ballantine Books, 1975), pp. 33-48.

[liii] Approximately 55 to 60 million people were killed compared with about 10 million in World War I. About a third of those who died in World War II were Russians. Young Students Learning Library (Shelton, CT: Newfield Publications, 1995), Volume 23, p. 2823.

[liv] Sir Anthony Eden, The Memoirs of the Rt. Hon. Sir Anthony Eden: Full Circle (London: Cassell, 1960), p. 518, and "the papers they signed and the assurances they gave must be accepted as having a validity comparable to those signed by elected governments."

[lv]Churchill, pp. 346-347.

lviChurchill, p. 123.

[lvii]Churchill, p. 209, where he relates, "The question...arises which is today the Power in Europe which is the strongest, and which seeks in a dangerous and oppressive sense to dominate. Today, for this year, probably for part of 1937, the French Army is the strongest in Europe. But no one is afraid of France. Everyone knows that France wants to be let alone, and that with her it is only a case of self-preservation. They are at once brave, resolute, peace loving, and weighed down by anxiety. They are a liberal nation with free parliamentary institutions. Germany, on the other hand, fears no one. She is arming in a manner which has never been seen in German history. She is led by a handful of triumphant desperadoes. The money is running short, discontents are arising beneath these despotic rules. Very soon they will have to choose, on the one hand, between economic and financial collapse or internal upheaval, and on the other, a war which could have no object, and which, if successful, can have no other result, than a Germanised Europe under Nazi control. There, it seems to me....that our national salvation depends upon our gathering once again all the forces of Europe to contain, to restrain, and if necessary to frustrate, German domination."

[lviii] "The Nations of the World," The World Almanac and Book of Facts 1999 (Mahwah, NJ: World Almanac Books, 1998).

[lix] Army Field Manual 100-5, Operations (Washington, D.C., Headquarters, Department of the Army, June 1993), p. 6-7.

[lx] Ibid.

[lxi] Field-Marshall The Viscount Montgomery of Alamein, K.G., The Memoirs of Field-Marshall The Viscount Montgomery of Alamaein, K.G. (New York: Signet Books, 1958), p. 70.

[lxii] Joe Strange, "Centers of Gravity and Critical Vulnerabilities," Perspectives on Warfighting, Number Four (Quantico, VA: Marine Corps University, 1996), p. 44

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