Drawing by Ted Zuber

COMPLEXITY SQUARED: OPERATING IN THE FUTURE BATTLESPACE

by Lieutenant-Colonel Bernd Horn

We have to put aside the comfortable ways of thinking and planning, take risks and try new things so that we can prepare our forces to deter and defeat adversaries that have not yet emerged to challenge us.[1]

Donald Rumsfeld, US Secretary of Defense

The military institution has been criticized continually for preparing to fight the last war, and, in many ways, this is understandable because of its conservative nature and abhorrence of change. There is, after all, a certain degree of comfort, if not logic, in maintaining doctrine, equipment, tactics and procedures that have proven successful in combat operations. To change, whether by evolution or by leaping to new concepts, methods or technologies, involves an enormous degree of risk, particularly in a field where failure carries such cataclysmic consequences.[2] "If the vision and the concepts are wrong," warned Major-General Robert Scales, "adding resources simply compounds the error."[3]

However, few competent military or political decision-makers would argue that the status quo is acceptable. The vacuum created in the wake of the Cold War has been filled with instability, conflict and seemingly continual change. The Canadian Army, like its allied counterparts throughout the world, must evolve if it is to remain a relevant institution.

But, to what end? What will the future battlespace be? To say that armed forces must be prepared for full spectrum conflict may be sound in principle, but it is hardly helpful. Yet, to attempt a definitive response would also be foolhardy. "Today's world is without precedent," cautioned French military analyst Phillippe Delmas, "It is as different from the Cold War as it is from the Middle Ages so the past offers no basis for comparison."[4] Clearly, there is no crystal ball. As quickly as a determinate method of fighting is developed by one belligerent, a counter is created by their opponents. It is important for commanders and strategists always to remember that potential antagonists are equally clever, and constantly striving to find a weakness to exploit. And, as the terrorist attack in New York on 11 September 2001 so clearly indicated, the attack that will be successful is the one that was not thought possible.

Therefore, although it is impractical to paint a future scenario with any degree of precision, it is possible to describe characteristics that are likely to shape the future battlefield and our ability to operate on it.[5] By understanding current trends and the possibilities that the future might hold, political and military decision-makers should be able

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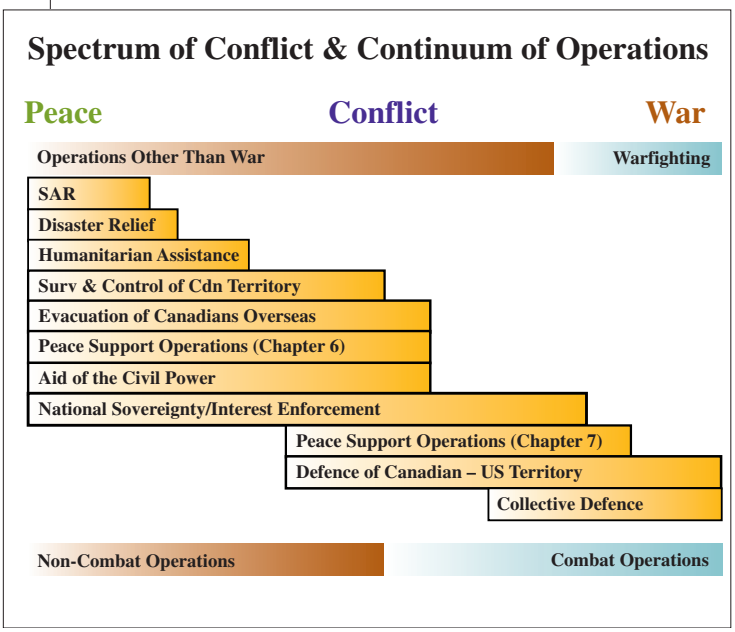

Figure 1 – Spectrum of Conflict & Continuum of Operations

to choose the path that will allow desired outcomes to be realized, and, conversely, prevent undesired possibilities from affecting our national security. Moreover, an understanding of the likely attributes of the future battlespace will allow commanders, planners and defence scientists to develop the necessary doctrine, training regimes and equipment to assist the Army in preparing itself for the challenges of the new millennium.

INCREASED COMPLEXITY

To state that the battlespace of the future – the land, air, sea, space and electromagnetic realm where armed conflict will be conducted within its cultural, economic, ecological, environmental, political, social and technological contexts – will be dramatically different from that of today is to repeat the strikingly obvious. "Future war," predicts the former US Marine Corps Commandant, General Charles Krulak, "is most likely not the son of Desert Storm; rather it will be the stepchild of Somalia and Chechnya."[6]

Certainly it will be increasingly complex. Gone is the reassurance and safety of a well-known, predictable and easily-templated enemy. The elaborate contingency plans once so important for the defence of Europe and the Western world are now irrelevant. So too are the doctrines and training programmes designed to prepare for combat against the former Warsaw Pact forces. Canada and its allies have been plunged into a chaotic and turbulent new era that is likely to become even more ambiguous, uncertain and volatile.

The battlespace is similarly predisposed. Its complexity will increase exponentially because of factors such as the asymmetric nature of the threat, the antagonists' choice of urban terrain, blurred operations, expansion of the battlespace, the technological/human interface, and the challenge of real-time media coverage.

THE ASYMMETRIC THREAT

The asymmetric nature of future conflict will have a dramatic effect on how we fight. "Asymmetry," according to American strategist Steven Metz, "is acting, organizing, and thinking differently than opponents in order to maximize one's own advantages, exploit an opponent's weaknesses, attain the initiative, or gain greater freedom of action." He adds: "It can entail different methods, technologies, values, organizations, time perspectives, or some combination of these ... [and it] can have both psychological and physical dimensions."[7] Doctrinally, an asymmetric threat is a concept "used to describe attempts to circumvent or undermine an opponent's strengths while exploiting his weaknesses, [and] using methods that differ significantly from the opponent's usual mode of operations."[8]

At its core, asymmetry is not designed to win battlefield victory. Rather, its aim is to disrupt, distract and disconnect, or in short, to wear down a normally superior opponent. "Difficult to respond to in a discriminate and proportionate manner," explained strategist Colin Gray, "it is of the nature of asymmetric threats that they are apt to pose a level-of-response dilemma to the victim. The military response readily available tends to be unduly heavy-handed, if not plainly irrelevant, while the policy hunt for the carefully measured and precisely targeted reply all too easily can be ensnared in a lengthy political process which inhibits any real action."[9]

Gray also points out that the asymmetric threat makes coercive threats less credible, and even poses difficulties in going to war, as was recently demonstrated in the war against terrorism, and by the lack of international support for the American war against Iraq in 2003. Moreover, the asymmetric threat makes the achievement of operational and tactical goals increasingly difficult. As Gray pondered, "What defines success?" Displacing Osama Bin Laden? Ousting Saddam Hussein? Furthermore, it is not enough for responses "to asymmetric threats to be effective; in addition, they must be politically and morally tolerable."[10]

Herein lies the difficulty for the practitioner. Commanders will be required to operate in, and be comfortable with, ambiguous and uncertain surroundings. Their options for using force will often be restricted. In addition, of necessity, they will require the capability of adapting physically and theoretically to changes in the immediate operational area as well as in the larger international security environment. These sorts of uncertain situations will also demand that individuals, units and formations be agile, flexible and capable of responding to the unforeseen and unexpected.

Complexity will also derive from the nature of the enemy that has been spawned by asymmetric warfare, and from the evolving Western way of war. As military superiority increases, so too will the resiliency of the opponents. The enemy is likely to work increasingly in complex networks of small organizations, each with a small number of dispersed individuals that communicate, coordinate and conduct campaigns in an inter-netted manner. These associations will be diverse, robust and redundant, thus making

" To change, whether by evolution or by leaping to new concepts, methods or technologies, involves an enormous degree of risk...."

it difficult to bring superior force to bear. There will be multiple nodes, and most likely no centralized command structure to target. Therefore, the question arises, "How do you defeat it?"[11]

In addition, both state and non-state actors will increasingly have access to advanced communications and weapons technology that will make them more effective by giving them global reach for planning, staging and striking. This will also provide opponents with the means of interfering with friendly communications, command and control networks. Central to future operations will be the threat of "cyber-shock" that can paralyze or destroy a belligerent's network, with the result being total destruction of an adversary's ability to maintain a coherent command and control ability.[12] The Assistant Deputy Minister, Office of Critical Infrastructure Protection and Emergency Preparedness for DND, reported that malicious attacks on systems and networks increased by 430 percent from 1999 to 2000, and by another 525 percent in 2001.[13] In 1995, the US Department of Defense experienced approximately 250,000 attacks.[14] During the crisis in Kosovo, in 1999, Yugoslav President Slobodan Milosevic organized a systematic "ping bombardment" of the NATO server that went on for ten days and totally incapacitated it with a virus.[15] Finally, during the first week of conflict in Iraq in 2003, over 20,000 web site attacks were recorded on pro- and anti-Iraqi war sites alone, in many cases making it impossible for sites to re-establish themselves because of repeated attacks.[16]

COMPLEX TERRAIN

Complexity will also derive from the terrain on which an opponent will choose to do battle.[17] Once again, the element of asymmetry and the enemy's desire to avoid the superior firepower, organizational and technological advantages of the United States and its allies will drive them to seek means of levelling the playing field. One obvious method will be to operate in an environment that negates Western technological advantages – namely urban centres.

Throughout history, cities have always posed an enormous challenge for armies. The compression of space and the proximity of belligerents shape the environment. Small targets, primarily people, are densely distributed in a high-clutter, masked environment. The design of cities, with their abundance of infrastructure of every nature, tends to limit many current military capabilities such as stealth, mobility, communications, surveillance and reconnaissance, and GPS navigation and target designation. Moreover, fighting in built-up areas is not a core competency in most armies. The difficulties are further exacerbated by the inability of soldiers and commanders to think in a three-dimensional manner because of failure to train and practice.

These challenges and limitations provide a levelling effect. In addition, cities also provide physical cover for the enemy. As noted, an urban centre by its very nature tends to neutralize technology, especially long-range weapons. As a result, it relegates action to close combat – normally a very slow, resource- and casualty-intensive process. Moreover, the clutter and dense nature of cities make them ideal for concealment, deception and surprise strikes. The 2003 conflict in Iraq demonstrated that an opponent will hide troops, equipment and weapons in churches, community centres, hospitals and schools, and he will deploy soldiers in civilian dress mixed in with the population. One unofficial after-action report revealed the enemy to be:

> Smart, flexible. Utilizing all means at their disposal. They have moved ammo in civilian trucks, held weapons to their own people's heads, and pretended to be doctors with asthmatic children. Pretend to surrender – then open fire.[18]

Not surprisingly, in a recent study on unrestricted warfare, two Chinese strategists have warned: "There is no means which cannot be used in war [in the future] and there is no territory or method which cannot be used in combination."[19]

The adoption of 'unrestricted warfare' on the part of some antagonists severely increases complexity for commanders and their soldiers. Regardless of the heinous nature of the circumstances that may have caused the conflict, or the moral bankruptcy of the organizations fighting it, the military forces of Western industrialized democracies will be expected to uphold principles and values that are fundamental to their societies. Future pressures resulting from the political context, along with constraints such as societal intolerance to friendly casualties and collateral damage, and demands for increasing precision engagements will make fighting exponentially more complex in the future.[20] When military force is authorized, the resulting action will have to be at as low a risk threshold as possible, ensuring a minimum of casualties and collateral damage, and yet it will have to be brought to a conclusion in the quickest possible time.

The result is an inherent paradox. Commanders are often left with the quandary of using enough force to win, but thereby risking criticism of causing excessive death and destruction (such as in the 2003 war against Iraq, when the media routinely aired photos of wounded Iraqi civilians despite American restraint); or criticism of using too little force with the concomitant risk of losing the fight, or being criticized for a stalled, ineffectual campaign (such as in the initial stages of the Kosovo, Afghan and Iraqi campaigns in 1999, 2001, 2003 respectively).

This realization, provides opponents with another valuable reason to use urban settings: political cover. The risk of heavy civilian casualties, the danger of collateral damage, and the likelihood of a subsequent humanitarian crisis in the aftermath of a prolonged struggle in an urban area, compounded by the scrutiny of the media, provide not only a levelling of the

battlefield but in some ways an advantage to the enemy. The resulting political constraints (i.e. restrictive Rules of Engagement), along with the necessity of having to invest heavily in humanitarian and public affairs efforts to counterbalance negative press coverage, can distract from the primary mission and sap momentum. This may also have the effect of prolonging the conflict, which to an impatient public is likely to be unacceptable.

MEDIA SCRUTINY AND THE REALITY OF THE STRATEGIC CORPORAL

As a result of the issues discussed above, in any future conflict leaders and their subordinates will operate in a politically sensitive environment where the actions of a single soldier at a roadblock or in a tactical setting can have strategic ramifications. Operating under the constant glare of the television camera will multiply the degree of complexity faced by leaders and their subordinates. "The Power of CNN" is no longer an idle network boast.[21] The 'CNN effect' has greatly magnified the notion of the "strategic corporal", where a low-level tactical decision or error can become a strategic issue as it is beamed across the globe in real time. In fact, it adds to the volatility of the political security environment. The media's global connectivity and instantaneous reporting can create highly-charged political problems simply because of viewers' reactions to news reports (such as collateral damage or perceptions of unjust military action). A recent example of this phenomenon was the US Marine Corps soldier who, upon clearing a stronghold in Iraq, raised the American flag. Although the flag was lowered almost immediately, the fleeting image of that action unleashed a barrage of controversy as it carried implications of the Americans being an occupying power instead of a liberating force. "A wrong decision in the glare of the media," warns Colonel Paul Maillet, a former DND Director of Defence Ethics, "can have far-reaching consequences that can affect peacekeeping mandates and strategic and national policies and aims."[22]

The CNN effect also feeds what has become an unrealistic impatience by both the public and the media. War, even when conducted in some of the most distant and hostile environments known, is now expected by a restless media and their audience to be over within days or, at best, weeks. In a medium where only 90 to 100 seconds are allocated to any single issue in the average news story, and where the dominant principle seems to be "if it bleeds it leads", there is a need for news to be dramatic if not sensational. This will cause great problems for the military. News reports can be expected to be fleeting and without context. "Television as a medium has no past and no future," explained NATO spokesman Jamie Shea, "It is always the eternal present. What BBC's Nik Gowing has called the "tyranny of real time," with no causality, and no connection to what came before or what goes next. So everything is immediately important and a few moments later completely unimportant, contrary to our experience of real life."[23]

A single act can become the defining image of a battle, campaign or operation. Failure or errors of any scale carry the potential of being catastrophic. Recent examples have shown that shocking images of combat can sway public opinion in an open, democratic society and create intense political pressure to cease hostilities.[24]

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And, there will be no respite. In Bosnia there were 3,000 journalists on the ground throughout the NATO air campaign of 1995. "They were faster than NATO soldiers or NATO satellites," conceded Shea. "Certainly faster than our intelligence community."[25] The infamous tractor bombing incident caused NATO to lose 20 percentage points of public support after images were beamed all over the world.[26] In the recent 2003 war against Iraq, there were approximately 810 embedded reporters with the Coalition forces, in excess of 3,000 war correspondents in total, and a multitude of others covering the conflict from locations throughout the globe.[27] This has led to a universally accepted populist notion that 'it isn't real unless it's on television.' To conduct operations in such an environment magnifies the complexity of an already complicated profession.

INFORMATION OPERATIONS

Operations in the future battlespace, at all levels, will be highly dependent on information operations (IO). These will include activities such as computer network attacks, efforts to counter enemy propaganda, deception operations, electronic warfare (EW), destruction of enemy IO targets, ensuring the security of friendly information and infrastructure, as well as related activities such as civil-military cooperation (CIMIC) and public affairs. One immediate requirement will be the need to get information disseminated quickly to military personnel and civilians in the area of operations, as well as to the domestic and international audience. This will necessitate the swift passage of information from the lowest levels involved, i.e. having events explained at the scene by the soldiers on the ground. This carries a degree of risk and adds to the complexity of the task. However, a RAND study concluded: "The marginal return from leveraging an information factor – such as the media – may be greater than the marginal return of applying more firepower."[28] In the end, time becomes the critical factor – often the centre of gravity.

This will have dramatic implications for those conducting operations. First, it will require a greater concentration on information operations and a comprehension of the peoples and cultures of the area of operations. It will also require significant effort devoted to countering propaganda and informing the media, the affected population, the domestic audience and the international community about the "proper and righteous" manner in which operations are being conducted.

BLURRED OPERATIONS

The constant media scrutiny – instantaneous global coverage of events as they happen in real time – will further add complexity to operations in the battlespace by what might be termed the 'blurring' of operations. Public indignation and the political pressure resulting from negative images portraying humanitarian crises will necessitate concurrent and parallel operations, rather than sequential operations according to a carefully laid out schedule. Best described by former US Marine Corps Commandant, General Charles Krulak as the "three block war," soldiers will be expected to provide humanitarian assistance in one part of the city, conduct peacekeeping operations in another part, and at the same time fight a lethal mid-intensity battle in a third sector.[29] During Operation "Iraqi Freedom", Lieutenant-Colonel William Wallace revealed that "One day our troops are kicking down doors, and the next they're passing out band-aids." He added, "In some cases, they're kicking down doors without really knowing if they are going to have to pull a trigger or pass out a band-aid on the other side."[30] In the end, victory will not be assured just because the shooting stops. "Winning the peace", as it has been popularly expressed, will become essential.

This reality, coupled with the tendency of opponents to use civilian infrastructure and populations to shield their actions, will almost certainly result in greater reliance on non-lethal weapons if friendly forces are to conduct missions safely without inflicting large numbers of civilian casualties or excessive collateral damage. By incapacitating crowds or even entire localities, soldiers can attempt to identify potential foes from 'friendlies' or neutrals without putting themselves or others at great risk. Although increasingly complex, the alternatives become untenable.

As a result, commanders and soldiers will be expected to transition quickly from fighting to humanitarian activities and aid to the civil power operations, and vice versa. They will be expected to conduct complex and dangerous combat in urban settings against a wily, elusive enemy. This will require finely-honed tactical skills at one moment – among them marksmanship, house clearing and demolitions – and then softer expertise such as negotiation, mediation and assistance to civilian authorities the next. These demand a totally different suite of skills and ability. In essence, the complex new battlespace will require that soldiers be warrior diplomats.

The implication for the warrior of the future battlespace is simple. To be a highly trained combat soldier will not be enough; this multifaceted environment will require soldiers to be highly educated. The traditional emphasis on training – "a predictable response to a predictable situation" – will have to be better balanced with education, defined by Professor Ron Haycock as the "reasoned response to an unpredictable situation – critical thinking in the face of the unknown."[31] In this vein, "time dedicated to understanding the higher orders of conflict inculcates mental agility and the ability to be creative as well as technically competent," explains Major-General Scales. "A well-read and educated leader," he adds, "will be better prepared to deal with the uncertainty and chaos of combat."[32] Decentralized decision-making power, and enlightened low-level leaders capable of making reasoned, timely decisions under pressure are what will determine success or failure.

EXPANDED BATTLESPACE

Increased complexity in the battlespace will also derive from the expanded nature of operations, which will be conducted simultaneously on land and sea, in the air and in space, as well as in the electromagnetic domain. Moreover, operations will be non-contiguous and non-linear. That is to say, operations will take place throughout the entire battlespace without the historical linear approach, where the frontages and flanks of opposing forces delineated the actual battlefield, and where boundaries, report lines and axes of advance defined the scope of manoeuvre of a commander, unit or formation.

Continual technological advancements will enable land forces to manoeuvre while acquiring and engaging targets more rapidly, at greater ranges, and with more precise effects, and greater lethality than ever before. The greatly improved ability to locate and identify targets, accurately assess their capabilities, and engage them in a timely manner will enable the employment of much smaller, more agile, networked units that can be dispersed over greater distances and still have greatly reduced logistics support needs. This diffusion of force, protected through access to real-time information and precision weapons rather than on mass and firepower as in the past, will allow for simultaneous operations throughout the battlespace. This will deprive an opponent of any respite as their fighting forces, infrastructure, command and control systems, and indeed their psychological resiliency (i.e. morale and will), are disrupted, displaced and destroyed.

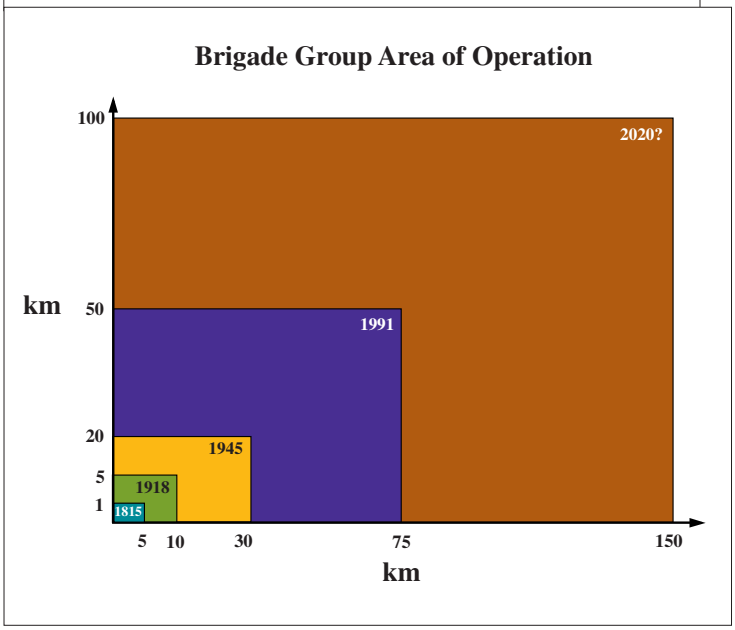

Figure 2 – The Expanding Battlespace

This will lead to a battlespace with many parallel and simultaneous operations being conducted by diverse yet interconnected and interdependent forces that are dispersed throughout a battlespace that is less dense and with no defined boundaries. Manoeuvre, tied to situational awareness and access to lethal weapons effects, will become dominant. The size of forces will become less relevant; forces will disperse and come back together as the operational situation dictates. Their ability to call on precision weapons, and provide accurate target designation at all times, will be the key to operational and strategic success.

Commanders at higher levels will be required to deal with wide-scale dispersion of their subordinate units and thus the challenge of a span of control that greatly exceeds what is now considered acceptable. Real-time threat assessments, the assignment of realistic tasks, and the proper allocation of munitions delivery systems and logistics sustainment will require careful management and control. Lower-level commanders will increasingly find themselves with near-independent commands at great distances from friendly forces. They will rely on agility, speed, accurate and timely information, and massed precision weapons effects coordinated through inter-netted command and control systems to achieve success.

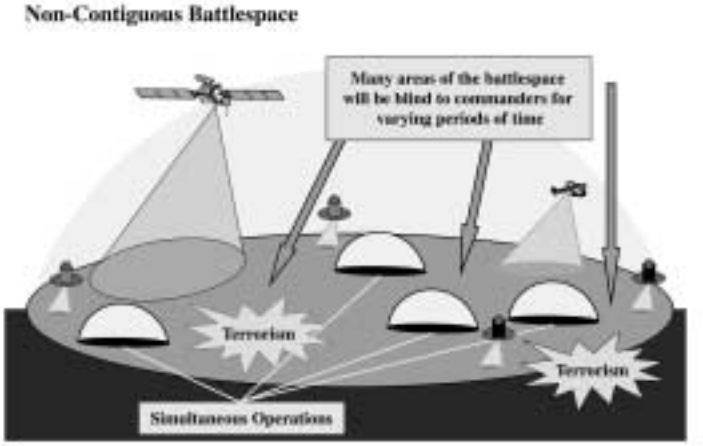

Figure 3 – Non-Contiguous Battlespace

CONTINUAL HIGH TEMPO OF OPERATIONS

Another characteristic of the future battlespace will be continuous battle. Technological advancements such as all-condition, all-weather, day/night vision enhancement will permit non-stop operations. This will allow the concept of tempo to be used as a deliberate tactic, i.e. the sustaining of an intensity of operations with which the enemy cannot cope. The will of an opponent is rarely broken by a single spike in intensity. Rather, a consistent, concentrated, simultaneous effort will be required over an extended period of time. By continually overwhelming the enemy's decision cycle, their ability to react and offer coherent resistance will be diminished.

Tempo will also increase as a result of the compression of time from 'sensor to shooter' and the ability to influence the entire battlespace. Technology will enable advances in early and distant detection of enemy forces. The ability to destroy those forces before they disperse, disappear or engage friendly forces, as well as the need to maintain unrelenting pressure on the enemy to ensure a quick and successful outcome, will drive belligerents to conduct non-stop operations until one side is exhausted or destroyed.

In addition, the political pressure for rapid resolution of a conflict will also drive a relentless tempo. The cost of war to modern societies is such that leaders will hesitate to engage in military campaigns unless the result is likely to be quick and decisive. Furthermore, as already discussed, the public, fed by an insatiable media, will also compel decision-makers as well as military commanders to push for instant results.

ENHANCED LETHALITY

Yet another characteristic of the future battlespace will be its increased lethality. Technological advances will continue to enhance the range and precision of weapons and target acquisition systems. As the 'sense and act' operational functions become more advanced, survival on the battlefield will become progressively more difficult. Dispersion, rapid mobility, stealth, quick response and force protection will be essential as long-range precision engagements by a myriad of weapon systems – kinetic energy, laser, sound, light and pulse – become the norm. The future battlespace will focus on simultaneous attack by interdependent air-ground-sea-space forces that are situationally aware and have a current and accurate view of the battlespace via computer and satellite. These forces will be networked from 'sensor to shooter' (i.e., surveillance systems will be electronically connected to all weapons platforms), which will ensure the capability for swift, massed effects.

Clearly, the key to success will be timely intelligence coupled with flexible, swift, lethal military response, and the technology is already proving to be both capable and lethal. For example, During Operation "Enduring Freedom" in 2001, senior Al Qaeda terrorist commanders travelling in a remote area of Afghanistan were killed by a missile fired from an unmanned, remotely-controlled Predator drone. Less than two years later, within 45 minutes of the information being passed, an American B2

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WAR	TARGET RANGE (enemy tank)	Number of Rounds for a Kill
Second World War	800 yards	18
1973 Arab-Israeli War	1,200 yards	2
War Against Iraq, 2003	2,400 yards	1

Figure 4 – The Growing Precision of Direct Fire Weapons[33]

WAR	No. of 2000 lb. bombs/ missiles to hit 60' by 100' tgt	No. of Aircraft (from medium height)	Circular Error of Probability
Second World War	9,070	3,024	3,300 ft
Korea	1,100	550	1,000
Vietnam	176	44	400
1991 Gulf War	30	8	200
War Against Iraq, 2003	(1)	1 (B2)	10

Figure 5 – The Growing Precision of Aerial Weapons[34]

Bomber struck a building believed to house Iraqi dictator Saddam Hussein. Increasingly, the dictum: 'If you can be seen, you are dead' will prevail.

However, the proliferation of inexpensive weapons and information technology will also allow antagonists to acquire a lethal capability relatively easily. Therefore, although small, agile, dispersed units will indeed be capable of dominating large areas because of access to accurate targeting data and precision-effects weaponry, they will need to remain dispersed, highly mobile and robust just to avoid the effects of the enemy's precision weapons.

THE TECHNOLOGICALLY-DEPENDENT BATTLE

The need for accurate, instantaneous situational awareness, intelligence and target acquisition, coupled with long-range precision effects, will make the battlespace of the future technology-dependent. "Our goal," explained Pennsylvania Representative Curt Weldon of the House Subcommittee on Procurement when speaking on the issue of the unmanned bomber/unmanned combat aerial vehicle, "[is to ensure that] within 10 years, one-third of our tactical strike aircraft will be unmanned."[35] US Air Force Lieutenant Colonel David Branham concurred. "Its possible," he commented, "that in our lifetime we will be able to run a conflict without ever leaving the United States."[36] Strategist and futurist, retired US Army Major General Robert Scales, has noted that "the task of destroying the enemy now [and in the future] belongs to firepower, not maneuver systems."[37]

In the near term, the conundrum will be the balance between technology and manpower. How much redundancy back-up from conventional 'legacy' formations and weapons will have to be retained, and for how long? The interface and integration of technology (i.e. equipment, surveillance systems, robotics and weapons) and humans will, of course, provide an exponential increase in capability and a more technologically proficient and aware military. However, it will also create technological dependencies and increased training requirements (whether practical or by means of simulation). In addition, the new information technology and sensor capability and output, coupled with full-spectrum connectivity, will provide an abundance (perhaps even an overload) of information that will need to be filtered and processed in a timely manner. This may well become the most daunting challenge for commanders of the future: to cull the important bits of information from the massive waves of clutter that will continually flood recipients.

It should be noted, however, that the rise of technology will not displace human ingenuity. It would be foolhardy to assume that an enemy that lacks similar technology or weapons systems will be incapable of causing destruction or mayhem. The threat of asymmetric attack will always be present, and commanders must never underestimate an opponent merely because of his limited technology.

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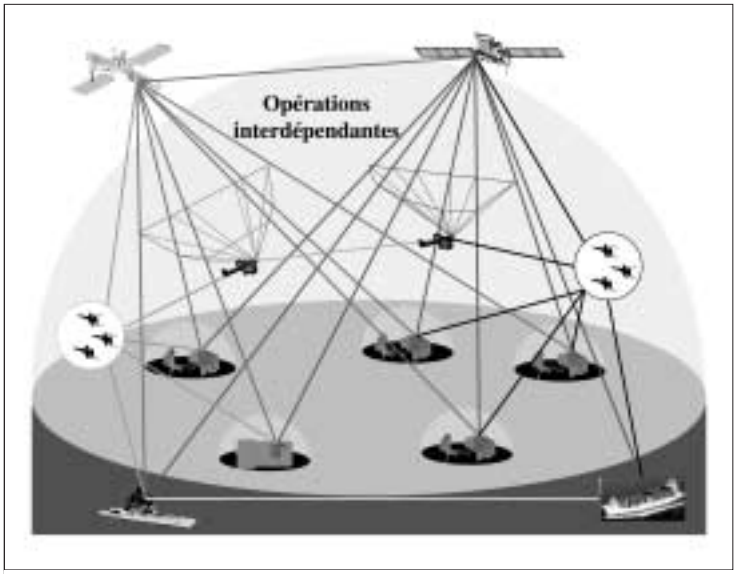

Figure 6 – Interdependent Operations

INTERDEPENDENT OPERATIONS

The expanded, more lethal, technologically-dependent battlespace creates the final characteristic of the future realm of conflict – interdependent operations. At this time, the ability to conduct effective joint operations – those involving two or more environments (services) of a single country – has been the immediate goal. This entails the ability to plan and conduct operations in a seamless manner, with integrated command structures, interoperable communications and information systems, along with common doctrine and procedures.[38]

In the future battlespace, however, military forces will have to move beyond joint to interdependent operations. The need for swift responses to fleeting opportunities on the battlefield will require adaptability and flexibility. It will require the ability to designate weapons platforms, regardless of which service owns them, to react instantly in support of another element anywhere in the battlespace. In essence, capability and effects must be completely embedded in one command. The continued existence of ponderous chains-of-command and unwieldy targeting protocols will be tantamount to failure. Equally, any inability to ensure connectivity and accurate situational awareness of all friendly forces will be deadly.

"The cost of war to modern societies is such that leaders will hesitate to engage in military campaigns unless the result is likely to be quick and decisive."

In addition, blurred operations, media scrutiny and political pressure will create a multi-dimensional battlespace that necessitates the cooperation and interaction of not only all three environments (services), but also governmental agencies and non-governmental organizations. Increasingly, interdependent operations encompassing a myriad of military and non-military forces working together will be the key to achieving the desired outcomes.

CONCLUSIONS

The future battlespace will be volatile, uncertain, constantly changing, and ambiguous. There will be an increased emphasis on information operations and small, agile, dispersed, situationally-aware units operating in a non-linear environment supported by instantaneously-delivered precision-effects weaponry. Operations will be conducted simultaneously on land, sea, air and space, as well as in the electromagnetic spectrum. Conflict will become increasingly complex because of the asymmetric nature of the threat, the use of urban terrain, blurred operations, and the expansion of the battlefield. Technological advances will ensure that the battlefield becomes even more lethal: 'If you are seen, you are dead.' Furthermore, operations will be multi-dimensional, requiring not only the close integration of all three environments, but also that of governmental and non-governmental agencies to achieve desired outcomes. Finally, all activity will be conducted under the unrelenting scrutiny of international media that will beam events across the world in real-time as they occur.

To function in this daunting environment will require a reorientation of how we think and operate on the battlefield. The American concept expressed as "See First – Understand First – Act First – Finish Decisively" would seem to provide the right guidance. This will be achieved by enhanced situational awareness made possible by global command and control and ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance) capabilities. It will also be the result of networked interdependent environments (services) capable of conducting simultaneous operations in a non-contiguous battlespace, as well as responding instantly to calls for massed precision weapons effects.

"By continually overwhelming the enemy's decision cycle, their ability to react and offer coherent resistance will be diminished."

The American solution, according to the White Paper Concept for the future "Objective Force" issued by the US Army Chief of Staff, is defined as operations "characterized by developing situations out of contact; manoeuvring to positions of advantage; engaging enemy forces beyond the range of their weapons; destroying them with precision fires and when necessary, by tactical assault at times and places of our choosing."[39] In essence, what will be needed are adaptable (highly trained and educated), highly mobile, well-equipped forces capable of rapid deployment on complex multi-dimensional coalition operations, and able to conduct missions across the entire spectrum of conflict.

NOTES

1. Speech given at the National Defense University, Washington D.C. 31 January 2002, <http://defenselink.mil/speeches/2002/s20020131-secdef.html>.
2. This is why the American military maintains a ratio of 15 percent of its forces in a state of change, while the other 85 percent remain constant and form the baseline combat capability. David Hughes, "The Future of Joint Warfighting," *Aviation Week & Space Technology*, 26 May 2003, p. 76.
3. Major-General Robert H. Scales, Jr., *Yellow Smoke. The Future of Land Warfare for America's Military* (New York: Rowman & Littlefield Pubishers, Inc., 2003), p. 19.
4. Phillippe Delmas, *The Rosy Future of War* (New York: Free Press, 1995), p. 213.
5. This projection is based on trends analysis which is based on the systematic collection of data on what is actually occurring in the world at present in regards to such things as technology, economic performance, military spending, environmental degradation, etc.... The analysis of this data normally indicates a specific direction, or trend for a given area. From this, a rough order of magnitude forecast can be made.
6. Robert Holzer, "Krulak Warns of Over-Reliance on Technology," *Defence News*, 7-13 October 1996, p. 4.
7. Steven Metz and Douglas V. Johnson II, "Asymmetry and US Military Strategy: Definition, Background, and Strategic Concepts," US Army War College, Strategic Studies Institute, January 2001, pp. 5-6.
8. Colonel W.J. Fulton, DNBCD, "Capabilities Required of DND, Asymmetric Threats and Weapons of Mass Destruction," Fourth Draft, 18 March 01, p. 2/22.
9. Colin Gray, "Thinking Asymmetrically in Times of Terror," *Parameters*, Vol 32, No. 1, Spring 2002, p. 6.
10. *Ibid.*, p. 9.
11. Mohammed Aideed in Somalia is one example. He used runners, burning tires and other primitive means of communication and was able to elude capture and destruction of his power base.
12. See James J. Schnieder, "Black Lights: Chaos, Complexity and the Promise of Information Warfare," *Joint Forces Quarterly*, Spring 1997, pp. 21-28.
13. The Standing Senate Committee on National Security and Defence, *Canadian Security and Military Preparedness*, February 2002, Part I, Item 15.
14. Edmund M. Glabus, "Metaphors and Modern Threats: Biological, Computer and Cognitive Viruses," in Lloyd J. Matthews, ed., *Challenging the United States Symmetrically and Asymmetrically: Can America be Defeated?* (Carlisle: US Army War College, 1998), p. 203.
15. Dr. Jamie Shea, "Modern Conflicts, the media and public opinion. The Kosovo Example," *Militaire Spectator*, JRG 169, 8-2000, p. 411.
16. Reuters, "War Hack Attacks Tit For Tat," <http://www.wired.com/news/conflict/0,2100,58275,00.html?tw=wn_ascii>, accessed 1 April 2003.
17. The term 'complex terrain' in the context of this chapter refers to terrain features that impact on line-of-sight, restrict manoeuvre and separate the soldier from his vehicle (e.g. jungle, mountain or urban environments).
18. "3-7 CAV Lessons Learned," posted on Companycommand.com, 1 April 2003.
19. Qiao Liang and Wang Xiangsui, *Unrestricted Warfare* (Beijing: PLA Literature and Arts Publishing House, February 1999), p. 199.
20. See Jeffrey Record, "Collapsed Countries, Casualty Dread, and the New American Way of War," *Parameters*, Vol 32, No. 2, Summer 2002, pp. 4-23.
21. It is estimated that a minimum of 100 million people had access to satellite networks carrying reports on the War in Iraq during the American-led invasion. International Press Institute (IPI), "Caught in the Crossfire: The Iraq War and the Media," <http://www.freemedia.at/IraqReport2003.htm>, accessed 6 June 2003.
22. Colonel J.P.M. Maillet, "Defence Ethics, Program Ethics and Operations Project," memorandum, 20 June 2000.
23. Shea, p. 409.
24. See Sean J. A. Edwards, *Mars Unmasked* (Santa Monica: RAND Arroyo Center, 2000), p. 67.
25. Shea, p. 410. The US Army 7th Cavalry learned of the start of the war in Iraq not from their chain of command but from their embedded CNN reporter, Walter Rodgers. He told the soldiers that the Americans had launched air strikes at Baghdad, marking the beginning of the war. Jacqueline E. Sharkey, "The Television War," *American Journalism Review*, May 2003, <http://www.ajr.org>, accessed 6 June 2003.
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27. IPI, "Caught in the Crossfire," and CNN televised report, 9 April 2003.
28. Sean J. A. Edwards, *Mars Unmasked* (Santa Monica: RAND Arroyo Center, 2000), p. xiv.
29. Robert Leitch, "The Three Block War: Urban Conflict," US Medicine Information Central, <http://www.usmedicine.com/column.cfm?columnID=37&isseID=23>, accessed 27 March 2003.
30. Michael Noonan, "The Military Lessons of Operation Iraqi Freedom," Foreign Policy Research Institute (FPRI) E-Notes, 1 May 2003.
31. Dr. Ron Haycock, "Clio and Mars in Canada: The Need for Military Education," presentation to the Canadian Club, Kingston, Ontario, 11 November 1999.
32. Scales, p. 13.
33. *Ibid.*, p. 65.
34. Source: George and Meredith Friedman, The Future of War (New York: St. Martin's Griffin, 1996), p. 262; Roger W. Barnett, *Asymmetric Warfare* (Washington D.C.: Brassey's Inc, 2003), pp. 43-44; CNN televised report, 10 April 2003.
35. Matthew Brzezinski, *New York Times Magazine* – Online edition, 20 April 2003.
36. *Ibid.*
37. Scales, p. 157.
38. Canada. *Joint Doctrine for Canadian Forces. Joint and Combined Operations B-GG-005-004/AF-000* (Ottawa: DND, 1995), pp. 1-11.
39. Steven Metz, Director of Research and Chairman of the Regional Strategy and Planning Department at the Strategic Studies Institute, has articulated six decisive characteristics for the future battlespace: strategic speed; full scale decisiveness; broad band precision; success in protracted, asymmetric, ambiguous, and complex conflicts; ability to operate in coalition; and rapid conceptual and organizational adaptation.

Photo by Silvia Pecota

A convoy of LAV IIIs moving along a road at dusk in Wainwright, Alberta, April 2003.