Weapons for Strategic Effect

How Important is Technology?

Colin S. Gray

January 2001

21

Occasional Paper No. 21
Center for Strategy and Technology
Air War College

Air University
Maxwell Air Force Base

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The Author

Dr. Colin S. Gray is a graduate of the Universities of Manchester (BA[Econ.]hons, 1965) and Oxford (D. Phil.. 1970). Between 1968 and 1973 he lectured in England at the University of Lancaster, and in Canada at the Universities of York and British Columbia. From 1970-72 he was also Executive Secretary of the Strategic Studies Commission at the Canadian Institute of International Affairs (Toronto). In the years 1973 to 1976 he was Ford Fellow at the Department of War Studies, King's College, London, and Assistant Director of the International Institute for Strategic Studies. In 1976 he moved to the United States. Initially he worked with Herman Kahn and Don Brennan at the Hudson Institute in New York, while subsequently he founded a new defense oriented think tank. The National Institute for Public Policy (Fairfax, VA). He held a Presidential appointment from 1982 until 1987 when he served on the President's General Advisory Committee on Arms Control and Disarmament. In 1987 he received the Superior Public Service Award on the recommendation of the US Navy. His work has been wide ranging across the defense community. He was an adviser to the MX and Small ICBM programs for many years, and he has attempted to contribute to the better understanding of nuclear strategy, arms control policy, maritime--strategy, airpower, space strategy, operations and—most recently—strategy, airpower, space strategy, special operation, and-most recently-the future of the US Coast Guard. As a dual UK/US citizen, he is an adviser to the British Royal Navy. In 1997-98 he served on the Panel of Experts on Britain's Strategic Defence Review. He is the author of sixteen books and several hundred studies, articles, and papers. His most recent books are Modern Strategic (1999) and The Second Nuclear Age (1999). He will publish Strategy for Chaos: RMA Theory and the Evidence of History in 2001. Dr. Gray returned from the United States in 1993 to be Professor of International Polities at the University of Hull. In August 2000 he took up a new appointment as Professor of International Polities and Strategic Studies at the University of Reading. In 2000-2001 he is also a Fellow of the Center for Strategy and Technology, Air University, Maxwell AFB, AL.

Preface

I am grateful to Grant T. Hammond, Director of CSAT, for the opportunity to serve as a Visiting Fellow in 2000-2001 and to contribute this Occasional Paper. Given the technical focus of most of the Papers, I though it would be useful, by way of some contrast, to offer a wide ranging exploration of the relationship between technology and war. The paper draws upon several research efforts which have yet to see the light of day in published form. Most especially, the paper draws upon the theory and historical case studies developed in my forthcoming book, Strategy for Chaos: RMA Theory and the Evidence of History. Also, I have drawn upon my contribution ("Fuller's Folly: Technology, Strategic Effectiveness, and the Quest for Dominant Weapons") to an as yet unpublished collection of essays, A.J. Bacevich and B.R. Sullivan, eds., The Limits of Technology in Modern War.

The central organizing idea behind this paper is that technology and war (or, indeed, peace) are linked by the consequence that we understand as strategic effectiveness. Technology in weapon systems, and in other military machines as well as in relevant a civilian systems, delivers its payoff in the effectiveness secured by the threat or use of force for the purposes of high policy. The playing field is strategic behavior and technology is just one, albeit a necessary one, among the players that collectively deliver the result.

I. Introduction

There is no doubt that technology is important in war. While it is difficult to identify major security issues for which technology is not important, determining just how important is another matter. Despite a consensus on the salience of technology, there is little agreement on just what that means for strategic behavior. Following in the footsteps of Clausewitz, this monograph seeks to contribute to the general "theory [which] should cast a steady' light on all phenomena so that we can more easily recognize and eliminate the weeds that always spring from ignorance; it should show how one thing is related to another, and keep the important and the unimportant separate."[1] Just how is one thing—technology—related to another—strategy? As Clausewitz stated: "[i]t is the task of theory… to study the nature of ends and means."[2] Just how is technology—the means—related to strategy—the ends?

The justification for this paper lies in the frequency with which the ends and means of strategy are either confused or reversed and in the need for some judicious removal of the weeds of ignorance. As with doctors, strategic theorists should be subject to the injunction that if they cannot help resolve a problem they should at least, "first, do no harm." Alas, such is not always the case. Strategy is both art and science and essentially a creatively adaptive behavior that cannot really be taught. But careful study of "how one thing is related to another" should enhance the quality of strategic performance.[3] Of course, being creatively adaptive may not suffice either, as both Ludendorff and Hitler demonstrated in the last century.[4] In both instances, they committed fatal errors that flowed from the failure correctly to "study the nature of ends and means."

The purpose here is to clarify what can be clarified. That is easier stated than accomplished. First, some truly key concepts are in dispute. These include the nature of man, the nature of war and the very concept of the popular notion of a revolution in military affairs (RMA). Second, because strategy is always "done" at a particular time and place, the strategy theorist may be ambushed by history in overextending an insight from one time and place to another. The analysis in this paper strives never to forget that the strategic theory that does not work in detail in the real world of strategic behavior cannot be sound theory. Bernard Brodie,

the greatest American strategic thinker of the nuclear era, advised that strategy "is nothing if not pragmatic…above all, strategic theory is a theory for action."[5] Clausewitz, as usual, had proffered the same advice 140 years earlier. "Just as some plants bear fruit only if they don't shoot up too high, so in the practical arts the leaves and flowers of theory must be pruned and the plant kept close to its proper soil—experience."[6]

The principal title of this paper asserts both the logical dominance of strategic consequences over the tools of war, and refers to the ill-understood, but necessary, truth that all weapons have strategic effect. It is inherent in the nature of their function. The question in the subordinate title uses technology as a metonym for the weapons systems with which we fight. It subsumes those weapons, the machines of all kinds that support them, the relevant technological know-how and industrial skills that produced them and the science behind it all. "Technology" is thus a convenient shorthand for this hugely complex system.

The relationship between technological means and strategic effect is explored in two chapters that focus on topics of ascending specificity. Chapter II, "Technology and War", probes the implications of technological innovations for the nature and conduct of war. It examines the synergism between Man and his tools (of war), and explores the idea that much of what Clausewitz understood by chance and by his compound mechanical concept of "friction" can be lifted by technological enlightenment. Chapter III, "The RMA and All That", tackles the broad question of change in strategic history, and considers RMAs as strategic behavior. The concluding chapter answers the question, "how important is technology" in war and strategy? It may be useful to sound a warning note in order to help prepare readers for what follows: "if technology is the answer, what was the question?"

II. Technology and War

Change in military affairs is as unarguable as its meaning can be obscure. In only fifty years, from 1910 to 1960, the striking power of warships increased from c.10 to c.1,200 miles (i.e., from Dreadnought to Polaris).[1] But, did that mean that navies were much more powerful in 1960 than 1910? Courtesy of mutual deterrence and competition from land-based missiles and aircraft, such a claim would be hard to sustain. If fifty years is all but an eternity in modern times, so too is the period between the beginning and end of a single war. The contrast between the French regiments that marched behind hands and unfurled flags to open the attack in Lorraine in August 1914, and the warfare by combined-arms combat teams characteristic of combat in the fall of 1918 (by all the players on the Western Front, save only for the Doughboys of the American Expeditionary Force) was huge. Innovation, though varied in pace and effectiveness, is both usual and expected. Chapter III explores some contending theories about possible patterns of change in strategic history. Here in Chapter II, however, we examine some arguably constant (or, very slow to vary variables) elements which bear hugely upon the meaning of' technological innovation in relation to war. These arguable constants are the institution war itself, human nature, and chance.

A Matter of Definition

Let us not mince words, war is organized violence for political ends. Those political ends can encompass a wide range of benefits among different eras and cultures, but they all can be corralled by Harold Lasswell's classic statement that polities is about "who gets what, when, and how."[2] Admittedly, there are discomfort zones where war appears to merge with crime and even sport and entertainment. As a spectator sport, war (even surrogate war, as with gladiatorial combat) has always been extremely popular. We humans find violence exciting, while war as spectator sport is agreeably safely exciting.[3] Clausewitz tells us unequivocally that "all wars are things of the same nature."[4] And what is that nature'? It is, we are advised, "an act of force to compel our enemy to do our will."[5] Also, according to Clausewitz' famous dictum, war has its only source in politics and "is simply a continuation of political intercourse, with the addition of other means."[6]

But what is war like? What distinguishes it more or less clearly from

all other human activities? Again, our Prussian mentor said it best. “The decision by arms is for all major and minor operations in war what cash is in commerce.”[7] Benjamin Lambeth reinforces Clausewitz when be writes: “Air power is a blunt instrument. It is designed, at bottom, to break things and kill people.”[8] No less brutally, or accurately, Williamson Murray observes that “in the final result military organization are paid to kill the enemy in as effective a fashion as possib1e.”[9] The threat and use of force, organized violence, for reasons of policy (be they dynastic, religious, spiritual - e.g., honor - or material), applied by contending political wills, is the very nature of war. It is the organization of violence that defines war, not the reasons of policy - provided the reasons are broadly political. After all, those reasons of policy prescribe peaceful intercourse most of the time.

War should be defined as a particular institution which is, at least logically, functionally instrumental. It is not the only functionally instrumental institution that secures policy ends. Diplomacy, economic statecraft, cultural subversion, and political warfare, are all, in theory, alternatives (or complements) to war. They are, however, different from war. The reason for risking belaboring the simple point that war is war, regardless of time, place, belligerents, or technology, is because many American commentators of recent years have asserted otherwise.[10] The matter is not easily researchable, but there are many instances where theorists appear only to be guilty of the misdemeanor of conceptual carelessness, rather than the felony of conceptual error.

Why should it matter whether commentators confuse change in the character and conduct of war with change in war’s nature? The answer is that this confusion encourages belief in a myth of transformation. The myth at issue here is the conviction that the human conditions in world politics as we have known it is in the process of being transformed into a context beyond war (at least, war as we knew it).’’ This is somewhat reductionist, because the relevant myth comes in several well nuanced variations. Some People deem “major war” to be obsolete, or obsolescent, while others, uncomfortable with the “major” ascription, prefer to argue for the atavism only of inter-state war.[12] Less root-and-branch in their expectation or affirmation of change, though scarcely more plausible, are those who discuss a transformation in war rather than from war.[13]

It is tempting to dismiss claims that the nature of war is being changed by an information-led RMA as nothing more significant than loss

of semantic discipline. The misuse of "strategic" is disturbing, because such misuse suggests that the offender is confused about means-ends relations.[14] Just as we are obliged to live with defense debate which routinely misuses "strategic" perhaps we should roll over without complaint when commentators claim that the contemporary RMA (whichever one or ones they happen to endorse) is changing the nature of war. However, and partly out of respect for the late Carl Builder, who wrote most tellingly about the need to keep "the strategic flame" burning bright,[15] someone should blow the whistle on conceptual nonsense.

War does not and cannot have several natures. In the heated theological debates of the fifth century, in particular, the ever arguably dual nature (divine and/or human) of Christ was earnestly disputed.[16] RMA theorists today tend to be less sophisticated and competent in logic than were fifth century theologians. Many of the more excited among the RMA literati assert—they can hardly argue—what would be a miracle were it true, or even merely plausible. Specifically, we are told that there is a change underway (or completed, or pending, or imminent, or probable, or possible—take your pick) in the nature of war.

The small problem with this claim is that it is literally impossible. Experts of equivalent competence can disagree about the pace or direction of change in the character and conduct of war. Furthermore, they can dispute whether or not war as we have known it is looking increasingly like yesterday's poor solution to yesterday's problems. But, they cannot logically disagree over the hypothesis that war is changing its nature. If war could change its nature, such a miracle would be akin to a dog becoming a cat, or - dare we venture the metaphoric analogy - a human being becoming a machine (or vice versa). If war changes its nature in response to challenges from technological and other conditions, then it becomes something else. Plainly, there are three classes of difficulty with an RMA debate that asserts change in war's nature: empirical, logical, and semantic.

The damage to understanding wrought by this error can be insidiously pervasive, even when the mistake is casually inadvertent. Because we are prisoners to the words we use and the concepts we wield as tools, unchallenged and soon habitual reference to change in the nature of war cannot help but encourage exaggerated expectation of irreversible transformational change. If we strategic theorists are to mind the store of conceptual tools responsibly, we must try to insist that commentators say what they mean, and that they say it in ways that are literally meaningful.

It is difficult to engage in debate over chance in strategic history, even more narrowly over the utility of rival RMA theses, when the conduct and character of war are hopelessly confused.

Lest the argument presented here be accused of a trivializing circularity, we must hasten to add that the empirical, logical, and semantic issues are clear and distinguishable. Far from being a necessary, and therefore trivial logical truth that war as defined here must always be with us, we can imagine an historical era wherein war—organized violence for political ends (power)—truly is passé in practice as well as in law and morality. However, we are unconvinced that such a happy time is at all likely to arrive in this Twenty-First Century. That is an empirically-based judgment. In summary, war can change its character cumulatively and radically. It could cease to function as an intended problem-solving institution (of last resort); but it cannot possibly change its nature, because in that event it would be transformed into something else.

If, as this author believes, the institution of war is, alas, likely to have as healthy a future as a past, what is the most important factor driving that pessimistic conclusion? To parrot the old adage, we have seen the enemy and he is us. The core subject for strategic study has to be mankind.

We are the Problem

From TNT, through machine guns, "strategic" airpower, nuclear weapons, to the internet, the latest marvels of technology have been hailed as the deus ex machina (and almost as machina rex et deus) which should banish the scourge of war. Unfortunately, thus far at least, technological innovation has proved effective only in solving or alleviating war's contemporary technological problems. Man's propensity to engage in organized violence for political purposes - which is to say, to wage war - has no more been suppressed by the latest machinery of death than it has by the burgeoning tools of communication. To be fair, the war-prone condition that appears broadly indifferent to technological change, also has proved substantially impervious to the ministrations of international law and organization. The record is by no means all black, of course. The nuclear revolution certainly caught the attention of potential belligerents and helped induce caution in military practices and conservatism in statecraft.[17] Nonetheless, it is a continuing fact that the United States has nuclear war plans which, albeit highly contingent, include attack options designed to do more prompt and delayed damage to the foe than any polity

has inflicted in modern history. Even today, nearly a decade after the fall of the "evil empire" of the Soviet tsars, the United States is prepared, if necessary, to wreak such havoc upon Russia, or China, or both in concert, as to make the Third Reich of May 1945 look like a holiday camp by comparison.

The point to emphasize is not that the United States (et al!) is wrong, morally or practicably, to maintain a fearsome nuclear capability. Indeed, it is not wrong. Rather the point is that even today's casualty-averse and ever more politically correct American society is comfortable enough living with a nuclear basis to its national security. Social learning—or culture, if you prefer—and technological conditions may appear to effect great changes in Man, but a closer look at the historical record tells a different tale. Sensitive people in the West today are apt to be appalled by the gruesome detail of slaughter lovingly provided in the most violent work of popular literature ever composed, Homer' Iliad. The almost mechanistically brutal hoplite combat of Greece's "golden age" is more appalling still.[18] However, although the abattoir-like features of ancient Greek battle suitably shock our civilization, it can seek solace in the comfort of historical distance. More puzzling than the willingness of Greek heroes, and ordinary citizens tactically obliged to behave in the phalanx as if they were heroes, to engage in brutality for a couple of hours at a time, was the endurance of modern citizen armies through more than four years of war from 1914 to 1918.[19] As if 1914-18 were not had enough, the War to End All Wars transpired to be but round one of a new Thirty-Years' War. We completed the Twentieth Century with a third great global conflict. Readers can choose whether they are more impressed by the Cold War's virtuality, or by its potential for limitless catastrophe. For the best and worst of reasons modem, indeed contemporary, Man has been able and willing to kill his own kind on an industrial scale.

At no little risk of incurring hostility from readers encultured to be generally optimistic about the course of history, this theorist must affirm the conviction that in human affairs little changes. Those who would study the past in order better to understand the present, could just as well study the present in order better to understand the past. *Plus* ça *change, plus c'est la même chose.* Although the forms of war alter with political and social organization, and certainly with technology, inter alia, the driving motives do not. If we see ourselves, as we should, in "the Western way of war" as invented in Ancient Greece, we should see ourselves also in the

causes of war identified by Thucydides. "Fear, honor, and interest" comprises as satisfactory a general explanation of modern war and defense preparation, as it does for like activities in earlier times) [20]

Although war is fraught with problems with a technological dimension, the institution of war is not itself a technological problem. That fact happens to be deadly for the utility of negotiated arms control regimes.[21] To control arms we need to control the demand for arms, and that demand flows from some mix in Thucydides' formula of "fear, honor, and interest." Four generations of scholars, over eighty-plus years, have assaulted the world's forests in covering paper with well-intentioned speculation on the causes of war(s) and the conditions for peace. No advance worthy of theoretical or practical note has been secured over Thucydides.[22] If good intentions, sophisticated methodology, and bold speculation could crack the conundrum, truly war would be yesterday's nightmare.

A part of the problem is that war is not all nightmare. Usually, it is undertaken for at least some sensible, even noble reasons, while the worst of circumstances does bring out the best of behavior in some people some of the time. Naturally, all too naturally, war also provides license and opportunity for the worst of behavior. Whatever one makes of his raft of strong opinions on a wide range of security topics, Ralph Peters, more than others of recent years, comes close to targeting the proper enemy. He writes:

> Our enemies of the future will be enemies out of the past. As the United States armed forces put their faith and funding behind ever more sophisticated combat systems designed to remove human contact from warfare, mankind circles hack to the misbehaviors of yesteryear. Technologies conic and go, but the primitive endures. The last decade of this millennium has seen genocide, ethnic cleansing, the bloody rending of states, growing religious persecution, the ascendancy of international crime, an unprecedented distribution of weaponry, and the persistence of the warrior—man of raw and selfish violence—as a human archetype. …We must study the minds and souls of violent men, seeking to understand them on a level our civilization has avoided for 2,000 years. We can no longer blame atrocities and the will to violence on the devil, or on mistaken ideologies, or even a childhood

> deprivation. None of the cherished explanations suffice. In this age of technological miracles, our military needs to study mankind... The heart of the problem is not the weapon, but the man who builds and wields it:[23]

With those words Peters sinks much of the desperately irrelevant arms control experience of the past century. Efforts to legislate peace by control of the weapons which express human antagonism proved as misguided in great power relations in the 1920's and '30's,[24] as they are failing again today in Northern Ireland. The problem, or condition, of the ever-changing institution of war is worse even than Peters allows, War is possible not so much because there are socially misfitting "rogue warriors," though such certainly exist (if not abound), -but rather because a very large fraction of Mankind - or, ironically, humanity - contingently is willing to take up arms and to kill. Modern technology, with its expanding horizon of the feasibility of reaching out to damage someone - albeit often precisely - does nothing to help banish war.

When technology poses all but intolerable risks and costs, even to the (Pyrrhic) victor, it is in the nature of strategic affairs for people to seek competitive solutions to the actual or impending stalemate.[25] "Modern warfare" was invented in 1916-18 in an only partially successful effort to resolve the paralysis consequential upon the fruits of pre-war civil and military developments.[26] The solution was found in a combined-arms style of combat keyed principally to technological improvement in artillery, and to new, or revived, tactical skills on the part of assaulting infantry.[27] The tanks and aircraft of 1918 were useful, but no more than that. For a more recent case, when the technology of the nuclear age denied the Cold War superpowers the practical option of grande guerre, they—the United States in particular—sought to escape paralysis by the invention of "limited war in the nuclear age."[28]

In common with global weather, the dynamics of war are so complex and chaotic that they resist comprehensive understanding. It should be needless to add that human dimension of war imposes extraordinary complications for research and policy which the natural realm cannot begin to match. Many scholars, commentators, and policymaker either ignore or neglect the point, but the social sciences are systematically more difficult than the physical sciences. For example, on the one hand, buildings and hillsides may be unstable, but tint instability should be approximately calculable, even if non-linearity is possible. On the other

hand, the political relations which determine decisions for war and peace, as well as price movements in financial markets, float along axes according to beliefs and sentiments which defy predictable calculation. Two generations of American defense analysts (this author included) were raised on the RAND Creed of rationally calculable Strategic Stability: I believe in invulnerable strategic forces, in the strategic forces triad, in quantifiable cost-effectiveness..., and so on. What the intellectually dominant RAND school of national defense analysis attempted was the reduction of the all too humanly political possibility of war to an economically rational engineering challenge.[29] Apply the principles of strategic stability to the Soviet-American strategic relations and, *ceteris paribus,* peace with security should be assured. This, as Ken Booth noted insightfully in 1974, was a vision of a "technological peace."[30] Get the force structure right (enough), comport ourselves prudently and responsibly in rational strategic behavior, and all should be well.

It is entirely possible that the American theory of strategic stability for stable deterrence, though well intentioned and notably rational, may have been thoroughly misconceived. The theory, and the policies it inspired and explained, was painfully bereft of human and political content. Even if policy is largely explicable with reference to *raison d'ètât,* that *raison* should include the Thucydidean factor of honor/reputation, and ought to recognize that the political velocity of policy is very much a matter of human volition. People who do not understand this point are vulnerable to the dangerous fallacy that deterrence is, or can be made, reliable.[31] It is the same mentality which is willing to believe in unsinkable ships, thoroughly safe sex, and which finds no discomfort in the ridiculous concept of the foreseeable future.

Much of the literature on the causes of war is as misconceived as consequentially it is unhelpful. Kenneth Waltz's classic study of *Man, the State, and War***,** is a superior holistically inclusive enquiry. It recognizes the traffic among three levels of analysis—Man, the internal political arrangements of states, and the system or (anarchic) society of states which we would call world politics. Waltz concludes persuasively as follows:

> The third image [the system of states] describes the framework of world politics, but without the first and second images [respectively the behavior of Man and the

> domestic character of states and societies] there can be no knowledge of the forces that determine policy; the first and second images describe the forces in world polities, but without the third images it is impossible to assess their importance or predict their truth.'[32]

The problem, or condition, of war-proneness is structurally too complex for developments in a single relatively simple dimension, the technological, to have profound implications. Man is a social being and as such cannot sensibly be considered as having a nature other than a social one. The Greeks took this point to the extreme with their belief that civilized life, indeed meaningful existence, was possible only through membership of a *polis,* with its balance of rights and duties. The arguable assertion that is the title of this section - "we are the problem's - might be improved if amended to read, "Man in Society is the Problem". But Man is always, and inalienably, in society.

Recent scholarship on "killing" is interesting and more than a little contradictory. Joanna Bourk's selectively anecdotal study of face-to-face killing yields the unsurprising conclusion that many psychologically apparently unremarkable people can come to enjoy, certainly to tolerate, killing.[33] By way of some contrast, Dave Grossman's rather more rigorous review of the same terrain emphasizes the challenge posed by, and the costs of, the need so to brutalize ordinary soldiers that they will kill when it is militarily necessary for them to do so.[34] This exploration of the relations among Man, technology, and war, points to three broad conclusions relevant to the on-going debate about the implications of technological innovation for the future of the institution, and character, of war.

- New technologies, even when packaged for effectiveness with appropriate changes in military organization, ideas for operations, and forces, must encourage strategically' competitive responses from abroad.
- The forms that war can assume are all too richly various. As Clausewitz stressed, "[w]ar is more than a true chameleon that slightly adapts its characteristics to the given case."[35] In other words, as one style of war becomes obsolete, so another will replace it. Moreover, many different styles of war will remain effective, only in

different geographical and geopolitical contexts. The U.S. military that may need to help protect Taiwan from an armed missile attack, *inter alia,* also may have to be prepared to wage classic air-land combat to seize ground. Or, it may have to fight its way, block-by-block, through some African, Asian, or Latin American city and to police a patched-up quasi-peace in some multi-ethnic disaster zone.

- Whatever we may think (If some of the fine print of Daniel Goldhagen's analysis (If German anti-semitism, the title of his book about *Hitler's Willing Executioners* does point to a troubling. unarguable truth.[36] It is incontestable that the German Army and, ergo, much of German society, was massively implicated in the conduct of the Holocaust, as well as the murder by neglect of millions of Soviet POW's.[37] For reasons that seem good enough at the time, most of us condone killing on our behalf, and similarly most are prepared to participate in acts of violence for reasons of state (and even to enjoy it). Make of this what you will, but it is a fact.

A Chaotic World of Chance?

If the nature of war and the human factor effectively are constants, what is the historical domain of Clausewitz's argument that "[w]ar is the realm of chance?"[38] Was he correct in his claim that "[n]ot only it's objective but also its subjective nature makes war a gamble"?[39] Contra Clauscwitz, is it possible to believe that uncertainty in war is a highly variable characteristic governed in good part by the technical competence of belligerents? 'The latter postulate is advanced today by Admiral William Owens as a consequence of his claim that the computer revolution enables us to lift the fog of war. Is it possible that Clausewitz mistook a passing condition of technically imposed ignorance for a systemic truth about war? Notwithstanding some minor genuflection in recognition of the complexity of the subject, Admiral Owens' advocacy of a computer-assisted RMA points "to the profound transformation of warfare itself that is taking place before our eyes."[40] While not strictly challenging the nature of war as we have defined it here, nonetheless Owens is portraying a vision of (hopefully) U.S. military effectiveness resting upon near-perfect real-time information in a theater of operations (at least, in a battlespace 200x200 miles in area). Owens' RMA looks to U.S. ability to turn any extensive battlespace into a shooting gallery wherein all but invulnerable American military personnel would teach