# THE REVOLUTION IN MILITARY AFFAIRS : A New Zealand View Part I


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## Working Paper 14/99


**Abstract**

Critics assert that New Zealand has a low capacity to absorb the Revolution in Military Affairs (RMA). This paper reviews RMA trendlines and enduring characteristics of New Zealand's strategic interests, constructs a New Zealand Defence Force (NZDF) modelled on RMA trendlines, and costs this model. The paper finds that the NZDF can absorb the RMA, and New Zealand can afford to further upgrade its armed forces within current financial baselines. A NZDF modernised along RMA trendlines would be significantly more effective as a fighting force (and in turn in its peacekeeping capacity), in its sovereignty protection roles; and in its ability to carry out ancillary tasks including research and, rescue and disaster relief.



**About the Author**

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**Acknowledgements**

My thanks to Cdr Paul Gilkensen, Lt Col David Gawn, Lt Col Rhys-Jones and Wing Commander Greg Elliott for comments on earlier versions of this paper. This paper represents the views of the author.

Centre for Strategic Studies
Victoria University of Wellington
1999




ISSN 1175-1339

**Introduction**

Professor Paul Dibb, the Head of the Strategic and Defence Studies Centre at the ANU in Canberra Australia, claimed recently that New Zealand has a "generally low capacity to absorb" the Revolution in Military Affairs (RMA). He claimed, with typical Canberra modesty, that Australia in contrast has a "high capacity to absorb" the RMA[1]. Observers such as Grant Crowley (a former Territorial Force adviser to Commander Land Forces) seem to concur with Dibb. Crowley has claimed, for instance, that the New Zealand economy is unable to "support a commitment to high-tech warfare".

How then do the Dibb and Crowley claims stack up? The New Zealand Defence Force has been using high technology for some time. RNZAF Skyhawks have been using Precision Guided Munitions (PGMs) for over ten years. HMNZS Te Kaha is equipped with an extensive range of high tech communications, surveillance, and weapons systems. So are Dibb and Crowley right?

**Method**

The method selected to answer this question is to:

(a) identify RMA trendlines;
(b) review briefly, the defence policy imperatives that may endure politically in New Zealand over next 20 years;
(c) apply RMA trendlines to those imperatives and see what kind of NZDF force structure and capability model emerges; and
(d) cost this model.

This methodology is a means to an end. The model developed in this paper is only to guess how the NZDF may be shaped if patterned along RMA trendlines. The shape developed here is only one of many potential alternatives. I have no particular attachment to the model set out. It is a tool, a means (albeit interesting) to an end. The end of this paper is to answer just one question, can the NZDF be modernised along RMA trendlines? The model also serves an additional, though secondary purpose. The model helps in showing how high technology and associated innovations may shape the New Zealand Defence Force in the years to come.

**What Is The RMA?**

The term RMA is so well known that it does not need restatement in another paper. My discussion here of the RMA is confined only to a review of its most salient points. The RMA consists of four factors in balance: improved Command, Control, Communications and Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); an emphasis on 'jointness'; advanced technology; and emerging operational concepts. The synergistic combination of these four factors within a military organisation will create a genuine *Revolution* in Military Affairs (RMA). Military organisations that implement the RMA will be rewarded with a quantum leap in capability.

The incremental adaptation of technology would represent an *Evolution* in Military Affairs (EMA). Evolutions produce significant increases, rather than quantum leaps, in capability. The RMA is being preceded by an EMA[2].

The RMA is an operational level innovation. The RMA has been developed to improve battlefield performance. The RMA will make the most difference in a theatre of operations where a very senior commander may be responsible to a number of interrelated but distinct battlespaces. Consequently

the RMA may be expected to transform the tactical and operational levels of war rather than the strategic level of war. The transformation of the operational level of warfare, especially in terms of the potential for high tempo campaigns, will have implications for strategic level command. The duration of future battles is expected to be dramatically reduced. This will increase the pressures, for instance, on political leaders to make faster decisions. However, the essential dynamics of war are unlikely to change at the strategic level as a consequence of the RMA. War will remain an essentially political and moral problem and technology cannot change this. However, technology will allow greater political interference in the operational level of war and also raise the pressures on political decision makers to make good, fast decisions. Figure 1 tries to capture these ideas in a diagram.

The synergistic meshing of the component parts of the RMA is a precondition to the effectiveness of this approach to military affairs. The component parts of the RMA that must work in synergy are :
(a) improved intelligence and command and control;
(b) the imperative of 'Jointness';
(c) advanced technology; and
(d) emerging operational concepts.[3]

***Improved Intelligence and Command and Control***

Improvements in information and systems integration technologies will transform military operations. Commanders at all levels will increasingly be provided with accurate real time information by vastly improved command, control, communications, computers, intelligence, surveillance and reconnaissance systems (C4ISR). Advances in sensors, computer processing, and telecommunications will provide the capability to determine accurate locations of friendly and opposing forces, non combatants and the ground (for commanders and their staffs will have never actually seen the land their forces will traverse before an operation starts as it will be controlled by opposing forces).

Forces able to harness these potential capabilities will gain 'dominant battlespace awareness'. Even though these advances will not eliminate the fog of war, 'situational awareness' will be improved, response times reduced, and the battlefield will become more transparent to those who have the technology. The fusion of sensors, platforms (that is, ships, aircraft and vehicles), command organisations, and logistic centres into a single system will allow more operational tasks to be completed faster.

Commanders will have available more information than ever before, while having less time to use it. This suggests that the responsibility for comprehending what the information means (operational appreciation) and using it (planning) may have to be increasingly shared with lower and more junior command levels. It also means that core functions such as artillery, armour, infantry, intelligence and electronic warfare can be embedded together at unit level in ground forces, for the first time in history. This trend has been common place in naval forces for many years, and modern multirole fighters and anti submarine warfare aircraft also embed reconnaissance and strike functions.

Increasingly, real time information will become more available to heads of state and their advisers. The opportunities for political interference at the operational level will increase. The wisdom of such interference in a democracy will always depend on the judgement of the head of state (as politicians are elected to shape the public interest). The nature and style of political interference will always fundamentally influence operational performance as politicians are ultimately responsible for

determining the operational mission, rules of engagement, and size and shape of a formation or unit. As the time available for politicians to make decisions decreases, due to the increase in the tempo in operations, the pressure to make these decisions will increase. One consequence of this dynamic is that politicians and their military advisers will need to collaborate closely to match styles of political control with circumstances. As high technology makes available more real time information for commanders and their political leaders, it will also make possible an increasingly detailed record of events that will enable higher levels of accountability.

To return to the point about the fog of war being lifted rather than removed. Armed forces modernised along RMA trendlines should have a vastly improved capacity to detect radar cross sections, infrared and electronic signatures of opposing and friendly forces. While forces modernised along RMA trendlines should know the locations, and the state, of a high proportion of hostile and friendly forces deployed in a theatre, there will be exceptions. Units, for instance, willing to disguise their locations, perhaps by turning engines off, using electronic deception, and by observing radio silence, may remain undetected (though in doing so performance is forgone). Nature (cloud cover and storms, for instance) may help other units evade detection. This suggests that there will still be gaps in battlespace awareness[4].

The better information acquisition systems become the more good information will be gathered. This will place great stresses on the operators responsible for making sense of that information. As operators and their computer systems are over-loaded, useful and indeed vital information may get lost in the ensuing clutter. Other information may take so long to be processed that it could end up being of little use to commanders. This phenomenon will force a more disciplined collection of battlefield information and the ruthless prioritising of interpretative effort. As a consequence efforts to create dominant battlespace knowledge may focus on the high value segments of a battlefield. Lower value parts of battlefield may remain shrouded in the fog of war. The fog of war is thus likely to remain. But unlike the past commanders will know exactly where the fog is lifted, for how long and where in contrast it is not. Unable to fully lift the fog of war, commanders will be forced to deliberately focus battlespace awareness.

Surprise encounters even at relatively close range with formations or units in parts of the battlefield still clouded in the fog of war will be a constant threat. Lightly armed and protected units (that may expect to be out of harms way) would be very vulnerable in these circumstances. So to would units that lack embedded tactical intelligence and electronic warfare (IEW) capabilities.

***The Imperative of 'Jointness'***

To date, conventional large scale operations have needed the physical massing of forces to neutralise enemy power. The build up and employment of massed combat forces, including platforms, weapons, and logistics is by its very nature time consuming. As the mass of a force is reduced, so too is the time needed to assemble it and make it effective. Combat capacity will be improved by integrating intelligence, command, weapons and logistic systems. More will be got from limited resources. Organisational friction will be reduced.

To achieve the effect of mass, without relying on massive forces, intense joint operations will be planned. Information superiority and advances in technology will allow the tailored application of joint combat power. High lethality precision weapons will allow commanders to attack targets concurrently[5]. It will be possible to dislocate an opposing force's capacity to understand what is

going on, for leaders to command, control and communicate, and for its own capacity to find, fix and destroy. The secondary effects of such coordinated strikes may be to disorientate and discourage ordinary soldiers by depriving them of leadership and knowledge of what is happening in an emerging battle.

One trend that is emphasised in the RMA literature is the idea that the control of joint assets should be embedded at lower levels of command than ever before. Greater operation independence will be provided to smaller formations. Macgregor suggests that Group Commanders will enjoy "unimpeded access to the same Joint assets now available" to a Corps Commander.[6]

Synergistic jointness will not see the end of discrete sea, ground, air and space forces. What may eventuate though is a merging, or fusion, of Service roles that display natural synergy.

***Advanced Technology***

Improvements in the lethality and accuracy of Precision Guided Munitions (PGMs), combined with the enabling capabilities of fast, accurate and detailed intelligence, surveillance, target acquisition and reconnaissance systems (ISTAR) will allow commanders to attack targets successfully with fewer platforms and less ordnance. Missions will be achieved more rapidly and at lower risk with stand off weapons (that is weapons mounted on platforms that operate beyond the reach of most hostile weapons) at greater range. "Individual warfighters will be empowered as never before, with an array of detection, targeting, and communications equipment that will greatly magnify the power of small units"[7].

Operations will be conducted at a higher tempo (meaning acting before another can react). Mobility and dispersion will increase. To cope with more lethal systems and improved targeting, forces will need "increasing stealth and other means of passive protection, along with mobility superior to the enemy's ability to retarget or react". Higher levels of dispersion and mobility will be achieved offensively as weapons platforms, and the capacity of individual war fighters, increase lethality and reach. Combat functions may be merged with, for instance, the embedding of reconnaissance, strike, and surveillance. Defensively, rapid dispersion and higher tempo operations will complicate an enemy's ability to accurately target friendly forces.

New information technology, increases in the range and lethality of precision strike capabilities, and the reduction in the size and number of units suggests that Areas of Operation (AO) may increase dramatically. Please refer to figures 1 and 2. One consequence of the trend towards smaller and smarter units in any battlespace is an increase in the vulnerability of small units surprised by opposing forces. To offset this vulnerability a countertrend towards protected manoeuvre can be expected to emerge in importance. Thus, as combat units decrease in size, an increased emphasis may be placed on maximising the lethality and range of organic weapons available to a small unit commander. This change will presumably be accompanied by the trend towards the maximising of organic information gathering systems and target acquisition systems available to the unit commander.

**Figure 1: Brigadier Group Area of Operation**

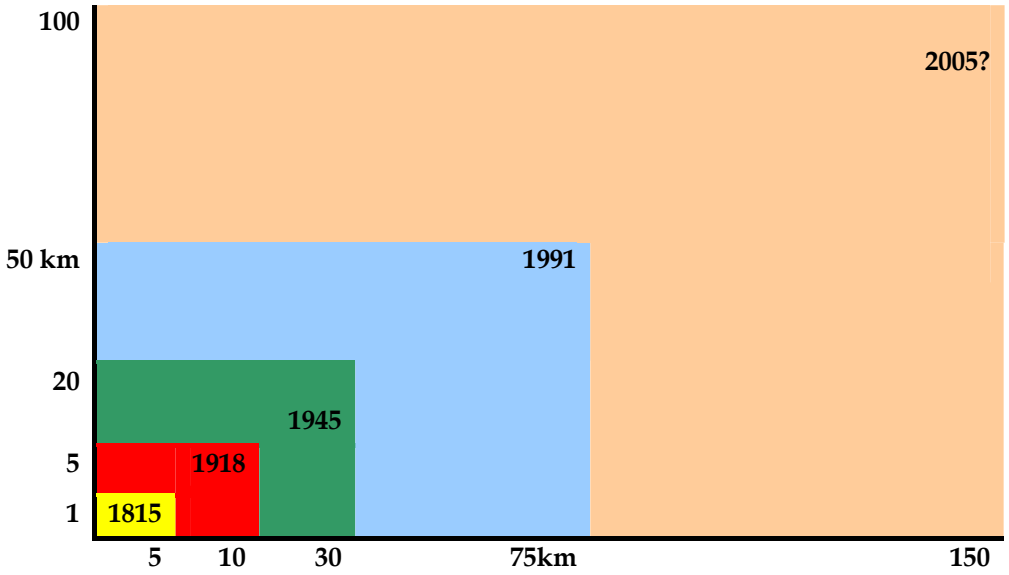
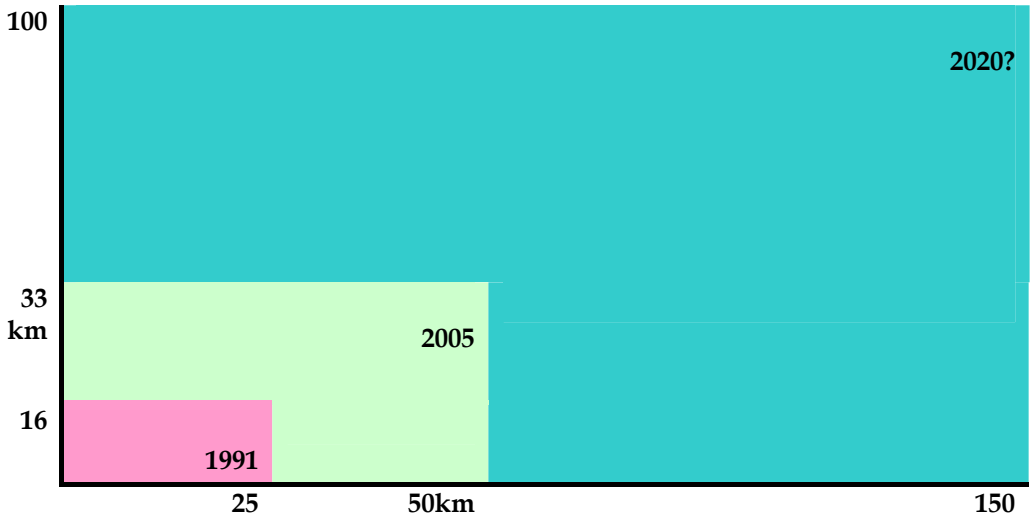



**Figure 2: Battalion Area of Operation 2020?**




*Emerging Operational Concepts*

With information superiority and technological innovation, new operational concepts emerge. The new conceptual framework gives primary emphasis to:

(a) **Dominant manoeuvre** or the synchronised multidimensional application of information, engagement and mobility capabilities to position and employ widely dispersed joint air, land, sea and space forces to accomplish assigned tasks.

(b) **Precision engagement** is the method of systems enabling joint forces to locate an objective or target, provide responsive command and control, generate a desired effect, assess success, and retain the flexibility to re-engage with precision if required.

(c) **Full dimension protection** seeks to control the battlespace to ensure joint forces can maintain freedom of action during deployment, manoeuvre and engagement while providing multi-layered defence for forces and facilities at all levels.

(d) **Focused logistics** is the fusion of information, logistics and transport technologies to track and shift assets even while enroute and to deliver tailored logistic packages and sustainment at all operational levels[8].

**Some Implications for Ground Operations**

The RMA envisages that ground operations will involve the fusion of ground and air forces working jointly (with maritime force assets also contributing where possible).

The essence of change for ground forces is captured in an observation by David Gawn:

> *The idea of a lineal battle field with a front line will increasingly be replaced by diffused battle. Islands of conflict… will emerge. Islands of battlespace dominance will be linked by tunnels of control. Technology has made weapons so lethal that forces that do not disperse will not survive. Increasingly enabled by information technology, the areas of operation for units will increase correspondingly. Dispersion is needed to avoid the effect of a single weapon of mass destruction. A scud missile attack for instance would wipe out an entire concentrated battalion. Dispersion is needed to mass effect rather than forces[9].*

This trend is influenced by the idea of the deep battle found in Soviet operational art. Soviet doctrine held that deep battle dislocation would determine a fight before the close battle was reached. This idea has found its way into NATO-ABCA doctrine (and consequently into the doctrine of almost all states with the main exceptions of China and India). Units in a distributed battlefield will each contribute firepower to dislocate an adversary through simultaneous strikes. The need to assault opposing forces in fortified positions (where defending troops are dug in behind mines, obstacles and wire, and have the use of rifles, grenades, machine guns, and artillery) in close battle may pass. This suggests that casualties in future battles can be significantly reduced as fewer and fewer infantry are exposed to the dangers of the close battle.

Ground forces directly engaged as adversaries infantry, armour and artillery in close battle as there was no better way. The concept of direct infantry assault may be relegated to history. Forces enabled by technology and doctrinal innovation can now stand off and deliver precision force against fewer but more important targets (such as command centres and specialised weapons systems). The lives of hapless defending infantry can be increasingly spared. An adversary's infantry can be induced to surrender (as were Iraqi infantry in the Gulf War) through intimidating displays of precision artillery combined with psychological operations. If they don't they can be spared. Or if they present a threat they can be dislodged by precision strike.

Close quarter battle, while undesirable, is still a possibility. As mentioned earlier, the fog of war is unlikely to be lifted completely. Lethal encounters at close range with pockets of infantry and armour will continue to present hazards to forces modernised along RMA trendlines. Small ground units will need to survive the unexpected. This suggests that it would be prudent to emphasise protection, and shorter range fire power, for ground forces.

The cumulative effect of enabling technology, precision strike, protected mobility and focused logistics, working synergistically with airpower could well change the traditional roles of separate arms (or corps) of an army (that is infantry, armour, artillery, engineers, logistics etc). The need for small, protected and manoeuvrable ground force elements suggests that armour (because of its inherent mobility and protection) may become the principal arm of reconnaissance, and a co-equal

arm of strike (specialising in the defence of reconnaissance platforms and the destruction of opposing armour).

Artillery is increasingly emerging as the other leading arm of strike thanks to its range, lethality, precision and capacity to function in any weather. Artillery can destroy enemy tactical centres of gravity whether they be command centres, communications nodes, artillery, surface to air missile (SAM) sites, armoured vehicles, or massed infantry. In a sense attack helicopters are flying artillery (but with a much shorter weapon strike range and much greater mobility).

Attack helicopters will increase in importance thanks to its mobility range of hundreds of kilometres, and the lethality and precision of its stand off strike These helicopter missiles can accurately target tanks at 5-10 kilometres. Whereas tanks have a firing range of 2-4 kms and medium artillery and MLRS)[10] a range of 30-40 kms. But attack helicopters have limitations, especially in difficult weather conditions. They are vulnerable to rifle and machine gun fire, and have demanding logistic requirements. These limitations are offset by their high rates of accurate fire and their capacity to acquire targets in good conditions (sensors in helicopters can see far further than those in tanks).

The role of the infantry is likely to change. Modern land battles will become increasingly like those at sea. Control will be relinquished as battlegroups pass over land in much the same way as fleets relinquish control of the sea after they have passed over it. Infantry may emerge as a supporting arm of strike and reconnaissance. The role of the infantry may become more discriminating. Instead of the traditional role of seizing and controlling large areas of ground the infantry may focus on seizing and temporarily holding small areas of ground to enable artillery and armour to halt, re-supply and rest in safety. Infantry will increasingly provide security for other soldiers engaged in information gathering, the delivery of fire missions, logistics and for command elements[11].

As the supporting arm of manoeuvre, infantry will of necessity travel in armoured vehicles. The armoured vehicle will increasingly serve as the infantry soldier's "pack" or "golf bag". This will allow infantry to multi-equip. Just as a golfers use their bags to carry a wide range of clubs, so too will infantry use their armoured vehicles to carry many types of specialist equipment. A specialist piece of equipment can be selected from the "golf bag" in much the same way as a golfer selects the right club to suit conditions.

Infantry have traditionally only been able to use the weapons they could carry. That is rifles, machine guns and light mortars (and limited ammunition, night vision equipment, mines, food, clothing and water).

The armoured vehicle as "golf bag" will allow for the multi equipping of infantry. Infantry transported by armoured vehicle will have available a far greater range of weapons and equipment at their disposal. More and heavier machine guns and ammunition may be available to the infantry as well as mortars and crew operated short and medium range anti-armour weapons. Infantry will be able to carry in their armoured vehicles heavier and more capable thermal imaging night vision, optical, and remote ground sensing equipment and engineering equipment.

The need for separate support sections within an infantry battalion will fade as specialist equipment is carried by the multi-equipped. As a consequence the size of an infantry battalion can be reduced.

Indeed, the days of separate infantry battalions may be ending. As the functions of other corps such as intelligence, communications and engineer support are combined with those of armour, artillery and infantry, much more versatile and flexible multirole organisations may develop at the tactical level.

Indeed this trend is already emerging. The mechanised reconnaissance-strike model (where even sub-units operate as small combined armed groups) favoured by the United States Army attracts widespread emulation. Increasingly the United States, Britain, Canada and Australia are enrolling units to reconnaissance-strike.

Motorised infantry, or infantry carried to the close battle in Infantry Mobility Vehicles (IMV), once dismounted are limited in the equipment they can carry. Motorised infantry, or infantry provided only with operational mobility, cannot multi-equip once dismounted. Dismounted infantry are not only slow but are also exposed to artillery and machine gun fire as they move to the close battle. Even small numbers of tanks can dislocate a much larger formation. New Zealand's bitter experiences in Greece, and the Western Desert (for instance at Ruweisat Ridge) is evidence enough of this[12]. Dismounted infantry degrade operational tempo as they lack mobility. Infantry on foot, for instance, can only move at around 3kms an hour in good country. In contrast the tempo of mechanised operations is now around 65kms per hour.

Motorised infantry, or infantry carried to the close battle in Infantry Mobility Vehicles (IMV), once dismounted are effective in rugged terrain and in close country (although no more so than mechanised infantry). However, an opposing force's centre of gravity is rarely found in these environments. Motorised infantry, whether carried by truck or IMV, have severe limitations in built up areas. Somalia illustrates the limits of mobile but lightly protected infantry trying to operate in built up areas where an adversary may be armed only with heavy machine guns and RPGs. Indeed the case for multi-role combined arms teams mounted in armoured vehicles with a "golf bag" of capabilities close at hand in built up areas is strong. In these environments infantry need protection, as well as a wide range of optical kit, engineer capabilities, and good communications. This will enable them to clear rubble, obstacles and explosive devices, locate snipers, other infantry and weapon systems, and at the same time trying to avoid collateral damage and shielding the lives of non-combatants.

The multi-rolled infantry of the future will be far more versatile than their lorry bound relics of the Second World War. They will be able to deliver a strike at short range (up to 1,000 meters). Nonetheless the effectiveness of crew mounted anti tank guided weapons should not be overstated. The success of Syrian tank hunter teams using Sagger GW and rocket propelled grenades (RPGs) in destroying Israeli tanks during the Yom Kippur War of 1973 was only short lived. Israeli armour and artillery developed new tactics (smoke and in direct fire) to neutralise exposed anti tank crews lying out in the open without protection[13]. Each development in anti tank missiles is in turn countered by new advances in the design of armour. However the sensible deployment of infantry protected by their armoured "golf bags" with fire support vehicles of sufficient calibre, using the right tactics, will provide sufficient protection and versatility.

Increases in capacity of C41SR technologies, and the increases in the lethality, accuracy and reach of weapons systems will allow units and formations to decrease in size. Communications technologies

will allow the physical span of control of commanders to increase. This will allow the coordination of widely dispersed units.

The trade off for a decrease in size of units is increased vulnerability. Small units will be incapacitated unless they can survive mines, rifle and machine gun, RPG, artillery and tank fire. Sufficient protection and mobility will be a pre-requisite to operational effectiveness. As the evading of detection becomes even more important in the future more emphasis will be placed on reducing the physical profile of vehicles and in maintaining the security of communications.

Control of the air is a prerequisite to future ground operations. Lifting the fog of war using sensor suites and electronic eavesdropping on board aircraft is critical to future ground operations. Fast jets will play a crucial role in the future battlefield. The evolution of fast jet strike platforms will increase.

However the full promise of fast jet strike against massed ground targets has yet to be realised. In the Gulf War, for instance, the success rates of fast jet strikes were never as high as claimed by the United States Air Force[14]. Fast jets are also limited by the amount of precision strike they can deliver against ground targets. In contrast to attack helicopters, precision long range artillery and tanks, the performance of fast jets in the close battlefield is more limited. During the Gulf War, United States airforce planners sought to destroy 50% of Iraqi artillery, armour and mechanised systems and 90% of the artillery capable of reaching breech areas. They believed in good faith that they had done so. In practice senior United States army commanders accepted only 50% of all kills claimed as confirmed. This rule of thumb was proved accurate by later events[15]. However, fast jets have a reach beyond that of any form of ground strike. Only fast jets can strike with great reach against high value strategic targets, or against reserve formations moving towards a battlefield. And, as Biddle has shown, fast jet strike also reduces an adversary's overall performance in unexpected ways. Air power contributed directly to the effectiveness of United States armoured cavalry in the Gulf War by forcing the crews of Iraqi tanks to dismount when attacked. As a consequence Iraqi tank crews were at times so preoccupied that they did not notice closing American armour until it was too late[16].

**Some Implications for Maritime Forces**

The implications of the RMA are less apparent for maritime environment. One trend is however beyond doubt. Naval and air forces will in the future (as they do already) operate interdependently in a maritime environment. Levels of battlespace awareness that are now being discovered by ground forces have been commonplace in the maritime-air environment for some time. Maritime forces are routinely equipped with stand-off precision strike. Stand-off strike can already be coordinated and timed by command centres to ensure that missiles launched from different ships and at different times can hit targets on land or at sea simultaneously. Maritime forces are emerging as an off shore arsenal for strategic and theatre strike.

Control of the sea has served as the core role for maritime forces. The way maritime forces have executed the control of the sea demonstrates a striking parallel with the way future ground operations may emerge. Information technology plays the crucial role in generating battlespace awareness. Indeed some of the most important warships, such as the Aegis class of cruiser, are those dedicated to information collection and management. Great distances separate adversaries. Precision stand off strike dominates engagement. Advances in stealth can be expected to play an important role in trying to reduce the radar signature (and thus the vulnerability) or ships. Joint operations

between ships, submarines, and aircraft (whether surveillance, electronic warfare or strike) have developed to such a high level in maritime operations that they are synergistic.

The idea of fleets of adversaries lining up and pounding each other into submission with naval gunfire appears to be as dated as the idea of infantry charging rifle pits.

**RMA and Low Level Operations**

RMA designers themselves are unsure of the extent to which these new concepts will apply to conflicts in closed country (forest and jungle) and mountains, and to fighting in built up areas (towns and cities). While information warfare systems, sophisticated sensors and remote surveillance vehicles may improve the capacity to locate concentrations of opposing infantry, armour, artillery, command centres and electronic emissions, small groups of lightly armed troops operating in cover or at night will be hard to find[17].

The adapted RMA, (especially the information component) offer perhaps its greatest utility in lifting the 'fog of war' in peacekeeping operations. As peacekeeping operations are undertaken at a far lower tempo than conventional operations, RMA surveillance technologies should allow the systematic mapping of all command posts and communications centres and of the movements of almost all military and civilian vehicle traffic. It should also allow the locating of most if not all artillery, anti tank and ground to air missile systems.

During the UN and IFOR/SFOR operations in Bosnia, for instance, the majority of civilian and military vehicles, artillery and air defence missile systems were known, along with the locations of command centres, and transmitting radios (which gave away the location of any concentration of forces of consequence). Technology is also very good at picking up mass burial sites and burnt out villages. RMA technology also allows the precise application of force to be used in self defence, or to protect safe havens. But, as with low level operations, RMA technologies are not much use against small groups of lightly armed troops operating with cover or at night.

The RMA will improve dramatically the quality of information available to policy makers in peacekeeping operations and can aid decision making. Knowledge will help forewarn peacekeepers of potential dangers. If force is to be used, it may be used with great precision. Commanders can be confident that they can launch a strike with minimal risk of civilian casualties. Precision allows force to be used against armed elements in ways that will minimise casualties to those delivering the strikes and among the forces of the targeted. Precision allows firepower displays to be arranged that may have a significant deterrent effect but little risk of inadvertent casualties. If force is used, for example, in self defence against a tank firing on peacekeepers/makers, it is possible (using a mix of information technology, psyops, UAVs, and the weapon system itself) to warn the offending crew before their vehicle is destroyed. This can be done by telling the offending tank commander that they should desist and by firing shells very close to the offending vehicle. If the tank commander persists the vehicle can be destroyed after a warning is given - allowing the crew to dismount and scurry to safety.

Forces modernised along RMA trendlines have a far greater capacity to contribute usefully in peacekeeping/making operations than unmodernised forces. C4ISR capabilities will provide commanders with real time information. Protection, mobility, and the option of precision strike

within ROEs, allow national contingents to undertake the full range of peacekeeping duties in the widest range of circumstances. Contingents bullied by tanks would have no option but to stand down unless they can defend themselves. This could have terrible consequences for both mission effectiveness and local people. The Dutch unit selected to observe the Srebrenica safe haven was for instance forced to stand aside when threatened by more heavily armed Serbian troops. The consequence of this failure was the butchering of the civilian population of Srebrenica by Serb forces[18].

Units entrusted with the protection of refugees and safe areas would have to be confident that they could hold their ground. Peacekeeping forces need protection, mobility and precision strike to be able to successfully intervene to put a stop to ethnic cleansing and other war crimes in progress.
Two lessons have emerged from peacekeeping operations in recent years. The first is that units used in peacekeeping operations must be trained and equipped the same way as forces trained for conventional operations. The second is that peacekeeping forces need to be robust. They have to have the capacity to stay in a hostile area and carry out tough missions. Forces dedicated to peacekeeping operations have to be equipped and trained for instant escalation. Initially peacekeeping doctrine stressed that deployments to operational areas should not risk intimidating local inhabitants. Consequently ground forces were equipped with light wheeled vehicles and lightly armed troops. However the experience of peacekeepers in Bosnia is that robust organisations are needed to protect refugees, to force apart warring parties, and to neutralise weapons systems trained on peacekeepers and non-combatants. Where combatants have armour peacekeepers need it also. The experience of Angola, Bosnia and more recently Kosovo shows that clashes take place where the armour is. The recent British Labour Government's affirmation of the centrality of mechanised forces for peacekeeping operations and rapid deployment forces illustrates this trend[19].

**RMA After the Cold War?**
The origins of the RMA owe much to the WARSAW Pact and NATO theorists. American army conceptual thinkers sought technology that would enable NATO deep precision strikes against massed echelons of Soviet armour and artillery intent on invading Germany[20].

Where are the massed echelons now that the WARSAW Pact has gone? The Soviet Union has collapsed? Will not the United States and its allies and friends now predominate to such an extent to make unnecessary the RMA? Is not the RMA a relic of the Cold War? According to military historian Martin Van Creveld:

> *The shift from conventional war to low-intensity conflict will cause many of today's weapons systems, including specifically those that are most powerful and most advanced, to be assigned to the scrap-heap. Very likely it also will put an end to large-scale military-technological research and development as we understand it today*[21].

Van Creveld may be right that low level warfare may emerge as the predominant form of warfare in the foreseeable future. But is Van Creveld right to imply that the RMA is destined to the scrap heap?

The problem with Van Creveld's thesis is that future multilateral operations may well take place in countries that are distraught with low level conflict and have access to sophisticated weapons arsenals. The source of conflict may be the quest of peoples seeking to determine their own future. Many of these people whether in the former Soviet Union, the Middle East, South Asia, China, or

Africa find their future and identities constrained by states created in earlier periods of history that showed scant regard to local circumstances. Where governing elites and peoples have been able to work out compromises conflict has generally been avoided. The divorce of the Czech Republic from Slovakia is a leading example. The inability of the peoples of Bosnia to work out a pragmatic compromise fuelled a bloody civil war. Most countries in Africa, the Middle East, the Balkans and Central Asia, may not possess stealth bombers, tomahawk cruise missiles, AWACS, JSTARS or Aegis. The peoples of Bosnia certainly did not have access to this level of high tech modern military technology. What the peoples of Bosnia did have access to (though the access was uneven) was the detritus of WARSAW Pact technology such as rifles, machine guns, mines, rocket propelled grenades, mortars, artillery, armoured combat vehicles, main battle tanks (some of World War Two design and some designed in the 1980s), surface to air missiles, and surface to surface missiles.

One of the unfortunate realities of the post Cold War is that Bosnia type arsenals exist in states beset with civil war including Albania, Armenia, Azerbaijan, Former Republic of Yugoslavia (Kosovo), Georgia, Moldavia, Russia (Chechnya, Ingushetio and Ossetia), Ukraine and Tajikistan. Other states with formidable conventional arsenals that have yet to resolve nationality and statehood include Kazakhstan, Krygyzstan, and Uzbekistan[22]. The future of warfare in these states is likely to be scattered, organised through military conscription and potentially very lethal for combatants, the innocent and potentially for peacekeepers and peacemakers. One indicator of potential lethality is the presence of over 5,100 main battle tanks, 4,000 armoured fighting vehicles and over 9,500 artillery pieces over 100mm in these states. If the weapons stocks of Kazakhstan, Krygyzstan, and Uzbekistan are excluded, there are still 1,200 main battle tanks, 1,300 armoured vehicles of other types, and 6,100 pieces of artillery over 100mm. Almost all of this equipment is of Soviet origin. All this equipment was designed for WARSAW Pact type battle[23] and not all of it could be expected to be in working order; some would be poorly maintained, some may be held back in war reserve, and some used for training. If 20% of this equipment is in war stock, 50% is allocated to training and only half of the remaining equipment is efficiently maintained there would still be over 1,000 main battle tanks, 800 other armoured vehicles and at least 1,900 artillery pieces over 100mm in good operating order in the states listed. Any peacekeeping or peacemaking mission undertaken in these places would need to keep in mind that these arsenals could be used against them. This correlation between access to these kinds of heavy conventional weapons and many quests for self-nation by the peoples of the former Soviet Union suggests that war while low level may also be very lethal.

Further complicating Van Creveld's thesis is evidence that states engaging in balancing behaviour do not seem to be assigning weapons that can destroy armoured vehicles, aircraft and shipping to the scrap heap. The behaviour of parties of unresolved conflicts in East Asia and South Asia does not conform to Van Creveld's predictions. Many of these states, especially Pakistan, India, China and the Koreas possess weapons systems of the 1970s/80s era and smaller quantities of very capable modern systems as well. If there is direct conflict it will probably be very lethal[24].

Conflict in Central Asia could be equally dangerous. Central Asia is an area of growing geostrategic importance because of its potentially massive oil reserves[25]. It is already subject to great power competition and rivalry between China, India, Iran, Russia and the United States. Each of these states, as well as the Central Asian Republics, are very well armed. Should competition turn to conflict, there is great potential for intensive large scale warfare to emerge.

Van Creveld's view of the future of conflict generally reflects patterns of conflict that have emerged in Africa. Sources of conflict are driven both by interstate conflict and by conflicts between peoples, or peoples and the state. The number of armoured vehicles and artillery is relatively low in comparison to the number in those parts of the former Soviet Union embroiled in conflict. The states of Africa that are (or have recently been) engaged in conflict are Algeria, Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Djibouti, Eritrea, Ethiopia, Liberia, Mau, Niger, Nigeria, Rwanda, Sierra Leone, Somalia, Sudan, Uganda and the Western Sahara. Between them these states posses 2,400 main battle tanks (generally older versions from the 1940s to 1970s), over 4,000 armoured vehicles (generally 1960s to 1970s versions) and 2,500 artillery pieces of over 100mm (from 1940s through 1980s). Most of these heavier weapons are to be found in the arms inventories of just a few states. Algeria owns 960 tanks; 1,690 other armoured vehicles and 326 artillery pieces, Angola has 400:296:390, Ethiopia 350:200: no estimate, Nigeria 200:830:431, and Sudan 280:732:600. The rest of the states of Africa embroiled in conflict possess between them around 300 tanks, 300 other armoured vehicles and 760 artillery pieces. I have assumed that the same war stock and training standards of states of the former Soviet Union discussed above may also apply to Africa. Also, assuming that the rates of maintenance are equally poor, then the total numbers of high lethality weapons to be found in working order in Africa (excluding Angola and so on) may be as low as 60 tanks, 60 other armoured vehicles, and perhaps as few as 150 artillery pieces. If the figures for the larger weapons owning states of Africa are included as many as 500 tanks, 800 other armoured vehicles and perhaps up to 500 artillery pieces may be found in working order[26].

Conflict in the majority of African states will be of a generally low level. However, if the big five (such as Ethiopia) intervene in the affairs of a neighbouring state then conflict may sharply escalate in intensity. Equally, should conflict break between parties who have access to the larger arsenals within a state possessing high lethality weapons systems, then conflict may quickly develop in intensity. These latter two types of instances have important implications for peacekeeping and peacemaking operations.

If Van Creveld is right that low intensity war will be predominant form of conflict for the future, then those parts of the world described above that may be the focus for future peace support operations offer a potentially very hazardous environment for peacekeepers and peace enforcers. Combatants will have access to weaponry that will allow them to escalate a low intensity conflict to a higher level very quickly. What will be the fate of peace support contingents caught in conflict that is rapidly escalating in intensity? Peacekeepers face the very real prospect of being caught in the cross fire of localised conflicts.

Emerging trends in the Asia-Pacific suggests that Van Creveld's thesis needs revision to take account of quite a different set of security dynamics. Unlike the regions discussed above, the Asia-Pacific is relatively peaceful, or at least more at peace than at any other time this century. Each of the region's low level conflicts (Cambodia, Mindanao, Kalimantan, Ache, Irain, Yaya, Timor) is contained. So too, are the low level conflicts in Xinjiang, Assam, Myanmar, and Sri Lanka. In each of these conflicts combatants (with the exception of Cambodia) do not have access to tanks, armoured vehicles or artillery. In contrast, the parties to the region's main flash points (Korea and Taiwan) are heavily armed. In Korea, for instance, the North and South have armed themselves with 9,300 main battle tanks (73% DPRK, 27% RoK), 2,400 other armoured vehicles (47%:53%), 14,700 artillery pieces of over 100mm (69%:31%), 29 submarines (86%:14%), over 50 midget submarines (all DPRK), 539 coastal

combatants (78%:22%), and 410 modern strike aircraft including United States aircraft based in the South (16%:84%). As well, both sides to this unresolved conflict possess a wide range of anti aircraft, shipping and tank missiles.

Taiwan and China face each other with similar arsenals, although it is very difficult to assess what proportion of the PLA would be dedicated to battle in Taiwan should it declare independence. Should war occur in either area (which seems unlikely for Taiwan but quite possible in Korea) then battle would be intense and involve high level conflict on the sea, ground and in the air. There is even the possibility that the DPRK could employ weapons of mass destruction. There is no working system to manage and resolve conflict in Korea as the Four Party Talks have ground to a hold, two party talks in the DMZ are ritualised, and the DPRK is not a member of the ASEAN Regional Forum[27].

In contrast, the potential for conflict in the Spratly and Paracel Islands does not appear to be high, thanks to the willingness of the parties to these disputes to enter into negotiations and to adhere to the UN Convention on the Law of the Sea. However, the way in which these conflicts emerged may signal a future pattern that could be repeated in the Asia-Pacific where claims to maritime territory were accompanied by low level displays of force. China, for instance, deployed Naval Task Groups to sail around the Spratlys in the late 1970s and again in the 1980s to make a diplomatic point by using its armed forces peacefully. Most parties to the conflict staked their claims with lightly armed troops who built small shelters on otherwise uninhabited reefs and tiny islands. Patrol boats, supply craft and electronic eavesdropping ships were also deployed. Submarines from various interested parties patrol these waters. A small number of exchanges of gunfire (between gun boats from China and the Philippines most recently) occurred. This kind of very low level conflict could occur again in the region over small outcrops and islands that are claimed by more than one party. There is a danger that these kinds of conflict can escalate. For instance, gunfire exchanged between patrol boats could escalate into missile attacks (from ships, aircraft or shore). This could trigger a deeper level of conflict that would be very difficult to resolve. This would have fundamental implications for the maritime security of the region and consequently for New Zealand interests.

This review has been limited to the analysis of only some of the wide variety of lethal weapons systems to be found in places where conflict has taken place in the last ten years. Kofi Annan's lecture on intervention given to the Ditchley Foundation earlier this year provides arguments for military intervention in support of diplomatic goals that conform to international law. The essence of Annan's argument though was moral. "When people are in danger, everyone has a duty to speak out. No one has a right to pass by on the other side". But, equally, states engaged in legally and morally sanctioned intervention have a responsibility to their own peacekeepers or peace enforcers. This brief review of the distribution of lethal arsenals in places where peace support operations may take place suggests that at the very least military forces engaged in these operations will need not only the capacity to deal with small arms and mines but also tanks, other armoured vehicles, artillery, and a wide variety of anti shipping, vehicle and aircraft missile systems[28].

**RMA and Aid to the Civil Power**

IF RMA trend lines are followed it may be possible to substantially improve the way armed forces can provide assistance to a civil power, especially in an earthquake. Earthquakes represent the most potent form of natural disaster that could devastate a New Zealand town or city. The main areas in which forces modernised along RMA trendlines could provide a quantum leap in assistance are:

(a) "situational awareness" through the use of sensors (day/night vision) to locate the living, the dead and to assess infrastructure damage; and
(b) C4 capabilities that can assist civil authorities when the entire communications and management systems are damaged or destroyed.

Armed forces modernised along RMA trendlines would also be able to provide assistance in traditional ways using the mobility afforded by the armoured vehicles (where wheeled vehicles cannot venture), engineering support, work parties and general logistical support.

The ways in which defence forces assist civil authorities in the future may change also. Currently much of what defence forces have to offer inefficiently duplicates existing civilian resources. For instance, military medical units would absorb scare and badly needed resources such as water, transport, and skilled staff from national health structures. In future defence forces exploiting RMA technologies may instead seek to provide civilian hospitals with what they actually need - accurate and timely information. The defence forces may not seek to generate that information (for to do so is to duplicate existing resources). Instead, defence may act as an information conduit between civilian medical assessment teams and hospitals.

This is only one example. Much military assistance provided in natural disasters is driven by domestic political imperatives: the need to be seen to be doing something. It is very hard to see what real assistance can be provided by a few Hercules loads of supplies, or from teams of medics who will arrive too late to be effective. Military medics trained to stabilise patients are as effective after a 12 hour flight as an ambulance crew at a car crash after 12 hours. Military engineers offer skills that are already present in local communities. An army grader or bulldozer is no different from a civilian bulldozer or grader, except that they have to be sustained by very long and expensive flights by Hercules aircraft.

What most communities devastated by a disaster lack is not equipment, supplies, or skills, but the capacity to undertake the reconnaissance of damaged areas, and the communications facilities to coordinate responses. It is in these areas that the RMA is useful.

**New Zealand's Interests and Responsibilities**

This paper assumes:

(a) that it is in New Zealand's vital interest to encourage secure Sea Lines of Communication (SLOC) and universal subscription to the United Nations Convention on the Law of the Sea (UNCLOS). 90% of the volume, and 99% by value, of New Zealand's trade is carried by sea[29].

Over half of New Zealand's economy is export orientated. The prosperity of our economy is dependent on the security of both our Sea Lanes of Communication and markets.
The stability and security of New Zealand's markets are of vital interest to New Zealand. There is a link between prosperity and trade that is not always direct. Of New Zealand's major markets only South Korea faces a military threat (from its unpredictable Northern rival). New Zealand's other major markets (Australia, East Asia, the United States, Canada and Western Europe) are free from military confrontation.

However, New Zealand's markets are situated adjacent to major areas of intense, low level conflict. Western Europe is next door to the Balkans. The United States is adjacent to areas of lingering low level conflict in Central and South America. Tensions over the South China Seas, Taiwan Straits, and South Philippines, for instance, are geographically close to, and in some cases involve, trading partners in the region.

It is in New Zealand's interests to play a constructive role in preventing tensions from escalating. It is equally in New Zealand's interests to dampen down tensions as part of coalitions of the willing and responsible;

(b) that the broad political consensus, with strong domestic support, will ensure that New Zealand remain committed to international peace support (both peacekeeping and peacemaking) obligations[30];

(c) that New Zealand will participate in multilateral coalitions of responsible states to repel aggression, or to provide assistance on humanitarian grounds.

The UN Security Council may sanction these coalitions. If the UN Security Council is unable or unwilling to act, and the cause is just, New Zealand should have the capacity to contribute a multilateral coalition of responsible states;

(d) that the security of energy sources vital to New Zealand's economic prosperity will remain a key interest. Because peace and stability are finely balanced in the Middle East, New Zealand's future sources of energy may come from new locations, such as the Central Asian Republics;

(e) that the NZDF will be expected to provide support to the civil power in an emergency (especially a natural disaster) and assist the provision of surveillance and patrol of the EEZ; and

(f) that relationship building with older and newer friends, using the armed forces, will remain an important part of New Zealand's diplomatic repertoire.

I have also assumed that any New Zealand government would want military contribution to:
(a) be effective for the size available; and
(b) avoid casualties to its own forces, its operational partners, and civilians in areas where it operates.

Effectiveness refers to the utility of forces on operations for the size available. Offers from New Zealand will need to be those that are wanted by other partners and those that can perform in the field. The criteria for determining the relative balance will depend on conditions. It is probably fair to assume that a New Zealand government, regardless of complexion, will seek the highest profile (both internationally and domestically) for any contribution it may make.

**Defence Policy Imperatives and the NZDF**

New Zealand's fundamental security interests are essentially maritime. For political and diplomatic reasons, Wellington would want to underscore the importance it attaches to the security of its maritime interests through sustainable contributions of forces that can operate in a maritime environment (whether on the sea or in the air).

New Zealand's responsibilities, especially towards international peacekeeping, are essentially on land, but also at sea. Markets are also land based. To meet international obligations and to signal its interests, I have assumed that New Zealand needs forces that can operate in a land environment.

I have also assumed that if political-diplomatic criteria are used in planning a future force, that a government will want to have the choice of selecting a contribution that is appropriate. In some circumstances this may be a contribution to combat forces. In other circumstances it could be a contribution of non-combat units, or a contribution of non-combatant forces protected by combat forces.

Combat forces earn high recognition from friends and allies. Combat contributions are sought after by friends, allies and the United Nations[31]. Combat forces have a capacity to defend themselves that non-combat forces cannot share.

There are good political and practical reasons for providing non-combat forces as the New Zealand contribution in a wide range of circumstances. These reasons range from the ever present need for good logistics to the desire of a government to preserve its policy integrity.

One reality is that domestic-political considerations will always need to be recognised as important planning factors in a democracy. For this reason, governments of the future will need to demonstrate for domestic reasons, that New Zealand can provide non-combat assistance in certain circumstances and also provide humanitarian assistance in the event of an international emergency or disaster. However, for non-combatant military support to be effective in the field, logistics units need to be trained for military operations as the supporting arms of combatant forces. If not, they will be unable to fit in with non-combatant military organisations of other states. This will reduce their utility in operations other than war, or as an alternative contribution to combat forces in time of war. Logistics units deployed to combat environments (for instance to reflect the desire of a government to avoid a combat contribution to a conflict) without a knowledge of combat would be a liability to themselves and to others.

**Revolution In Business Affairs**

For planning purposes I have assumed that a future NZDF would also take advantage of the revolution in business affairs. Principal components of the revolution in business affairs include:

(a) improved information systems that integrate financial, logistics and personnel information. As a consequence, the size of administrative structures have declined, and levels of supervisory management have been reduced;
(b) responsibility has been given to more junior managers and account-ability tightened;
(c) greater emphasis on performance based rewards for managers;
(d) the contracting out of non-line support and servicing functions to other firms;
(e) inventory and asset draw-down;
(f) focus on core business (or doing a few things and doing them well);
(g) shedding of peripheral functions and accounts, even if profitable; and
(h) adhering to practical management spans (or managing a few core functions and doing them well).

**Application of Revolution in Business Affairs to NZDF**

I have assumed that the NZDF will seek to continuously improve the performance of its non-operational support functions to free resources from the tail to the teeth through:

(a) the contracting to private enterprise of non-operational, non-deployable support functions;
(b) inventory control reform;
(c) the minimising of capital charge by reducing ownership of non-operational infrastructure;
(d) contracting out of selected in-theatre servicing functions;
(e) contracting out of selected strategic re-supply and transport services; and
(f) greater modulation of equipment allowing efficient servicing.

I have also assumed that wider trends in business management will influence the NZDF in the future. These trends include:

(a) lifting the "fog of management";
(b) improved management information systems;
(c) reduction of organisational friction;
(d) elimination of redundant layers and spread of organisation; and
(e) devolution of responsibility and accountability for tasks.

At the same time the NZDF can be expected to devote considerable energy to training and developing its core asset: its people.

**Interoperability Imperative**

The setting of military operational standards is driven by imperatives beyond New Zealand's control. The standards by which the credibility and capacity of New Zealand's armed forces are judged are determined by benchmarks established by others.

Whether we like it or not the United States sets these benchmarks and is the source of much, but not all, of the current innovation in RMA[32]. Nonetheless the application of the RMA is not restricted to the United States, and attracts near universal consideration amongst military development staffs. This attention is not limited to NATO and Russia. The RMA sets the standards for those states in the Asia-Pacific modernising their armed forces. In some states this process is well advanced, such as in Japan, South Korea, Taiwan, Singapore and Australia. In other states such as China, Malaysia, Thailand, Indonesia, India, and Vietnam segments of their armed forces are developed to a high standard with the RMA making a slower impact.

One implication of this trend for the NZDF is that, to be able to operate effectively in the future in the Asia-Pacific, or in a large scale UN or coalition arrangement. It will need to be interoperable with forces modernised to RMA benchmarks. These trends underscore the importance of the NZDF continuing to remain involved in the leading standardisation arrangements of its friends and allies, such as the ABCA, and of maintaining high technical benchmarks. As well, the NZDF will need to keep abreast of standardisation arrangements being followed by newer friends.

**The Limits of High Military Technology for New Zealand**

New Zealand is not in the business of acquiring the upper end of high military technology. Space systems and stealth fighters are not for New Zealand. I cannot imagine New Zealand contemplating the acquisition of cruise missiles. New Zealand does not need airborne early warning systems and joint surveillance and target acquisition systems set up in large jets. New Zealand does not need to consider buying smart Aegis style cruisers. What New Zealand needs is technology that will allow our service people who are on peace support operations to work with others effectively, and for the armed forces in time of war to perform credibly and with minimal risk. This means that the units and sub-units that New Zealand deploys overseas on operations need to be up to scratch. The equipment needed at this level is already on the market, well developed and tested. It is not excessively expensive. And, this paper will show in due course, most of the equipment New Zealand needs is affordable.

**New Zealand's Prospects**

As mentioned earlier, doubters from here and across the Tasman question whether New Zealand has the capacity to absorb the RMA.

It is hard to know exactly how Dibb arrived at his judgement that Australia would continue to decisively pull ahead of New Zealand. He does not supply a supporting argument to sustain this judgement. Perhaps Dibb assumes that New Zealand needs to develop RMA capacities at the national level, and at formation level. If so this would be misreading the New Zealand context.

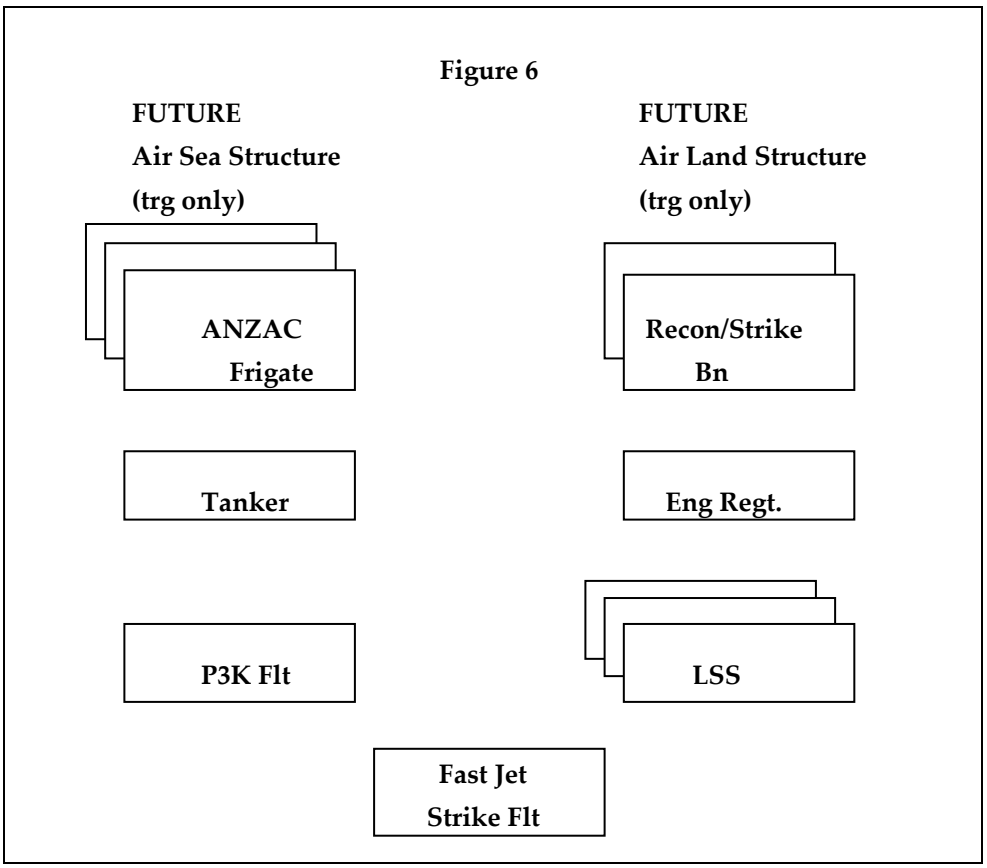
What New Zealand needs is the capacity to develop, train, and deploy good quality units and sub-units for multilateral arrangements and perhaps coalitions of friends and allies. New Zealand needs to apply the RMA at unit level, and create units that are thoroughly interoperable. New Zealand has no strategic need to create higher formations or joint forces along the lines assumed to be necessary by Australian scholars such as Dr Stewart Woodman of the Strategic and Defence Studies Centre at the ANU[33].

What New Zealand does need is the capacity to interoperate in a joint force environment as part of a larger formation, without actually having to create a joint force (except for ad hoc operations in the South Pacific)[34]. This will have important implications for training. If RMA trendlines are followed there is no reason why a "virtual joint force" (see figure 5) could not be created for training. For this purpose NZDF units could be organised along lines of natural synergy. Platforms capable of performing in both maritime/air and land/air environments emerge as specially valuable. The F16 is a good example of a platform capable of operating in a strike role in sea, land and air operations. One line of natural training synergy would be for sea-air units to focus on the maritime environment (ANZAC frigates, tanker, P3K, F16). Another line of training synergy could be that of land-air units specialising in ground operations (recon-strike, engineers, attack helicopter, F16 and LSS)[35]. The broad relationship between the maritime air sea training structure, and the structure for air-land training is expressed in figure 6.

**Figure 5**
**Jointness**
**New Zealand Context**


**Training For Jointness** | **Deploying in Combined Joint Ops**

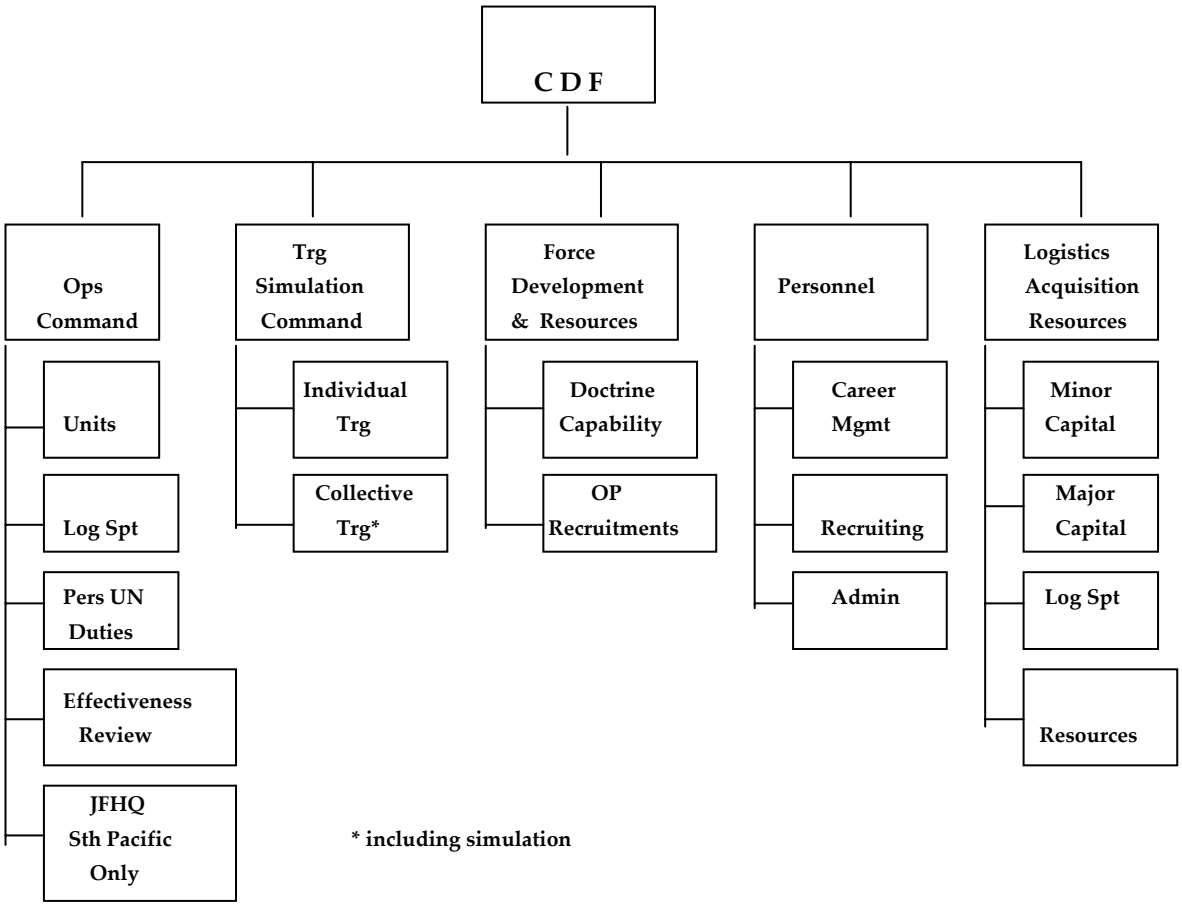
**Figure 6**




If business management trendlines are followed, in synergy with those of the RMA, the NZDF could choose to focus on a small number of defence outputs. This would mean that fewer units would be raised, but it would also mean that units could be properly equipped and trained across the board. The operational deployment and training of the units may also be organised differently.

The merging of business management trends with those from the RMA suggest that the higher command structure of the NZDF may be transformed. If the desire to remove organisational friction is held to be important, and the spirit of jointness further develops, and natural synergies that cross single Service boundaries increasingly intersect, then perhaps NADF higher level organisation may evolve along the lines expressed in figure 7.

**Figure 7**




Organising defence structures at the higher level, following these trendlines, could develop further in the years to come. Perhaps in the future, Ministry of Defence functions (acquisition, evaluation) may be fused into the NZDF, in the spirit of cooperative administration. The policy role of the Secretary of Defence may be transferred to a small but highly powered and influential National Security Council. Such a Council could evolve to advise the government on the security implications of domestic and international developments. Perhaps the Council could oversee the development of security policy and national responses on security issues. Its role may fill a niche created by the preoccupation of the Ministry of Foreign Affairs and Trade with international trade issues. If the desire for synergy is an organising consideration, such a Council would probably seek to avoid duplicating the responsibilities of the CDF. Rather it would develop advice on force structure and capabilities issues and the operational control of defence forces.

**New Zealand and Prospects for the RMA**

Organisational reform is one thing, but can New Zealand absorb the RMA? At unit level, New Zealand has the capacity to absorb the RMA as long as an 'off the shelf' equipment acquisition programme is followed. For instance, all the equipment needed to outfit an ANZAC frigate, Orion, F16 or recon-strike battalion is already on the market. The acquisition cost of a complete ANZAC frigate, for instance, is below $600 million. Acquisitions of this scale are paid off in the same way as an ordinary mortgage for a house. A mortgage is paid off over a number of years, which makes it affordable. $600 million paid off over ten years is a bit over $60 million a year. An 'off the shelf'

policy would allow New Zealand to avoid high 'brand new system' integration costs and to take advantage of lower unit costs that are a consequence of large production runs.

For New Zealand, the acquisition of C4ISR and EW technology is not a far fetched prospect. Specialised digital equipment is already in service in Australia, the United States, Britain and Canada. The ANZAC frigates are equipped with very modern C4ISR capabilities (including fire control systems, radar, sea sparrow anti aircraft missiles, and secure digitised communications links). The Orions once upgraded (with data management systems, radar, electronic warfare systems, communications including a tactical data link allowing the aircraft to securely exchange digital information with other aircraft and ships, and navigation systems) will be capable of working in a RMA environment. The New Zealand Army's armoured unit is already equipped with thermal imaging night vision equipment and remote ground sensors. The information warfare and communications capabilities needed by the army are already in use by their British, Canadian and United States counterparts. New Zealand needs to upgrade some platforms, especially for maritime strike and for the army, and has sufficient funds to do so.

The NZDF has been using joint force doctrine of its friends and allies for many years. The challenge for New Zealand will be to integrate combat support, weapons, sensors, and combat information systems in real time. Another challenge will be organisational. RMA trendlines suggest that the shape of organisation for ground units in particular may change, and frequent change is often a cause of friction and resistance.

If the policy assumptions outlined earlier are nearly correct then New Zealand needs forces for lower level operations that may escalate to the medium level. It also needs forces capable of operating in a higher level contingency. Equally, there is an expectation that New Zealand must retain the flexibility to provide aid to the civil power and to assist in the control of the EEZ. This suggests that New Zealand needs:

(a) precision stand off tactical strike (for ground forces, precision strike against armour, at maximum possible distance and for maritime forces, precision surface, air and sub-surface strike);
(b) digitalisation to tactical level C4ISR and ISTAR;
(c) good platforms for maritime-air and ground-air functions;
(d) protection for ground forces; and
(e) strategic lift.

Of these five needs, only the first two are driven by the RMA. The other three represent the "best of the past".

This paper argues that the RMA is possible in the New Zealand context. The paper also suggests that if RMA trendlines are followed then some units may evolve in new ways. The purpose of the following is not to advocate any particular force structure or capability. Rather I have asked the question, what form and content could the NZDF take if RMA trendlines are followed? I have then

costed the model that is arrived at. The model itself is nothing more than a handy tool to answer the question, is the RMA possible in the New Zealand context?

If RMA trendlines are applied scrupulously some interesting observations emerge. The most significant changes would appear to be in store for the army. The smallest unit capable of independent operations is a battalion/regiment. The UN only recognises a battalion sized grouping. Yet, New Zealand's contributions of army units on active service since 1965 have been made at company level or below. These units have not been expected to operate independently. Instead, New Zealand sub-units were slotted into a larger parent unit.

However, a company of infantry reinforced by a slice of a battalion headquarters, several troops of armour, and slices of self contained engineers and logistics sub units, could be deployed on UN operations as a battalion group. Thus, a unit grouping could perform as a self contained package on UN operations. Thus the army provides governments with deployment options ranging from sub-units that can be integrated into other larger units to self contained mini battalions capable of operating independently in UN operations.

For training and sustainment reasons a battalion /regiment infrastructure would be needed. A battalion/regiment organised along RMA trendlines would emphasise the importance of C41SR, ISTAR, and the fusion of reconnaissance and strike functions. As well, combat support functions and logistic support considerations would need to be catered for. The essence of such a regiment is reconnaissance and strike. The shape of such a regiment is set out in figure 8 and costed in figure 9.

**Figure 8**

**Recon/Strike Regt**

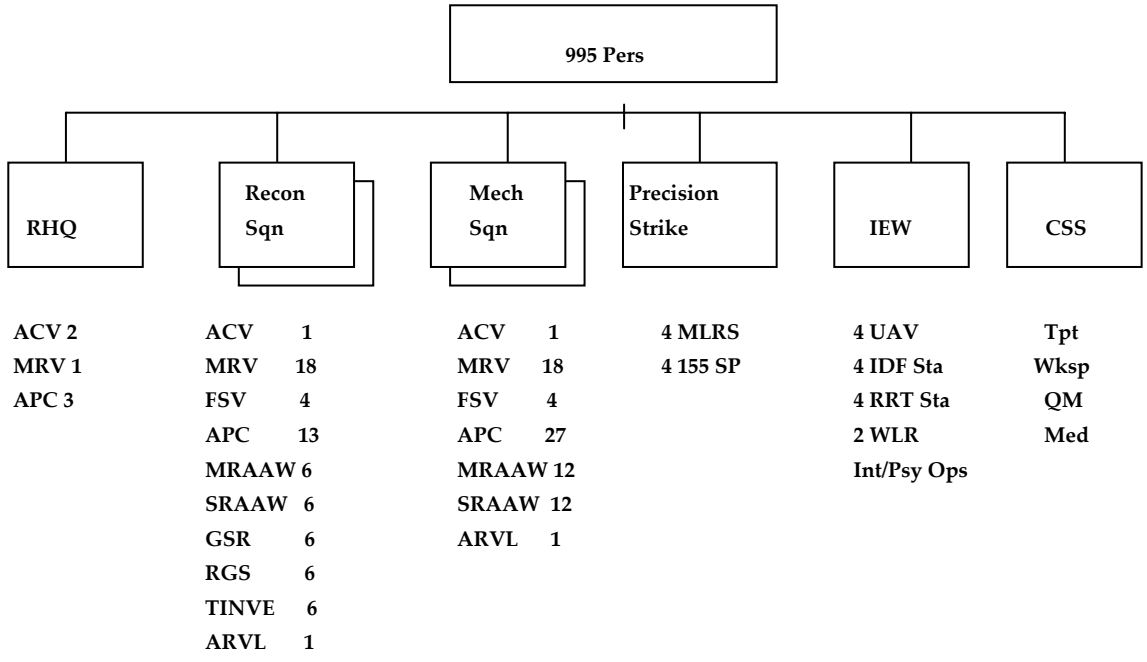


**Figure 9**
**Recon-Strike Regt Costing**

| Function[36] | $m cost | quantity | $m cost |
|---|---|---|---|
| IEW | | | |
| WLR | 4 | x 2 | 8 |
| RRT Sta | .05 | x 4 | .2 |
| IDF Sta | 1 | x 4 | 4 |
| UAV | 2.5 | x 4 | 10 |
| Precision Strike | | | |
| MLRS | 15 | x 2 | 30 |
| 155 sp | 4 | x 4 | 16 |
| ACV | 4 | x 2 | 8 |
| APCL | 2 | x 10 | 20 |
| Recon-Mech Sqns | | | |
| MRV | 4 | x 41 | 164 |
| FSV | 4 | x 16 | 64 |
| ACV | 2 | x 6 | 12 |
| MUA | 4 | x 8 | 32 |
| APC | 2 | x 77 | 154 |
| ARVL | 3 | x 4 | 12 |
| MRAAW | 1 | x 36 | 36 |
| SRAAW | in service | x 36 | |
| GSR | 1 | x 12 | 12 |
| RGS | in service | x 12 | |
| TINVE | in service | x 12 | |
| Road Heavy Lift Tpt | | | |
| A'd tpt | 1 | x 32 | 32 |
| **TOTAL COST $m** | | | **614.2** |

The regiment would consist of two reconnaissance squadrons and two mechanised squadrons. The embedding of precision artillery and intelligence and electronic warfare (IEW) reflects trends discussed earlier in the paper. Such an organisation provides the mobility and protection required for peace support operations and conventional warfare. Personnel trained in this regimental structure would also be capable of organising and staffing a Bougainville type exercise.

This structure reflects the fusion of modern technology into a standard cavalry regiment organisation favoured by Australia, Britain, Canada, and the United States, similar to that of regional friends such as Singapore and Malaysia. Elements from the regiment could be deployed on any kind of peacekeeping, peacemaking or conventional operation. It would be thoroughly interoperable with

the formations of states that New Zealand is likely to join in multilateral operations, except for MLRS that is widely used by Britain and the United States. An additional regiment would need to be raised to sustain the first on operations, should New Zealand decide to supply a regimental sized unit for broader strategic reasons. Such and additional regiment could, for instance, run a long term pace operation.

Attack helicopters are the optimal land attack platform. They work in synergy with the other parts of a recon-strike regiment and with other heavier armour formations. At around $65 million each (a minimum batch of 12 would cost at least $780 million) attack helicopters are expensive. Twelve attack helicopters would be needed to guarantee a flight of four for operations. Four more would be needed to sustain the lead flight in the field. An additional four airframes would be needed to cover training and the replacement of airframes destroyed in training. However, the acquisition of attack helicopters, while affordable, would force a trade off. That trade off would be the capacity to create a second recon-strike regiment. This suggest that an attack helicopter unit would not be affordable within current defence spending baselines. Unless the argument was accepted that future operations may have such a short duration that a regiment could be deployed without need of replacement.

The natural partner for such a combat organisation that could perform both combat and non-combat support would be an engineer regiment. Support would range from civic assistance in the South Pacific, to assistance to the civil community in the event of a major disaster in New Zealand, and support for peace-support operations such as demining and construction. This organisation already exists in the form of 2 Engineer Regiment in the NZ Army (though it cannot be deployed by C130). The structure of the engineer regiment would not change due to the RMA. However developments in technology would allow the unit's mine clearance and mapping functions to be significantly strengthened. This is important for the combat support role of the engineers is to remove obstacles that slow the tempo of ground operations (and to create obstacles that would slow the tempo of opposing forces). Emerging technologies allow remote mine detection equipment using ground penetrating radar, for instance, to quickly locate mines at minimal risk to the operators of the equipment[37]. At present, New Zealand army engineers use World War II technology that is not only slow but that also exposes personnel to grave risk. While 2 Engineer Regiment is reasonably well equipped for its general engineering roles it lacks basic equipment for its rafting and gap crossing tasks. The engineers peace support roles, such as mine clearing, construction and so on, require exactly the same equipment as for its combat functions.

The equipment needs for 2 Engineer Regiment are affordable as is shown in figure 10. New engineer equipment may be affordable, but could the New Zealand economy and defence budget sustain two recon-strike regiments? Figure 9 provides a ballpark conservative costing of the principal equipment for this regiment. New equipment for two regiments would cost around $1.2 billion.

**Figure 10**
**Engineer Regiment Equipment Needs**

| Equipment | $ million |
|---|---|
| Rafting, gap crossing | 8 |
| Rapid route clearance (mine plough etc) | 5 |
| Remote mine detection (ground penetrating radar) | 5 |
| Geometrics (terrain visualisation) | 5 |
| Total | 23 |

Yet the Defence Assessment for 1997 allocated only $723 million to the army for investment in capital. One possible option is to bridge this shortfall by doing strategic lift differently. If Logistic Support Ships are purchased instead of C130 J aircraft the NZDF would not only massively increase its strategic load capacity but would also free up at least $720 million for investment in armour and associated systems which would cover the shortfall mentioned earlier. It would also give the NZDF the capacity to transport strategic cargo to any port in the world. The NZDF could shift cargo and equipment inland if it deployed heavy land transporters by logistic support ship. If one logistic support ship was fitted with litters for moving cargo to shore the NZDF could shift cargo from ship to shore throughout the South Pacific.

In contrast, the C130 J is limited to the carriage of light forces only, which exposes New Zealand to the "fly light, die early" problem[38]. Logistic Support Ships could also serve New Zealand's security responsibilities in the South Pacific that are now performed by C130s. However, the way in which the NZDF currently plans strategic lift would have to be done differently.

The consequences of the RMA for the shape of the RNZN and the RNZAF are not as dramatic. As mentioned earlier, both RNZN and RNZAF maritime strike will need longer range precision missiles (Harpoon because of its 60 mile range). For the ANZACs stand off surface to surface missiles, as well as the upgrading of seasparrow, the acquisition of a surface to surface missile and improvements in command and control are justified. As mentioned, the upgrade for the P3K is already funded. If F16s are acquired they will need to have both long range stand off missiles (for their maritime role) and the capacity to deliver ground attack PGMs (for a ground attack role). Interoperable communications capacity is a pre-requisite to effectiveness.[39]

**Consequences of not taking RMA Seriously**

New Zealand could choose not to take the RMA seriously. Such an option would have consequences, including:

(a) higher casualties (the rates can be modelled[40]);
(b) battlespace ignorance;
(c) vulnerability;
(d) decreasing capacity to work with friends and allies;
(e) a gradual and insidious lowering of capacity in peacekeeping, peace-making and regional security roles; and
(f) little capacity to take on new roles such as verifying the peace using C4ISR technologies.

New Zealand's capacities to control its EEZ and to use its armed forces to provide assistance to the civil power, especially in the event of a large natural disaster, would not be degraded, assuming that platforms continue to be modernised and maintained. However, New Zealand would lose the potential for its defence force to take a "quantum leap" in the level of assistance it could provide in key civil defence roles, especially to disaster surveillance and reconnaissance, in the event of a major earthquake.

**Sustainment**

Defence force units and sub-units cannot be sustained indefinitely on operations. The stresses of an operational environment generally limit personnel effectiveness to tours between six to twelve months. Equipment needs to be maintained and overhauled. New personnel need to be trained using the same kind of equipment that they will use in operations.

As a general rule it takes three frigates to keep one on station and two companies or squadrons of ground forces to keep one on operations. For fixed wing aircraft the ratios of airframes needed to cover maintenance, training and operations differ (in part because separate airframes are used for lead in flying training).

Sustainment is impossible without high quality training processes and logistic support. If training, logistics or equipment are insufficient, the quality of operational performance will decline, and make casualties more likely.

The only exception to this rule is the provision of Logistic Support Ship (LSS) and tanker support services that are used to support operational deployments. As both types of ships are less complex than other defence platforms their maintenance and training cycles are generally less demanding.

If RMA trendlines are followed by the NZDF this will have major implications for ground forces movement requirements. The weight of ground forces units will increase. A Recon-strike regiment will be too bulky and heavy to deploy by C130. The trade off for increases in protected mobility on the ground and genuine strike ability will be a combat force that will take a little longer to deploy than the two light infantry battalions would now. It needs to be kept in mind that a light infantry battalion deployed by C130 would have to leave its medium B vehicles, that is trucks, behind as they can't fit in a Hercules. It would take less time than it took to deploy Kiwi Company deployed to Bosnia by commercial shipping. The size and deployment characteristics of the engineer regiment

would not change significantly due to the RMA. 2 Engineer Regiment as mentioned before, cannot be moved by C130. Strategic lift is needed at the moment to accompany a Skyhawk detachment overseas. This is because Skyhawk engines need to be started by a small generator. One way around this problem may be to buy extra start up generators and to pre-position them at airfields that the Skyhawks would traverse to their destination. While this may cost a few hundred thousand dollars it would be much cheaper than buying a new C130 that would cost many tens of millions of dollars.

There is a good case for re-examining strategic lift. At present, most New Zealand army units (such as Queen Alexandra's Mounted Rifles (QMAR), the Field Hospital and Engineer Regiment) cannot be deployed outside of New Zealand.

Given the requirement to lift heavier units, more logistic support ship capacity may be needed. This is in part, to guarantee availability, and in part, to ensure the manageability of replenishment cycles for units or sub-units deployed on active service. One consequence of this trend may be that readiness standards would be adapted. Instead of having many sub-units and units maintained at near instant readiness, a few, or perhaps just one sub-unit may be kept at this status. This may be possible if say, P3K were designated the highest readiness status (for ISR is a common need in almost all contingencies). Modern frigates, strike aircraft and recon-strike could be maintained at lower levels (around six weeks, depending on distances to theatre). This would still represent an impressive capacity for a small state and a massive real increase in capacity over that of the NZDF at the present time.

**Is the RMA Affordable?**[41]

The RMA has important implications for NZDF personnel. Slightly fewer, but better military personnel will be needed. Serving in a RMA environment will in itself provide a more stimulating career. More investment in training and education seems likely to prepare personnel to serve in a high tech - high NZDF.

One inescapable RMA trendline is the decline of personnel strengths. It appears doubtful that part-time soldiers will be able to master the complex range of skills needed to serve effectively in a force influenced by RMA trendlines.

The need for the NZDF to directly employ civilians in support functions may also decline as greater use is made of contractors to provide non-deployable and non-operational support functions.

The assembly of these trends suggests that the size of the total NZDF regular personnel base may be reduced from around 9,000 to 7,000. The army Territorial Force's existence is difficult to justify on operational grounds. In the future, civilian support would remain important, but would probably be mostly contracted out. A reduction in the extent of the NZDF sounds large, but could be achieved in just over three years (without redundancies) as long as normal personnel attrition rates of 10% - 15% continue. Some reskilling and regrading of personnel may be necessary.

**Implications for Single Service Capital Allocations**

The long term capital funding projections for the single Services set out in the DA 97 do not provide each service with proportional access to capital funds. The RNZN receives 22%, the NZ Army 16%, and the RNZAF the lion's share at 44%. 16% of capital is set aside for infrastructure.

If the NZDF is modernised along RMA trendlines as described in this paper, (and accepts the form of trade offs suggested here also) then the proportion of capital allocated to each single Service would change. Figure 11 shows that the relative allocation of funding to the RNZN would increase slightly (by 2% to fund two additional LSS). The RNZN budget would cover the purchase of a new ANZAC frigate, a fifth Seasprite helicopter and upgrades to the ANZAC weapon systems. Funding for the NZ Army may increase by 13% to fund two recon-strike regiments and an engineer regiment equipment upgrade. RNZAF funding would cover the upgrade of the Orions and purchase of F16 strike aircraft. Funding for the RNZAF could drop from 45% to 26% as a consequence of funding the Navy to provide strategic lift. This is an option that would free up around $660 million of capital for investment in protected mobility for ground forces.

**Figure 11**
**Change to Service Capital Allocations**

| | **$m From DA 97*** | **$m To #** |
|---|---|---|
| Navy | 955 | 1027 |
| Army | 723 | 1253 |
| Air | 1934 | 1148 |
| Simulation | | 100 |
| Infrastructure | 723 | 723 |
| Total | 4335 | 4251 |

* Long term projections to 2016/17

# Capital funding accelerated, programme completed 2012

**The RMA Is Affordable**

The purpose of creating a model for a NZDF reshaped along RMA trendlines is not to advocate any particular force structure or capabilities match. Rather, modelling is a means to hang a costing to the well held answer to the question raised by Dibb and Crowley, is the RMA possible in the New Zealand context? My answer is to that question is an emphatic yes.

The NZDF could be modernised along RMA trendlines by and within current financial baselines (of around $1.4 billion) as long as the relative emphasis given to investment in personnel and capital investment was changed. Figure 12 sets out the relative changes to investment that would be needed.

**Figure 12**
**RMA Affordability**

| | **$m Status Quo** | **$m RMA** |
|---|---|---|
| Personnel | 510 | 390 |
| Operating | 310 | 310 |
| Depreciation/Capital | 204 | 354 |
| Capital Charge | 370 | 345 |
| TOTAL | 1394 | 1088 |

The New Zealand economy could sustain the cost of the modernisation of its defence force within current funding baselines if a greater proportion of the defence budget was allocated to capital. If New Zealand accelerated the defence capital funding programme, the RMA could be integrated into the RMA by around 2012.

This paper presupposes that New Zealand will relish the chance to exploit opportunities offered by the RMA and new approaches to business management. However, New Zealand may prefer to take a more conservative or a more measured approach.

I am not suggesting for a moment that the model outlined here may be adopted, or even should be adopted. The model developed here though suggests how a NZDF reshaped along RMA trendlines, and trendlines now emerging in business affairs, may look. How the NZDF may look in twenty years is impossible to forecast. This paper is speculative. And the one consistent theme that emerges from these speculations is that RMA will have far reaching consequences for NZDF that may reach far beyond the obvious.

## END NOTES

[1] Paul Dibb "The Revolution in Military Affairs and Asian Security" in *Survival* Vol. 39 No 4 1997-98 p 98

[2] Elizabeth Stanley *Evolutionary Technology in the Current Revolution in Military Affairs: The Army Tactical Command and Control System*, US Army War College, 1998 p5, 49-57

[3] This overview is drawn from the US Chairman of the Joint Chiefs of Staff, *Joint Vision 2010*, Washington, Chairman of the Joint Chiefs of Staff, and William Owens "The Emerging Systems of Systems" *Proceedings*, May 1995 p 36-39

[4] Sir Michael Quinlan *Future Patterns Of Military Conflict* (a note on a conference jointly organised by Ditchley and RAND), 1977 p1.

[5] *Ibid.* pp.17-18.

[6]Douglas Macgregor, Combat Group Slide from presentation on Reorganising the US army for the 21st Century and Beyond nd

[7] *Joint Vision 2010* p. 13.

[8] *ibid*. pp. 20-27.

[9] Note of a Centre for Strategic Studies-Institute of Policy Studies seminar at Victoria University by Lt Col David Gawn *The New Zealand Army Prepares for the 21st Century*, Wellington, CSS:NZ, 1998.

[10] In contrast the 105mm light gun operated by the NZ Army has a range of around 12km.

[11] R Dunn "Time x Technology x Tactics = RMA, Why We Need A Revolution In Military Affairs And How To Be In It!" *Australian Defence Journal* Jan/Feb 1996; p.12.

[12] At the battle of Ruweisat Ridge on 14-15 July 1942, two lightly armed German reconnaissance units with less than 30 tanks held off a British Armoured Corps, captured a New Zealand (light infantry) Brigade and forced the withdrawal of two NZ (light infantry) divisions. Over a thousand New Zealanders were killed, wounded or captured. This defeat was a consequence of poor planning within the NZ Div., wrong tactics, the absence of armour under control, and the failure to create powerful combined infantry, armour and artillery fighting groups. In essence the defeat was a consequence to a lack of skill among two NZ Div senior officers that flowed from pre war neglect. These officers were learning on the job with disastrous results.

[13] Kenneth Macksey *The Guinness Book of Tank Facts and Feats* 3rd Ed; London, Guinness, 1980 pp183-188.

[14] GAO Report to Congress, *Operation Desert Storm: Evaluation of the Air War* Washington, General Accounting Office, 1996 p 3-5; The GAO report found that the effectiveness of airpower in the Gulf was inhibited by aircraft sensors' inherent limitations in identifying and acquiring targets and by problems in gathering accurate battle damage estimates. The favouring of high altitude attacks to maximise aircraft and pilot survival degraded weapon system effectiveness. Deliveries of weapons from medium and high altitudes resulted in the use of sensors and weapons systems at distances greater than they were designed for. These higher altitude attacks also exposed aircraft sensors to man-made and natural impediments to visibility.

[15] BG Robert Scales *Certain Victory: The U.S. Army In The Gulf War* Dulles, Brassey's, 1997; p.178 and 187.

[16] Stephen Biddle "Victory Misunderstood: What the Gulf War tell us about the Future of Conflict", *International Security*, Vol. 21, No.2, 1996; pp 162-163.

[17] Utgoff, V. "Military Technology: Options for the Future", in Blechman, B. (eds) *The American Military In The 21st Century*, New York, St Martins Press-Henry Stimson Centre, 1993. pp. 168-169, and 182-184. Utgoff makes the point that military capacities in close country and 'hit and run' warfare can be strengthened by developments in military technology. The Chairman of the Joint Chiefs of Staff notes the "promises of technology are less certain" in closed country and in built up areas. Chairman of the Joint Chiefs of Staff. *Op. Cit.* p. 14.

[18] Christopher Bellamy *Knights In White Armour: The New Art of War and Peace,* London, Pimlico, 1997; pp 118 and 163.

[19] *The Strategic Defence Review 1998,* London, The Stationary Office, 1988; p 28; see also Strategic Defence Review Fact Sheets for the Armoured Corps and Infantry.

[20] Elizabeth Stanley, *Evolutionary Technology in the Current Revolution in Military Affairs: The Army Tactical Command and Control System,* Washington, Strategic Studies Institute, 1998; p 9.

[21]Martin van Creveld The Transformation of War p 205 quoted in Adams, Sqn Ldr J M *An Essay On The Revolution In Military Affairs,* RNZAF Command and Staff College, 1996.

[22] International Institute for Strategic Studies, *Status of Armed Conflict 1994-1997,* London, IISS, 1997.

[23] International Institute for Strategic Studies, *The Military Balance 1996/97,* London, Oxford University Press, 1996.

[24] *Ibid.*

[25] Constantine Arvanitopoulos, "The Geopolitics of Oil in Central Asia" *Thesis;* pp 18-27

[26] *The Military Balance.*

[27] *Ibid.*

[28] Kofi Annan, *Ditchley Foundation Lecture XXXV Intervention,* Oxfordshire, Ditchley Foundation, 1998.

[29] Cathy Downes "*The Dimensions of New Zealand's National Security"* in Peter Cozens (ed), *New Zealand's Maritime Environment and Security,* Wellington, Centre for Strategic Studies, 1996, p 195.

[30] All major political parties represented in Parliament support peacekeeping. There is strong domestic support for peacekeeping. A UMR Insight poll found that peacekeeping enjoyed support from 78% of those polled, while 72% agreed that a strong and effective defence force was important.

[31] This was certainly the case in Korea, Malaya, Borneo, Vietnam, the Gulf and Bosnia. I am unsure of whether combat forces were requested for Somalia. The contribution to Bougainville was a mix of command, observer and logistic elements drawn from across the NZDF.

[32] See for instance, Nye, J and Owens, W. "America's Information Edge", in *Foreign Affairs,* Vol. 72, No. 2, 1996. p.20-54. Molander, R. *et al. Strategic Information Warfare: A New Face Of War,* RAND, 1996. Davis, N. "An Information-Based Revolution In Military Affairs" in, *Strategic Review,* Vol. 24, No. 1, 1996. p. 43-53.

[33]Stewart Woodman "Back to the Future?" *New Zealand International Review* Vol. 23, No 2, 1998p 5. Dr Woodman suggest that the most attractive way to restructure the NZDF would be to adopt some form of "joint maritime task force" consisting of several frigates, an LSS type ship, troops, specialist equipment, and transport or combat helicopters.

[34]The NZDF have already addressed this challenge by creating a Joint Force Structure within the HQ NZDF Operations Branch that is raised as required.

[35]I have assumed that the same F16s would be used to train in both the maritime and ground environment.

[36] The acronyms referred to in this figure are Intelligence and Electronic Warfare (IEW), Weapon Locating Radar (WLR), Radio Station (RRD Sta), Intercept and Direction Finding Station (IDF Sta), Uninhabited Aerial Vehicles (UAV), Multiple Launch Rocket System (MLRS); 155mm Self Propelled Gun (155 sp); Medium Reconnaissance Vehicle (MRV), Fire Support Vehicle (FSV), Mortar Under Armour (MUA), Armoured Command Vehicle (ACM), Armoured Personnel Vehicle (APC), Armoured Recovery Vehicle Light (ARVL),

Medium Range Anti Armour Weapon (MRAAW), Short Range Anti Armour Weapon (SRAAW), Ground Surveillance Radar (GSR), Remote Ground Sensor (RGS), Thermal Imaging Night Vision Equipment (TINVE).

[37] See *Proceedings of the Technology and Mine Problem Symposium*, Naval Postgraduate School, Monterey, 1996.

[38] "The Future of Armoured Warfare 'fly light, die early'", *International Institute of Strategic Studies Strategic Comments*, Vol. 4, Issue 8, October 1998.

[39]The idea of a recon-strike battalion is taken from ideas mooted by NZ Army officers themselves. Indeed most of the thoughts and ideas expressed in this paper owe their origin to serving NZDF officers. However, few , if any, NZDF officers would concur with the exact arrangement of thoughts expressed in this paper. While the ingredients for this ideas stew may have been sourced externally, I was the cook. The most important source of inspiration, aside from serving officers themselves, is Douglas Macgregor *Breaking the Phalanx: A New Design for Landpower in the 21st Century*, Washington, Centre for Strategic and International Studies-Praeger, 1997.

[40] For instance, the comparative cost (in lives, equipment and ammunition etc.,) of assaulting different types of defensive positions can be modelled. Variables can be manipulated (such as tactics, equipment, unit organisation, training proficiency standards, etc.,) to work out the most effective methods and those that carry the lowest wastage of life.

[41]Costing used in these slides was derived principally from the Defence Assessment 1997 major capability and infrastructure investment projections; NZDF departmental Forecast Reports 1997/1998 and equipment estimates were taken from various specialist and official publications derived from American sources.