The Impact of the Digital Technical Revolution on Peer Versus Peer Kinetic Warfare[1]

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Introduction

The recent AUKUS alliance has drawn attention once more to the fact that, despite the focus in recent years on non-kinetic/non-linear warfare, classic military power and power projection are still an important component of international relations, strategic thinking and, ultimately, warfare. Whilst fully acknowledging the vast importance of non-kinetic competition, conflict or warfare - the aim of which, after all, is to win without the need for nasty, bloody destruction – it would be foolish to forget that the ability to deploy and employ kinetic force still matters, and that hybrid warfare covers the whole spectrum of weapons, including kinetic. Moreover, our recent defeat in Afghanistan against a very much non-peer enemy should help to challenge our complacency. It is high time that we in the West re-assessed our hard military ability honestly and frankly. In this paper I would like to give a push to that process. It is much better to expose our military deficiencies ourselves, now. It will be much less painful than having a peer enemy do that for us.

Background

Visitors to the Royal Military Academy Sandhurst, the British Army's Officer Training School, will see photographs of the pre-World War I graduating classes. These pictures show the graduates posing in the formation of a classic, tightly packed, three deep, upright Napoleonic era battle square! Before 1914, the British Army could not but know of the existence of telephone communications, barbed wire, accurate bolt action magazine-fed rifles, machine guns, and quick-firing, breech-loaded, reduced recoil, rifled howitzers and guns, which could fire contact, delayed or time-fused high explosive and/or shrapnel shells. Moreover, all of these relatively new technologies had been used during the Russo-Japanese War that was fought only a decade before World War I; indeed, many were used in the Boer War that the British Army fought only five years before that. Yet, the British Army, like all other major European militaries, went to war

[1] This analysis addresses conventional peer versus peer kinetic combat between nations whose militaries operate equipment based on new advanced technology. It does not address combat with non-state groups or one-sided combat against non-peer nations whose militaries operate only obsolete or obsolescent equipment. Nor does this analysis address hybrid warfare. Consequently, this analysis does not discuss the disproportionate role and importance of special forces, which have considerable significance when conducting non-peer kinetic combat and/or hybrid warfare.

in 1914 thinking that the subsequent combat would be short and dominated by maneuver. None of these state-of-the-art militaries were prepared for trench warfare and the static attritional blood bath that subsequently occurred.

British pre-World War I literature illustrates how they fondly remembered their previous colonial campaigns where "We have the Maxim and they have not." But no Brit, it seems, thought ahead to a future conflict where both sides had Maxims!

Just over two decades after the end of World War I, the German and Soviet militaries recognized the synergistic impact of new advanced technologies on land warfare, ironically studying British military experimental exercises that the British themselves did not pursue. These new advanced technologies included powerful internal combustion engines and wireless communications. The impact of these would once again allow ground forces to decisively maneuver in combat. Making effective use of these new advanced technologies at the very beginning of World War II, Germany was initially able to achieve tremendous operational victories, but these did not prove to be strategically decisive. Ultimately, Germany's enemies became their technical and tactical equals. The greater mass that the Western Allies could generate, and Soviet excellence in operational art, led to Germany's defeat.

Recently, US, British and NATO forces have once again been engaged in one-sided "colonial" wars against non-peer enemies. While our militaries have been in sustained low-scale conflict with non-peers, new advanced technologies have emerged and fully matured. It would be logical to assume that these new advanced technologies would have by now made a significant impact on current and future combat tactics, operational art and national strategy. But, as before, this has not generally occurred, despite the startling defeat inflicted on Armenia in Nagorno-Karabakh by Azeri forces – albeit with Turkish and Israeli help.

In my opinion, this failure to transform reflects the fact that current international militaries are, once again, commanded by senior officers whose paradigms inevitably reflect only their prior combat experience. For decades, these officers have fought enemies who, however brave - and occasionally collectively or even individually skilled - just became targets to be neutralized during largely one-sided combat which was dominated by the attritional use of vastly superior technology. Press comments on the West's recent failure in Afghanistan have focused on our defeat off the battlefield, despite our military superiority. But this fact, salutary though it is, has obscured the problem of our militaries drawing the wrong *military* lessons from the two decades of fighting.

Relatively small volunteer forces conducted these recent "colonial" wars. Consequently, most current Western political leaders, as well as the national populations which elected them, have little understanding of the human and material cost of large scale, peer versus peer warfare. Worse, both political leaders and the general population have come to consider the very limited military casualties in combat as both militarily significant and representative of modern warfare.

What would combat between technological peers or even near peers be like today, or in the near future? Does mass still define national military power? Will attrition still ultimately determine the victor in combat? Can remote major powers still militarily dominate distant regions? Is force-projection and forced entry still feasible? Can precision attack be strategically decisive? Will new advanced technology impact the likelihood of surprise? Will it increase or decrease international stability? How does the impact of new advanced technology address the used of blockade as a military policy? This analysis will attempt to provide an answer to these profound questions. It will be based on both the existing ability of selective nations to generate regional military power at an acceptable annual cost, as well as their ability to generate that power versus deployment time.

This analysis will also reflect the use of only known, currently fielded military technology. Consequently, the potential impact of future weapon systems currently in development, such as directed energy or very powerful lasers, as well as hyper-velocity rail guns or hyper-velocity long-range maneuvering missiles, will all be discounted, as none of these are known to be fully operational and in the current widespread use of any international military.

This analysis also recognizes that very few international militaries broadly field new advanced technology or can effectively exploit the available technical menu. This, I would assess, reflect the impact of several factors:

- First, the military systems of most post-Cold War nations have proven to be extremely inefficient at turning their allocated national defense budgets into useable military power;
- Second, lacking any perceived existential threat, most nations generally allocate a relatively small proportion of their GDP to national defense;
- Third, because of the extremely high cost of their volunteer military personnel, only a relatively small proportion of this limited defense budget can be allocated to R & D and procurement;
- Fourth, the limited funds allocated to R & D and procurement are all too often directed to non-competitive military industries which emphasize the production of over-priced platforms and which are generally produced in inefficient small numbers, versus force multiplier subsystems;
- Fifth, the staffs of most militaries are rarely able to generate operational requirements that yield improved capability at an acceptable cost.

This overall inefficiency generally reflects the reality that peacetime military leaders tend to be conventional, low risk, non-visionary thinkers. In addition, major military industrial firms have undue influence and are generally almost universally self-serving. The current generation of civilian political leaders, who provide both direction and oversight, are generally militarily illiterate.

A handful of national militaries have proven to be both fiscally efficiently and able to militarily exploit new advanced technology. It is precisely the militaries of these few disproportionately

powerful nations that best represent what a peer threat should be. For the purpose of this analysis, their current military capability will, therefore, form the basis of what best represents a regional peer military threat.

The author has generated the assessments and conclusions that follow. These reflect: his unique experience comparing US and Soviet weapon systems; his studies of the cost impact of alternative national defense systems and both Cold War and more recent military tactics and technology, and particularly; his work on recent Middle Eastern conflicts and the uniquely efficient and effective Israeli Defense Forces.

Strategic Overview

Then

In the Twentieth Century, the ultimate victory in two world wars was achieved mostly by sustained attrition rather than by the results of short decisive battles. In essence, the rival coalition of nations that could generate greater mass was ultimately more capable of sustaining the attrition associated with lengthy continuous combat. This was especially true of the Western Allies and at the time was recognised. When asked what he thought had been the most important weapons of the war, General Eisenhower confounded journalists by answering: *'Most senior officers regard as the most vital to our success...the bulldozer, the jeep, the two and a half ton truck, and the C-47 (Dakota)'.* The atom bomb and the aircraft carrier didn't get a look in.

These two world wars have been characterized as "industrial wars", because victory went to the coalition that was better able to sustain the generation of huge quantities of steel and other metals, machine tools, chemicals, electronics, etc., as well as having adequate accessibility to petroleum and other vital raw products. Moreover, all the nations engaged in these industrial wars deployed relatively huge militaries whose personnel were generated by universal conscription. The warring nations also dedicated an immense proportion of their GDP to national defense.

Furthermore, most of these nations entered these conflicts with large pre-existing military-industrial complexes and/or rapidly convertible industrial facilities. This meant that military production output could be relatively quickly increased to enable the warring nations to rapidly equip their rapidly growing order of battle. Wartime production also proved able to offset the subsequent heavy continuous material losses associated with attritional battle. Much of the equipment used in these twentieth century world wars was already in production or in the process of development at the time of the actual outbreak of combat. There were significant exceptions, notably the development of armored vehicles and poison gas during World War I and nuclear weapons, specialized amphibious craft and jet aircraft during World War II. Twentieth Century civilian societies also generally accepted the inevitable "butcher's bill" associated with huge attritional battles. Information was universally censored and controlled by all of the competing governments.

In twentieth century industrial wars, the effectiveness of senior military leadership at the strategic level was primarily a function of their ability to best allocate the available order of battle, personnel and equipment in order to meet their national military objectives. The success of military leadership at the operational level depended on their ability to timely concentrate forces relative to both geography and enemy dispositions, conceive appropriate plans and subsequently modify these plans to best exploit the dynamics of combat in order to achieve specified military objectives. At sea and in the air, the Western allies were best at this; on land, most competent was the Soviet Union. Tactical military leadership reflected the ability of officers and NCOs to train and direct personnel in force versus force combat at the squad to corps level, while best exploiting the available technology and terrain.

In large part, the national resources that could be allocated to the generation of sea, air and land forces dictated the strategically options of military leaders. Technology and terrain dictated both operational art and tactics. For most of the twentieth century, precision fire, other than line-of-sight direct fire by high velocity guns, was impossible. For example, while most infantry were provided with adequate training in order to achieve a high hit probability on the firing range, in actual combat, it required many thousands of rounds of small arms ammunition to kill or wound an enemy soldier. Because of this lack of precision, it was usually necessary to generate massive aerial and/or artillery bombardments in order to achieve adequate military results. Strategic bombing attacks, designed to reduce an enemy's ability to generate massive quantities of armament and/or fuel and other raw materials, proved to be relatively ineffective because the accuracy of aerial bombing was measured in kilometers. In both wars, blockade was ultimately more effective than strategic bombardment, although it is now understood that this did force Nazi Germany to divert massive resources away from crucial land theatres. But blockade lacked glamor and was slow to generate measurable results.

After the end of World War II, only the Soviet Union continued to generate active and reserve conventional forces that were realistically capable of fighting a sustained large-scale peer versus peer conventional war. But preparing and equipping a mobilizeable military that was 11.5 million strong, which could be fully equipped and which could sustain conventional combat for twelve months, required the continuous annual allocation of perhaps 30% of the Soviet Union's GDP to national security for over four decades. The decision to generate these unnecessarily huge conventional forces in the Cold War ultimately bankrupted the Soviet economy and led to the political collapse of the Soviet Union. When asked why the Soviet Military decided to generate this massive force when every NATO military understood that they would be faced with a choice to go nuclear after seven to ten days of combat, a Soviet Colonel-General replied to the author, "No one decided. It just happened."

Following World War II, the very existence of nuclear weapons reduced the probability of major large-scale peer versus peer wars. Hence, NATO nations shared a common pretense of fielding realistic conventional forces. NATO war games consistently resulted in a decisive Soviet breakthrough occurring sometime between days seven to ten after the initiation of combat across the inner-German border. While serious defense analysts understood this, NATO nations simply refused to enlarge their conventionally armed order of battle in order to prevent such a

quick and decisive break through by Soviet ground forces. NATO never generated adequate operational or strategic reserve military forces. Most NATO member states did not even maintain adequate war reserve ammunition and spares to sustain combat beyond day ten. But, the Soviets did not attack, as they were deterred by the accepted certainty that the US would resort to the use of nuclear weapons when facing catastrophic defeat in Western Europe. Both the US and the USSR also recognized that they had to constrain their non-European allies. The two superpowers generally ensured that local conflicts would not escalate beyond mutually acceptable limits.

Now

Towards the end of the twentieth century, major new advanced technologies evolved that would cumulatively allow the transformation military forces and, consequently, dramatically change peer versus peer warfare. The most significant of these technologies I assess to be:

- The digital revolution in electronics,
- The provision of satellite-based precision navigation, and
- The availability of the internet.

These new advanced technologies combined to allow a nation which has a well-educated and motivated population to generate a relatively powerful leading-edge regional military, even if that population is relatively small and generates a limited gross domestic product, while also having limited natural resources. But this is true only if it fully exploits these new advanced technologies. Consequently, such nations can generate regional military dominance, which can be extended over a relatively significant reach.

Based on what one such small nation can currently achieve, it is feasible for a small nation to possess near real-time 24/7 regional surveillance, the ability to precisely target any regional aim point with precision weapons delivered by surface ship, submarine, or air, and while simultaneously deploying an active national defensive shield against a precision enemy attack. Moreover, it is also currently feasible for such a nation to simultaneously generate and deploy a relatively large, well-trained and very well equipped order of battle. In fact, the regional land and air forces, which such a nation can generate are far larger than those that remote major powers could project into their region.

After the end of the Cold War, European nations, with rare exceptions, opted for relatively small militaries based on the use of salaried volunteer personnel. These European nations have also generally limited their allocation of GDP to national security to 2% or less. With exceedingly rare exceptions, international political leaders do not recognize that population, GDP and access to natural resources no longer define a nation's ability to generate regional military power. More often than not, these leaders continue to assess military power based on what have become meaningless factors. They have failed to understand that the variation in the efficiency of alternative national defense systems has allowed a handful of nations to generate a disproportionate military capability.

Spending a lot on national defense has, therefore, been generally perceived as the dominant factor impacting national military capability. In reality, this perception is simply not valid. Statements such as: “Our country has the fifth largest defence budget in the world” are meaningless except perhaps in terms of flagging up the relative incompetence of the national procurement system. Worse, they may denote that the political leadership has been deluded into over-estimating the national ability to deploy military power. Such delusions are dangerous.

The allocation of resources (both personnel and funding) provided to most international military services (Army, Air Force, Navy, or Marines), and the subsequent distribution of these resources to the various “trade unions” within each of these services, has barely changed over the many decades, notwithstanding that the new advanced technology menu has radically changed and the Cold War has ended. For example, the US Navy consists of a series of separate “trade unions” including surface warfare, submarine warfare, aviation warfare (which is further subdivided into fighter aircraft, anti-submarine/maritime patrol aircraft, and helicopter communities), amphibious warfare, etc.! Since the end of the Cold War, the diameter of the “pie” which nations have generally provided for their militaries has been significantly reduced; but, the proportionate size of the slices of the “pie” which have subsequently been allocated to each of the military “unions” has not!

The conclusion seems obvious; that the first allegiance of most senior military officers is all too often to their particular service “trade union”, not to the greater national interest of generating maximum military capability at the least cost to society.

By comparison, because of this widespread “trade union” territoriality, any nation whose military leaders are *not* tightly bound by the vested interests of their “union” will likely be capable of generating disproportionate military capability. This reflects the fact that the proportional allocation of defense funding can be shifted to those combat arms that can most benefit from the impact of the force multiplier weapon systems that have been made feasible by new advanced technology. Perhaps fortunately for the world, no single nation which has large-scale intellectual power, as well as a large population, industrial capacity, natural resources, and wealth, has yet proven capable of disproportionately exploiting the impact of new advanced technology on the effectiveness of its military forces. The large nation that can first achieve military transformation at reasonable cost will become the future dominant world power. It remains to be seen if this will be China.

One additional factor that is not usually recognized is the long lead time which is now almost universally required for nations to significantly increase their currently existing military order of battle. The issue is not so much about increasing the number of military personnel – although that is an issue - as it is about equipping them. It would likely require about twelve to fifteen months for any nation to introduce conscription and generate significant numbers of additional military personnel. This time includes three to six months in order to generate the legislation needed to approve conscription and the subsequent time to create the required training

facilities and trainers, plus nine months for basic, advanced and unit training. Obviously, generating larger numbers of specialists like aircrew would take far longer.

But few nations, if any, have maintained a serviceable reserve of effective equipment that could be used to equip these additional personnel. Nor have most nations retained mothballed production facilities that would have the capacity to dramatically surge the delivery rates of the munitions and spares that would be consumed while training these additional individuals. While fifteen months might be perceived to be lengthy, the lead time that would be required to produce the increased numbers of required military equipment is actually far longer. It would require perhaps two to three years for the current production rates of existing military vehicles and aircraft to significantly increase. It would require at least four to five years to achieve the production of additional naval ships and submarines beyond those currently in the pipeline. Consequently, unless our militaries can be persuaded to think and do things differently, for almost all of them future conflicts will inevitably be fought "come as you are."

Today, as before, military capability is obviously relative. Moreover, military capability should be compared based on the military forces nations can deploy in any region within a meaningful time frame. Military forces which cannot be timely deployed and which cannot be sustained in high intensity combat are ultimately irrelevant. Projecting meaningful military forces over long distances requires significant specialized shipping and large numbers of military transport aircraft.

Furthermore, only a limited proportion of the order of battle of any nation that employs volunteer military personnel can be maintained at a consistently high level of combat readiness and/or be permanently forward deployed. This was true two thousand years ago for the Roman legion manning Hadrian's Wall, and it is still true for the British Army today. Historically, *at best*, only about one-third of any nation's active force structure will be combat ready and immediately available for deployment and/or forward deployed at full strength.

Additionally, for nations that consider themselves a global power, a limited proportion of their combat ready order of battle will have to be retained as a strategic reserve. For example, the US Army and US Marine Corps combined have a current active order of battle consisting of thirty-nine maneuver brigades. But, only about thirteen of these are estimated to be currently at full strength and combat ready. It would likely require at least ten weeks for nine of these maneuver brigades to be deployed to any region. Six of these nine brigades are light infantry units, which lack armor and heavy artillery. Deploying these forces to any region optimistically assumes that they could be peacefully transported and will have access to a fully functioning pre-existing logistical network of ports, airfields, and industrial facilities, as well as being able to employ an existing transportation network.

By comparison, it is an undeniable reality that a relatively small nation can generate regional military power, which vastly exceeds that which distant nations, however large, can realistically project into their region within days, weeks, or even many months. For example, as compared to the UK, Israel, which has approximately one-sixth the population and GDP of the UK, has an air

force which can generate about eight times as many daily high quality fast jet sorties as the R.A.F, and sustain them in combat for three times as many days. The IDF can deploy regional ground force maneuver brigades that are at least twelve times more numerous (with generally superior kit and greater sustainability) than the British Army can project into the Middle East. Moreover, Israel can mobilize these air and land forces within ninety-six hours, whereas the UK would likely require ninety-six days or more to project its far smaller conventional military forces into the Middle East. Also, Israel currently has superior space-based intelligence assets, a far superior battlefield command and control system, and maintains and inventory of about twice as many nuclear weapons as the UK.

However, as a regional power, Israel's small Navy is primarily designed for operations in the littoral waters of the eastern Mediterranean. The Israeli Navy's order of battle will soon include seven corvettes, eight fast attack craft and six attack submarines. By comparison, the UK perceives itself to be a global power. It therefore fields an ocean going navy which includes two aircraft carriers, nineteen destroyers and frigates, seven nuclear attack submarines and four SSBNs. The RN also continues to deploy specialized amphibious ships.

The R.A.F deploys a relatively large number of aerial tankers and military transport aircraft, which are both required for force projection and/or out-of-area operations. But it has only a hundred or so state-of-the-art combat jets. The British Army can at best only deploy one light army division, which requires many weeks to be projected overseas. Several years in the future, this division will be supported by about sixty daily relatively short-range F-35B sorties that will be generated by the air wing that will be based on a forward deployed CVF aircraft carrier. One small division supported by sixty fast jet sorties does not represent a significant military capability against a peer enemy.

Once regional combat has been initiated, if a remote power reaches a decision to intervene, it will face the military reality that force projection is very likely to be impossible. A peer regional enemy will possess a variety of precision weapons that will be capable of being used to pre-emptively neutralize the ports and airfields that force projection depends on. Moreover, a regional peer nation can now launch a decisive strategic attack, which can be successfully executed long before meaningful remote military forces can be projected into the region. Consequently, force projection will only prove to be feasible if the allied regional nation, which will be subjected to attack, is unilaterally capable of defeating the hostile assault.

But, if this were true, why would force projection by remote nations then be required? Force projection has, therefore, become feasible only if a regional enemy provides unambiguous evidence of its evil intents, but then passively allows remote powers the time required to peacefully project meaningful military forces into their region. Surprisingly, this actually has happened in the past, for example, when Iraq twice chose not to pre-empt force projection by the US and its Allies. But, the assumption that all future potential regional enemies have leaders that would be as stupid as Saddam Hussein should not be the basis of national strategy.

If force projection is not feasible and the enemy's initial regional attack has succeeded, the conventional military response of remote nations would have to be "forced entry". This is generally executed in order to achieve a regional foothold using an amphibious and/or paratroop operation. In World War II, such operations proved feasible, but only so long as the attacker had both regional naval and air supremacy. At that time, anti-ship weapons used for shore defense primarily consisted of huge fixed gun mounts. These could be detected and destroyed by overpowering naval gunfire or aerial bombardment. Previously, the attacker was mobile and could concentrate their military forces, whereas the defender had no choice but to statically defend every beach and/or island that could be the target of an amphibious operation. The same was true for defense against paratroops. The defenders' static anti-aircraft guns had limited range and had to be spread out to defend vast areas.

But today, significant naval gunfire support is no longer available. Current ships are extremely vulnerable to ASCMs, which employ mobile launchers and have very long engagement ranges. Additionally, amphibious craft are catastrophically vulnerable to man-portable, long range ATGMs, particularly as they slowly cross the surf line and come ashore. Transport aircraft, flying en masse at low altitude, are extremely vulnerable to man-portable and vehicle-mounted mobile SAMs.

Blockade remains a strategic option that new advanced technology has not made impractical. In fact, new advanced technology, especially sea mines, has likely made blockade increasingly feasible. Both satellite and long endurance UAVs equipped with synthetic aperture radars now allow 24/7 surveillance of large ocean areas. Interdiction of hostile maritime traffic can be accomplished anywhere in international waters many thousands of kilometers from the hostile destination. The ships executing the blockade now have long reach because of their embarked helicopters and/or UAVs. Many warships now have the ability to launch and retrieve small, seaworthy, high-speed interceptor craft. At intercontinental range, attacking the warships that are conducting maritime interdiction will be extremely difficult, particularly if these ships have significant passive and active protection features. For example, China currently imports 75% of its POL from the Middle East. All of these tankers have to transit the Indian Ocean. Yet, the USN apparently plans to concentrate its ships in the South China Sea, where anti-ship sensors, mines and weapon systems can be deployed in large numbers, rather than planning to interdict China's economic lifeblood in the remote Indian Ocean. As long as the economies of nations depend on maritime transportation, open ocean blockade remains an extremely low risk and feasible military strategy.

Unquestionably, these new advanced technologies, which by now have fully matured, allow a leading-edge military to deploy precision weapons that can be used to rapidly neuter an enemy by a relatively brief decisive strategic attack. For example, in 1991, the US, UK and other allies projected many hundreds of thousands of troops into Saudi Arabia. These large forces required nearly six months to mobilize and deploy. A very large order of battle was required to launch a conventional attack on the Iraqi forces that had conquered and occupied Kuwait. But, Iraq generated its refined POL using only 24 cracking towers. Because its oil wells could provide a never-ending source of crude oil, and its refining facilities could meet its daily civilian and

military needs, Iraq maintained relatively limited stores of refined POL products. Consequently, targeting these 24 cracking towers, which would have likely required the delivery of no more than about 32 precision weapons, could have relatively quickly deprived Iraq of POL. Without POL, its huge military could not fly its aircraft or move its vehicles. A very limited strategic attack could have achieved decisive results without requiring a long, slow and potentially costly conventional attack.

Today, any advanced nation left without POL, or electrical power, or internal transportation, or internal communications would, ultimately, lack the means for sustained self-defense, no matter the size or tactical capability of its military's order of battle. Few advanced nations could effectively function after the neutralization of only hundreds of well-selected aim points, such as petroleum cracking towers, high voltage transformer complexes, key bridges and tunnels, and command posts. Most significantly, all of this can be accomplished using a precision attack that can result in relatively limited collateral damage and only a very small number of innocent casualties.

Consequently, because of the impact of these new advanced technologies on military effectiveness, and the practicality of precision attack, post-Cold War twenty first century kinetic wars between peer or near peer nations will likely be short, decided by strategically decisive, precision attacks conducted during the opening hours of a conflict. Furthermore, a nation's military capability no longer depends on mass so much as it does on the nation's ability to exploit advanced technology in a timely manner.

In summary, at the present time it is feasible for nations to rapidly achieve decisive regional strategic attacks using conventional weapons, as long as they have transformed their militaries to fully reflect the impact of new advanced technologies. Large nations can no longer quickly generate additional military manpower and/or kit. Warfare will generally be conducted "come as you are." Remote nations cannot quickly or safely force project meaningful military forces into distant regions. It is no longer feasible for remote nations to employ forced entry. Because of the vast differences in the efficiency of national defense systems, relatively small nations can generate far greater regional military capability than far larger, far richer nations. Had almost any NATO army been defending Nagorno-Karabakh instead of the Armenians, it would have suffered the same fate. Blockade, based on the remote interdiction of maritime transportation, remains a viable strategic option for any nation capable of deploying a significant ocean going navy. The variation in population, GDP or national resources is no longer decisive. Finally, the time required for mobilization and/or deployment has become an absolutely critical factor when comparing regional military capability.

If prior twentieth century world wars were characterized as "industrial wars" then future twenty-first century wars between peers or near peer nations should be characterized as "intellectual wars". Nations whose political-military leadership has the vision, insight, and particularly the institutional flexibility to generate an efficient national defense doctrine and the ability to fully exploit the advantages of new advanced technology can generate vastly disproportionate

military capability. But because so few nations have been blessed with such leadership, this new reality still generally goes unrecognized!

Tactical and Technical Competence

While this analysis does not address the issue of tactical and technological competence, it should be recognized that not all international military personnel are equal, nor are all equally well-trained, and some military leaderships have proven better able to fully exploit the tactical and technical menu than others.

A classic example was the outcome of the 1973 Yom Kippur War in the Middle East between Soviet equipped Arab forces and US/NATO equipped Israeli forces. Prior to the war, the USAF and the CIA expected that the air-to-air kill ratio of F-4 Phantoms would be about three-to-one against the (far less expensive) MiG-21. But the Israeli's F-4s achieved a favorable air-to-air kill ratio of about twenty-to-one. The USAF, knowing that Israeli and USAF air crews flew about the same number of annual flight hours, happily assumed that this one-sided kill ratio could be expected in any European war. Then, just months after the war, Israeli F-4 aircrews came to the US and, thanks to the USMC flew F-4s against US aircrews flying identical F-4s. The result was the "Miramar Massacre", with the Israelis achieving up to a 12:1 air-to-air kill ratio against their US friends! The results should not have been a surprise as actually the IDF Air Force had annually accrued FIVE times the annual air-to-air training sorties as USAF F-4 crews.

Today, most military assessments amount to "bean counts", which, for example, compare the gross number of aircraft in a nation's order of battle, but ignore aircraft quality, serviceability, readiness, the achievable daily sortie rate, and, most significantly, air crew quality and tactics. Such "bean count" net assessments are fundamentally useless and are generally misleading. It seems obvious that the possible variation in tactical and technical competence can have a dramatic impact on the regional balance of military power. Bigger is not always better.

Current Peer Versus Peer Combat

Intelligence generated by electro-optical satellites, supplemented later by synthetic aperture radar (SAR) satellites was once in the sole ownership of the US and the USSR However, advances in technology have allowed the development of small, relatively low cost, LEO and SAR satellites. This has permitted nations with GDPs about only 2% that of the US to independently generate useful space-based intelligence. While the coverage provided by these mini satellites during each overhead pass may be less than that of the vastly larger super power satellites, and the resolution less, the military usefulness provided by these affordable satellites has proven to be disproportionately cost effective.

This space-generated intelligence has been supplemented by advanced signal intelligence systems that are ground, air, ship, and space-based. Consequently, any peer, or even near peer,

nation should, at the onset of a conflict be assumed to possess data on all regional static strategic and military targets, thereby permitting the creation of a list of precisely located predetermined aim points for precision attack. Prior to combat being initiated, mobile targets can also be detected, identified, tracked, and precisely located in near real time by similar means, as well as by 24/7 surveillance UAVs, stand-off sensors mounted on manned surveillance aircraft and used by covertly inserted targeting teams.

Once combat is initiated, it is possible that vital surveillance, communications and navigation satellites will be subject to attack. It is potentially feasible for regional powers to generate a limited anti-satellite capability. Surveillance aircraft, which generally are based on civilian airliners or large business jets, which normally operate in peace time at safe and legal stand-off ranges, will be engaged in wartime by long-range SAMs and/or interceptor aircraft. It is also probable that non-stealthy medium and large UAVs will become relatively simple targets for existing SAMs. Therefore, additional means will have to be developed to provide survivable wartime 24/7 surveillance. The survival of standoff special mission aircraft will require the neutralization of long-range enemy SAMs and the achievement of regional air supremacy. Advanced self-defense capability will be required for the large airframes used for standoff surveillance. The widespread deployment of stealthy mid-sized UAVs will be necessary, as well as the deployment of mini UAV swarms. All of these capabilities will, likely, be held in secrecy for first use at the onset of a conflict.

Elementary air-to-ground guided weapons used in WWII had only limited success because of effective countermeasures, poor reliability and the vulnerability of the launching aircraft. Kamikaze aircraft were a crude form of precision weapon. While they damaged numerous ships, the vast number was shot down. By the early 1970s, the USAF and USN had successfully introduced air-to-ground electro-optical or laser guided precision weapons into service. These weapons either had to be locked onto their target before launch or required orbiting aircraft to designate the target. They were used successfully during the later stages of the Vietnam War and the Yom Kippur War. The requirement for pre-launch target lock or for an orbiting aircraft to illuminate the target proved to be extremely difficult in areas that were heavily defended by SAMs.

Technology rapidly advanced and inertial guidance systems and data links made feasible by the use of reliable digital technology progressively became available and affordable for use in missile guidance systems. In the mid-1970s, the first effective standoff lock-on after launch air-to-ground PGMs were generated. The Israeli Air Force very effectively employed these types of weapons in the 1980s. During the ‘80s, scene correlation guidance matured and was employed in advanced ballistic and cruise missiles. Non line-of-sight optically guided tactical missiles were also secretly deployed. The subsequent development of GPS precision navigation permitted the development of reliable precision, low-cost guidance for all types of air and ground launched guided weapons.

Today, precision-guided weapons can be air, sea or ground launched. These weapons have a variety of trajectories, warheads, speeds, ranges, and signatures. Leading-edge peer militaries

maintain large inventories of a wide range of such weapons. These can hold at risk an enemy's vital infrastructure and all types of military targets.

The capability for regional military powers to launch fast, massive precision attacks already exists. For example, the Israeli Air Force currently deploys about 300 high quality multi-role fast jets in squadron service. Each of these aircraft can generate multiple sorties per day. They can strike targets out to a range of up to 800 km. without requiring air-to-air refueling. Each of these sorties will require about 1.3 to 2.4 hours depending on the mission range. The turnaround time between sorties should be about 0.5-0.75 hours. Therefore, within a period of six hours, the fully mobilized Israeli Air Force can likely generate three attack waves, against targets out to a range of about 800 km. They can generate about 600 strike sorties within 6 hours. Consequently, their aircraft can deliver up to 2,500 Mk84 2,000 lb. precision-guided weapons during this short time period. Moreover, each of these large weapons could be replaced by 4 smaller 250 lb. precision weapons.

At shorter ranges, the IDF can currently employ up to about 200 upgraded GMLRS mobile rocket launchers. Each of these launchers can fire precision-guided rockets, varying from 2 to 36 weapons per salvo per launcher. Within six hours, each of these launchers could certainly be used to fire several salvos. Therefore, within six hours, the IDF can fire many thousands of precision-guided rockets, which can attack targets at ranges from 35 to 300 km. Supplementing this firepower, are smaller and shorter-range NLOS missiles, as well as guided artillery and mortar shells, all of which can be targeted against nearby predetermined aim points.

Obviously, if all of this potential firepower were to be unleashed in a pre-emptive attack, hostile neighboring nations would be devastated within a few hours. Even at a range of 2,000 km, within six hours, the Israeli Air Force could potentially generate two attack waves. However, the number of weapons delivered by each sortie would be significantly reduced. Therefore, they could likely deliver a maximum of about 650 precision-guided one-ton bombs. These would also likely be supplemented by conventionally armed ballistic and cruise missiles.
Militarily, Israel is a rare exception. By comparison to Israel, not one European NATO member currently fields a multi-tier air defense system and many have minimal air interceptor capability. Virtually none have hardened vital facilities to minimize the impact of conventional weapon attack. Whereas the IDF has multiple brigades equipped with armored vehicles that have active defense systems which can defeat all ATGMs, only a few companies of European NATO MBTs will soon be so equipped. European militaries possess only a handful of extended range non-line-of-sight ground-to-ground missiles and the inventory of precision-guided air-to-ground PGMs is, at most, generally measured in the hundreds, not the thousands necessary. The sad reality is that most nations today do not field leading edge militaries, nor can they deploy ground, air or naval forces with a meaningful order of battle.

Today, new advanced technology has allowed the introduction of multi-service, fully integrated command and control and battle management systems. These systems have dramatically impacted the ability of military forces to coordinate and direct fire. All inputted targets and all means of fire could be integrated by existing state-of-the-art, multi-arm, cohesive, battle

management systems. These systems are able to assign any target to any selected means of engagement. The target detection time to weapon detonation time can now be measured in no more than a relative handful of seconds, where this time largely is based on the time of flight of the weapon selected to neutralize the target. A well-conceived battle management system will, likely, be able to reach an engagement decision for any available weapon system located within the engagement range to the target based on the target's characteristics, estimated probability of kill, the cost per kill, ammunition inventory availability, time of flight to destruction, and expected collateral damage, among other decision factors. All of this currently exists and has been fielded by a nation that allocates a limited budget to national security. But, this has become feasible because, and only because, the defense system of that nation is relatively efficient, its technical personnel are militarily literate, and the national objective is limited to regional self-defense.

At this time, Israel almost certainly has the world's most efficient national defense system. It still employs near universal conscription followed by compulsory reserve service. Therefore, the annual cost of mobilisable Israeli military personnel is extremely low. It has a single integrated general staff, which makes exceedingly pragmatic decisions in how it invests its limited budget in R & D and procurement. It benefits from the availability of militarily knowledgeable engineers and scientists, who have been able to identify leading edge force multiplier technologies. Israel also obviously benefits from having access to leading edge US research, materials and weapon systems. Most important, its objective is limited to regional self-defense.

It should be obvious that the combination of 24/7 surveillance and precision guided weapons allows a regional power to pre-emptively neutralize the ports and airfields that any hostile remote major power would require to effectively project military forces into that region. This will be true unless the regional power's means of fire can be pre-emptively destroyed by very long-range standoff attack. Achieving this would be very difficult if the engagement time reflects the use of relatively slow weapons, because many of these counter force targets are likely to be mobile. The use of counter force targeting would also be complicated by the reality that enemy targets might be passively and/or actively protected. Using very long-range standoff weapons in the counter force role will be very difficult and exceedingly costly. Therefore, being able to project forces into any region against a peer will be exceedingly difficult after the onset of combat.

Consequently, I consider that any major power that continues today to invest in force projection - which requires the sustained generation of a relatively large order of battle (recognizing that only about one-third will normally be combat ready) as well as both specialized amphibious and fast deployment shipping and military air transports - is fundamentally wasting taxpayers' money.

Conversely, major powers might alternatively choose to disproportionately invest their annual defense budgets in conventional strategic strike weapon systems. These include ground, air and ship-launched ballistic and very high-speed cruise missiles, which would be able to hold any

hostile nation at strategic risk, no matter their regional conventional military capability. Vital strategic targets are easily recognized, static and usually relatively unprotected.

However, very long-range weapons are inherently far more expensive than the much shorter-range weapons deployed by regional powers. In addition, the deployment of these very long-range conventional weapons will likely be inconsistent with current strategic nuclear disarmament treaties. Further complicating the use of this alternative strategy is the reality that regional powers can deploy significant area and point air defense systems designed precisely to neutralize, or at least reduce, the threat of precision standoff attacks.

One possible cost-effective solution to the generation of intercontinental strike might be the use of mobilisable commercial ships and/or aircraft as launch platforms. These can be used as launch platforms for more affordable intermediate range conventionally armed ballistic and cruise missiles. These launch platforms would standoff at relatively safe ranges over 500 km. from the borders of regional powers.

If a regional conflict were to be initiated by a peer or near peer nation, the primary military objective would logically be to ensure success in the "intelligence war". Intelligence war, as defined herein, is the ability to detect and engage targets and quickly allocate destructive fire, while denying the enemy the capability to do either. Both sides in a peer versus peer regional conflict will obviously have the ability to attack static targets detected before the onset of conflict. Hence, due to this reality, there inevitably will be great political instability. Advanced technology has so enhanced the lethality of attack that the decision to pre-emptively shoot first has obviously become strategically vital.

In a regional conflict, the subsequent impact of return fire can be significantly reduced by combining the use of counter force pre-emptive targeting with a combination of active and passive defense. Thereafter, after the onset of conflict, by neutralizing the enemy's ability to surveil and communicate, their ability to engage non-line-of-sight mobile targets would be significantly reduced.

Nations that can generate disproportionately large military budgets will have the huge financial resources required to generate very expensive platforms - such as aircraft carriers with their very specialized aircraft, nuclear submarines and dedicated heavy bombers - that smaller nations with limited defense budgets simply cannot afford. However, these expensive platforms do not necessarily generate cost effective military capability.

USN nuclear powered aircraft carriers and their associated battle group are a case in point. The USN has to procure ten in order to sustain forward operations by three. A current production Ford class nuclear carrier has a procurement cost of about 15 billion dollars. It has a planned extended service life of over 40 years. Each battle group currently includes at least 5 surface combatants and 1 nuclear attack submarine as escorts, plus at least 1 large fast replenishment ship. These escorts have a combined additional procurement cost of about 10 billion dollars. They have a somewhat shorter service life than the carrier. Because of their shorter service life,

1.5 sets of escorts would have to be procured during the service life of the carrier. The carriers' embarked aircraft and helicopters have a replacement cost of another 7 billion dollars. Over the service life of the battle group, the USN will have to procure about 3 sets of aircraft and helicopters because of their relatively short fatigue life. It requires about 6,700 personnel to man each carrier battle group. The annual cost of the USN personnel crewing each battle group is about 2 billion dollars. To this must be added the cost of additional personnel required for rotation and training, the lifecycle cost of maintenance and operation, as well as the fact that the USN buys 15 aircraft for the 10 – 12 in actual squadron service.

Carrier battle groups are generally perceived to be powerful political instruments, but what is the actual military capability they can provide? When current USN carriers have been used in combat they have only been able to generate about twenty long-range strike sorties per day. This reflects the reality that many of their 44-48 multi-role combat aircraft have to be dedicated to defensive combat air patrols, while others are employed as buddy tankers. The conventional near one-to-one aircrew to aircraft ratio employed by the USN limits the daily sortie rate to about 1.25 long-range sorties per day. The USN can concentrate two carrier battle groups in area within several weeks. Consequently, the generation of about 50 to 60 offensive sorties per day requires an annual investment of over 40 billion dollars a year.

The military power generated by USN CVNs is an illusion that is prohibitively expensive. Worse, current technology has made carriers extremely vulnerable. They are mobile, but the distinctive vee-shaped wake that is generated by their hull can be detected by space, aircraft or UAV based synthetic aperture radars. Carriers also have large and distinctive radar and electronic signatures. Because forward-based carriers represent such a vital, costly and irreplaceable target, any enemy might likely concentrate their military resources in order to attack them. Because the carrier's aircraft currently have limited range, the enemy's anti-ship weapons need not have excessive range. Existing USN carriers have limited passive protection and embark thousands of tons of mass detonatable munitions. Advanced technology will permit a smart enemy to employ anti-ship weapons that can precisely target the vulnerable magazines holding those munitions. If their attack succeeds, the result will be the immediate destruction of the carrier and the loss of the entire crew. In fact, recognizing that the instantaneous death of over 5,000 US personnel would so stir America's reaction, a smart enemy might choose not to attack these ships.

Operation *Desert Storm* was the last major conventional war of the twentieth century. During this war, only a small proportion of the air delivered ordnance was precision guided. Advanced avionics had reduced the miss distance of air delivered conventional bombs and submunitions from multiple kilometers to tens of meters; close, but not precise! Ground forces employed submunition warheads for their rockets and artillery shells. When fired in large numbers, these could neutralize relatively large areas. Generally, ground forces did not field long-range precision weapons. However, at line-of-sight range, advanced fire control systems provided all direct fire weapons with a relatively high theoretical hit probability. But, in the smoke and haze generated by burning oil fields, the feasible detection range turned out to be relatively short.

In *Desert Storm,* the aircraft loss rate per sortie was far lower than experienced in previous wars. This reflected the fact that allied air forces were first able to neutralize major Iraqi SAMs using virtually the same tactics and technology that the Israelis had employed to defeat far denser Syrian air defenses a decade earlier. Thereafter, allied aircraft stayed high, above the lethal altitude of Iraq's numerous conventional AAA weapon and small man-portable SAMs.

While, on paper, Iraq had a very large military, in reality many of its forces were under strength, poorly trained, abysmally led, lacking cohesion and the will to fight. They were generally equipped with obsolescent, if not obsolete, equipment. It was, in the words of one allied Division Commander, "a live fire exercise, with occasional return fire to keep the troops on edge."

The US, the UK and their allies all basked in the glory of their very one-sided victory. They forgot that, prior to Operation *Desert Storm*, international intelligence agencies had concluded that Israel, operating alone, could defeat Iraq, plus Egypt, plus Syria, plus Jordan, etc. in fewer days than the allies took to pound Iraqi forces from the air. However, it is likely that Israel's victory would have resulted in significantly increased casualties for both the victor and the vanquished. Our collective success in Operation *Desert Storm* created an ill-deserved perception of military omnipotence, which has bent most subsequent military assessments and may partially explain the lack of military transformation in the following years.

Three decades later, every type of weapons system used during *Desert Storm* would have precision engagement capability. The use of PGMs by manned or unmanned attack aircraft is now the standard. It is now feasible for aircraft to launch multiple guided weapons against numerous targets during each sortie. The MLRS launchers, which in 1991 were used in batteries or battalions to obliterate one large area using multiple launchers, each fired a full salvo of twelve rockets. At that time, multiple launchers would simultaneously fire at one common aim point. Today, an updated GMLRS launcher can precisely engage up to thirty-six individual point targets with great precision in less than two minutes.

The sensor-to-shooter time between target identification to engagement with indirect fire in the most advanced militaries has been reduced from tens of minutes to tens of seconds. Every mortar and every artillery piece now has the potential to fire guided shells and, therefore, has become a precision weapon system. Thanks to advanced battle management systems, any vehicle or any infantryman can now request engagement of a precisely located target, which can be quickly hit and destroyed by supporting means of fire. Twenty-four/seven fire support can be provided without requiring the use of orbiting attack aircraft. But, the trouble is that a peer enemy (and today that could be a small country we look down on, such as Azerbaijan) can do unto us as we can do unto them, unless we can deny them the ability to designate targets and allocate precision fire, or, far more difficult, destroy all their means of generating such fire. Currently, it will be possible to partially neutralize the effectiveness of only some inbound precision weapons by passive and/or active defense.

To be militarily effective, nations have to generate precision strike warfare forces that are at the leading edge of all offensive and defensive technologies. This includes the ability to provide survivable 24/7 real time surveillance, have the means to rapidly detect and track targets and allocate effective quick reaction means of fire against targets at short to long ranges. These targets will have various characteristics, each requiring a specific type of warhead to ensure destruction. A nation will need to field active and passive means to defend vital national assets and military forces against equivalent enemy precision attacks. Effective offensive and defensive capability have become absolutely necessary. If any element of precision strike warfare is unavailable or ineffective, the viability of national military defense will be at catastrophic risk.

At the present time, I assess that the probability of peer versus peer precision strike warfare will be highly unlikely. This reflects the reality that very few nations currently have this capability. Consequently, what is far more likely is that a nation whose military incorporates the ability to conduct precision strike warfare, made feasible by new advanced technology, will engage, and very rapidly crush in overwhelmingly one-sided combat, an enemy military which still reflects the previous state-of-the-art. There are simply lots of nations which have not woken up to the new realities.

When peer versus peer militaries clash sometime in the future, the depth of the battlefield will be significantly increased, the force-area density will be significantly reduced and, unless one side achieves dominance at intelligence warfare (as previously defined), mobility on the battlefield will become impossible. The rate of attrition will vastly exceed recent military experience. However, the likelihood of technical-tactical surprise will be vastly increased and, if achieved rapidly, prove to be strategically decisive. If surprise is achieved, combat between peers will be exceedingly one-sided and relatively far shorter than experienced in all previous wars.
Sadly, only one nation has deployed a multi-tiered national air defense system, without which other nations have become catastrophically vulnerable to a strategically decisive integrated precision strike. Few nations have hardened vital civilian or military facilities against precision attacks. Active defense systems for vehicles, which can neutralize many radially inbound weapons, are proven, but are only fully operational in one military. Few deploy none line-of-sight missiles which are proven, and long-range versions and the battle management systems required to effectively use remote fire are the exception, not the rule.

Summary

What was then can be compared to what is now and summarized as follows:

Factor	**Then**	**Now**
National Military Capability	Mass	Intellectual Capability and Efficiency

Strategic Importance of Time	Limited	Decisive
Achievement of Victory	Slow Attrition	Quick Strategic Attack
Wartime Flow of Info to Population	Slow and Controlled	Fast and Uncontrolled
Military Leadership	Allocate and Direct Resources	Exploit Technology and Allocate Fire
Forced Entry versus Peer	Possible	Exceedingly Difficult
Force Projection versus Peer	Feasible	Virtually Impossible
Standoff Strategic Attack	Ineffective	Effective and Practical at Short to Medium Range. Feasible, but Exceedingly Costly at Intercontinental Range
Blockade	Feasible but Slow	Feasible, but Slow
Possibility of Decisive Strategic Surprise	Very Rare	Very Probable

The transformation in warfare between Then and Now and the evolution of precision strike warfare reflects the full impact of new advanced technology. Affordable space-based surveillance, unmanned air vehicles, battle management systems, real time data links, and precision-guided weapons of all types are all only feasible because of new advanced technology. Today, small nations can now be equipped with a variety of precision-guided weapons, have access to 24/7 regional surveillance, employ command and control and battle management systems which can synergistically generate a target detection to target destruction time which will be only seconds more than the time of flight of the selected weapon. A leading-edge peer or near peer nation now has the ability to quickly and precisely attack and destroy thousands of regional targets.

In this age, the battlefield will now be far deeper that it was heretofore. Survival on this battlefield will utterly depend on denying the enemy the ability to acquire targets, communicate with potential shooters, and/or defeating the guidance systems of inbound munitions or actively defeating the warhead and weapons effect of these munitions. To succeed, a nation's military must be at the leading edge of all the technical elements associated with precision fire warfare.

It should be obvious that, given the lethality of precision fire, firing first will, very likely, be strategically decisive. Politically, this is clearly highly destabilizing. Equally obvious, if a nation can

deny its enemies the ability to communicate and/or generate precision guidance, the resulting combat would be an exceedingly one-sided event between haves and have not's. I assess that achieving this capability will be driven by software, not hardware. Platforms and weapons have to be tested and, consequently, are very difficult to hide; but software can be hidden relatively easily until it is first used in combat. This lends itself to an increased ability to achieve potentially decisive technical surprise, again increasing instability. Transient superiority in the denial of target engagement will become strategically decisive at the onset of combat. All of this would logically combine to generate a "use it or lose it" mentality.

Remote powers, like the US and the UK, have to project military forces into distant regions. But this largely depends on the availability of forward air bases and ports, which are obviously vulnerable to pre-emptive precision attack by a regional hostile power. Offsetting this, remote powers, which generally have relatively large military budgets, will have the potentially unique financial capacity to develop and procure expensive very long-range standoff precision attack weapon systems. These include ballistic and cruise missiles (particularly hypersonic weapons) or shorter-range weapons that can be launched from aircraft or ships located at a relatively safe standoff range. These precision weapons, if available in adequate numbers and smartly targeted, could quickly strategically neutralize most countries, but only if those countries do not have an adequate defensive capability.

Long-range standoff precision attack capability might well render the regionally decisive conventional order of battle generated by local powers to be strategically irrelevant. But, very long-range bombers and large survivable naval ships are all exceedingly expensive. Therefore, achieving adequate numbers of precision weapons capable of intercontinental conventional strike may prove to be financially unachievable. To an extent, the cost of each weapon may well be offset by the fact that deploying such systems will not be manpower intensive. Massive increases in the number of intercontinental conventional strike systems are likely currently constrained by existing arms control treaties. Obviously, it would be feasible to quickly turn any such weapon with a conventional warhead into a nuclear-armed device. Achieving intercontinental conventional precision strike is certainly technically feasible but the cost and political viability requires serious study. A less costly option may be the deployment of intermediate-range precision weapons launched from relatively low-cost standoff aircraft and/or surface ships. These could include mobilisable merchant ships and commercial aircraft.

Major powers like the US and UK, which are generally isolated from regional threats, might best exploit new advanced technology by focusing on a national military strategy which combines strategic intercontinental precision attack with open ocean blockade. If this were to be done, there would be no reason to continue to deploy exceedingly expensive but undersized and slow-to-respond ground and air forces designed for force projection and, if required, forced entry. Generating such conventional forces at annual budgetary costs which are higher by an order of magnitude or more than that required by a regional power to generate a comparable maneuver brigade or fast jet sortie makes no strategic sense. A national defense strategy for remote powers based on strategic bombardment and open ocean blockade could generate decisive military capability at substantially reduced cost.

The impact on warfare of existing state-of-the-art precision attack technology should have already had a major impact on military transformation, national strategy and international politics because conventional precision-guided weapons can achieve what strategic nuclear weapons were deployed to do but without resulting in hundreds of millions of innocent deaths, if not the destruction of all mankind. It also should be obvious that this technology has decoupled a country's size from its ability to generate regional military power. Furthermore, it is inherently logical that the existence of these weapons is highly destabilizing because of the increased likelihood and decisiveness of strategic surprise.

But in the real world today, there has been no military transformation in Europe or North America and international politics has not transformed either. Countries that are perceived as highly capable - but in reality, are not - simply continue to act as though nothing has changed. Sadly, national leaders have not recognized the destabilizing political-military impact of even the existing technological menu, let alone what is to come in the near future. They have not understood how dangerous their illusion of power can be. They have failed to realise the important deterrence effect that a modern procurement system confers.

As we move on into the 21st Century, we should be prepared for a painful geo-strategic shift as countries that undergo real military transformation and appropriately reallocate their resources will significantly increase their power and influence at the expense of nations which remain tied to yesterday's "Sunset capabilities" and which will, inevitably, decline.