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***THE BIG ISSUE:
COMMAND AND COMBAT
IN THE INFORMATION AGE***

EDITED BY

DAVID POTTS

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The Command and Control Research Program (CCRP) has the mission of improving DoD's understanding of the national security implications of the Information Age. Focusing upon improving both the state of the art and the state of the practice of command and control, the CCRP helps DoD take full advantage of the opportunities afforded by emerging technologies. The CCRP pursues a broad program of research and analysis in information superiority, information operations, command and control theory, and associated operational concepts that enable us to leverage shared awareness to improve the effectiveness and efficiency of assigned missions. An important aspect of the CCRP program is its ability to serve as a bridge between the operational, technical, analytical, and educational communities. The CCRP provides leadership for the command and control research community by:

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CHAPTER 1

Introduction

By David Potts

This Occasional considers command and combat in the information age. It is an issue that takes us into the realms of the unknown. Defence thinkers everywhere are searching forward for the science and alchemy that will deliver operational success. They must reconcile the tantalising possibilities of technology with the enduring nature of the most demanding aspects of combat, framed by post-Cold War strategic realities. A small team in the British Army's conceptual '*think tank*', the Directorate General Development and Doctrine, located at Upavon on Salisbury Plain, has been working together on this issue for some 18 months. Whilst nobody has any certain answers, their views represent some of the current forward thinking within the British Army.

They argue that the information age will be defined as much by the blossoming of regional conflict and global terrorism as by the technology. However, the technology offers us the potential to change the way we choose to fight and this notion lies at the core of the so-called Revolution in Military Affairs. But, by delivering a military hegemony to the United States, the RMA may have acted as a catalyst for even deeper and more fundamental change. Stronger

forces may be at work, which will, in a genuinely revolutionary way, redefine the nature of war and consequently the capabilities required to wage it. Either way, the facts are inescapable - the age we live in demands Armed Forces characterised by new thinking, new concepts, new doctrine, new tactics and new organisations, fired by committed leadership and enabled by state of the art information age technology.

Part One addresses a range of philosophical issues. In the opening scene, *Tomorrow's War*, the editor explores the nature of future conflict and the fragility of many of our current assumptions. He also provides some insights into the nature of tactical engagements in the information age. In *No Revolution Please, We're British*, he and Jake Thackray analyse the nature of RMAs and the innate British reluctance to acknowledge or embrace them. This has a potentially incalculable opportunity cost that we have paid dearly once or twice in our military history. Jake then goes on to describe The Holy Grail of a fully digitised and networked command system and the potential benefits it could yield.

John Keegan argued that the '*mask of command*' in the Cold War, nuclear age was '*Post-heroic*', in Neo-heroic Command the editor picks up on this theme and examines the mask of command in the information age. Jim Storr then rounds off this section with two pieces. The first on Command Philosophy argues that Mission Command is enduring and is indeed a pre-requisite for the successful exploitation of information age command systems. In the second he stresses the importance

of seeing the Commander as Expert decision-maker. He analyses how decisions are actually made and argues the importance of harnessing and developing intuitive judgement.

Part Two highlights the possibilities and some of the challenges. Jake Thackray opens by describing *A Commander-centric Approach* to future command structures and investigates a range of issue such as span of command, hierarchies, the evolution of echelons, deputies, and the impact of reaching back to the home base to draw on support there.

Tim Blad then discusses issues that take us *Beyond Interoperability* at the tactical level, including the disparity that will exist between digitised and non-digitised forces and the inherent frictions of multi-nationality. In a related piece, Paul Lefever examines information-sharing post-11 September and considers the issues this raises at the strategic inter-governmental level.

In *The Divine Threads* Graham Le Fevre exposes the architecture and command and control (C2) arrangements required to exploit our investment in new Intelligence, Surveillance, Target Acquisition and Reconnaissance assets. He then offers an exciting 3D Vision of the potentially revolutionary impact that aerial surveillance systems will have on how we understand the battlespace. This leads into *The Case for Manned Reconnaissance*, co-authored with John Thornton, in which the continuing requirement for manned reconnaissance is explained and asserted.

The last morsel in this section is *The Delilah Factor*, an editorial piece on the new vulnerabilities that reliance on digital systems will bring and some of the challenges posed by Network-centric Warfare.

Part Three offers a prognosis for the future - if the visions expounded in Part Two materialise and the challenges are substantially overcome, what then? *Tactical Combat with the new C4ISTAR* depicts the profound impact these new systems might have on how we will fight and offers insights for the future of land force and joint tactical combat. In *Whither the Close Battle*, Richard Cousens examines the British love affair with the close battle and concludes that this aspect of combat will change fundamentally in ways that will impact upon the very structure of the Army. John Russell then offers an immensely important and thought provoking piece on Asymmetric Warfare, which he argues is the true face of battle in the 21st Century. Jake Thackray rounds off with *Once Upon a Time in the Future*, a fictional narrative of a future conflict. It is not a flight of fancy, as Jake has tried to depict capabilities that will actually be in-service in 10 years or so. Inevitably some will find the scenario conservative, others unlikely, but Jake has succeeded in bringing together many of the threads of argument in the preceding pieces in a lively, imaginative and interesting way.

Finally, the short Afterword challenges conventional wisdom and underscores the imperative for new thinking. *The Big Issue* can be dipped into, or read from cover to cover. There is something for everyone, whether an armchair theorist, a planner,

capability developer, 'warfighter', technocrat, bureaucrat, academic, or interested layman. It soars through strategy and policy and swoops down on relevant tactical and procedural detail. Think of it as a ball - it has now been passed to you - if you run with any of the ideas herein, the pass will have been worth the making.

PART ONE

Tomorrow's War

**No Revolutions Please, We're
British**

The Holy Grail

Neo-heroic Command

**A Command Philosophy for the
Information Age**

The Commander as Expert

CHAPTER 2

TOMORROW'S WAR

By David Potts

'There was black dust along the roadway from the bridge onwards and it grew thicker in Fulham. The streets were horribly quiet....I saw altogether about a dozen [dead bodies] in the length of the Fulham Road....the black powder covered over them...one or two had been disturbed by dogs'.

H G Wells¹

Who has seen tomorrow's war? No one. However, we have had glimpses of its various scenes, acted out on a global stage and etched into the public imagination by an all-pervasive media.² Its manifestations have taken many forms in its varied appearances from the Gulf to Rwanda, Somalia, the Balkans, Sierra Leone, Chechnya, Palestine and now Afghanistan. But amid scenes of chaos, barbarism and traditional courage – the defining characteristic of warfare in the information age is the real-time coordination of numerous weapons over great distances, creating an unprecedented combat capability – something that has been unimaginable prior to the emergence of information age technology. But although technology can confer great advantage, it cannot of itself determine the nature, course or outcome of war. There is no easy

formula for war now or in the future – *‘there are in warfare no constant conditions’*.³

But what of the events of 11 September – a blip, or the face of wars to come? For a moment it seemed that the fatal hijackings and coincident anthrax attacks threatened to catapult the world into some ghastly synthesis of the information age and the plague ridden middle ages? Perhaps they are simply the manifestation of so-called *‘asymmetry’*⁴ – essentially unconventional forces, tactics and techniques applied against our vulnerabilities and to obviate our strengths? The short answer is that we do not know – yet. Time will tell, as John Updike observed in the immediate aftermath – we will only really understand the true significance of 11 September when we look back on it from some years in the future.⁵ Stock prices have recovered remarkably quickly, much more quickly than after Pearl Harbour, to which 11 September is inevitably compared. Perhaps even more remarkable is the speed with which the US, with a little help from some friends, not least the Northern Alliance, has brought down the Taleban regime in Afghanistan – a country most would have imagined was beyond its effective strategic reach, in view of its position in central Asia and the unhappy experience there of Britain and the Soviet Union. If nothing else, the events of 11 September have brought into sharp focus a reminder of the horrors of war – the unthinkable is possible, no contingency is too awful to envisage and no home base is inviolate.

But the threats and challenges defence forces faced on 10th September have not gone away. There will

be no clearly definable, two-dimensional battlefield – there will be a battlespace. It is potentially truly global: it stretches from wherever our forces are deployed, back through their lines of communication to the home base of all participants and embraces anywhere abroad where we have interests and vulnerabilities that can be attacked or exploited by a ruthless adversary. It encompasses the land, the high seas, the ocean depths, airspace, space, cyberspace, the electro-magnetic spectrum, and the minds of men. Consequently, military operations have become infinitely more complex, but they have also retained many enduring features.

The *'spectrum of conflict'* is no longer (if it ever was) a neat, easily comprehended linear escalator – with peace at one end and war at the other – it is a continuum within which lie a range of military and non-military conflict prevention, conflict and post conflict activities.⁶ The distinction between these is blurred and it is possible to conduct all three forms of operation simultaneously in the same theatre of operations. Such a view is coherent with Krulak's vision of the 3-Block War⁷ – in which we find humanitarian, peace keeping and warfighting operations being conducted at the same time and in the space of three city blocks. Some now question whether conventional force on force warfighting is likely to be a reality in the future. The answer is a resounding yes, but it will be very different and is highly likely to include the elements of the 3-Block War and asymmetry, mixed together and spread like a bloody jam. The implied polarity in some British military thinking that distinguishes between warfighting and other operations as alternatives is

misleading: they will occur simultaneously, in the same theatre of operations, or in different, but linked theatres as part of the same conflict and in wholly unpredictable circumstances. Vietnam is an indicative model with force on force warfighting and revolutionary guerrilla warfare occurring simultaneously. However, the difference post 11 September, is that we must expect our enemies to also attack our home base and our friends and interests around the world in horrific and novel ways and on a scale that we are only beginning to imagine – some Chinese writings describe this as '*Unrestricted Warfare*'.⁸

Unrestricted Warfare is actually a very wide concept that goes beyond violent action and can occur outside the moral boundaries the West has set for the conduct of its wars. It encompasses '*non-military war operations*' to embrace cyber attack, economic, monetary, social, political, cultural, psychological and ecological dimensions as well as '*new terror war*' (the synthesis of maniacal terrorism and weapons of mass destruction). It transcends all boundaries and limits. It is, paradoxically, the logical response to the US military hegemony delivered by the so-called Revolution in Military Affairs. The West's seeming invincibility in symmetric 'conventional' combat means that any canny foe (and we must assume they are all canny) will seek to fight us on terms of his, rather than our, choosing and that this will include a range of techniques that will be as appalling as they are effective and unforeseen.

However, while some potential adversaries will operate without constraint, legal and moral constraints have had, rightly, an increasing influence on the conduct of operations by Western forces. But, warfare has now become constrained in a somewhat ritualistic construct in which almost no one is to get killed. Collateral damage, the killing of innocent third parties (usually civilians) or the destruction of schools, hospitals and other humanitarian icons is strictly taboo, while avoiding the loss of lives amongst own forces has become, in some cases, an obsession that constrains commanders. Most bizarrely of all is an increasing squeamishness at the idea of killing the enemy – examples of this moral confusion abound from reactions to the sinking of the *Belgrano*, to the Gibraltar killings and the Basra Highway. All this barely a generation after the US and UK carpet bombed German cities and the US dropped a uranium bomb on Hiroshima and a plutonium bomb over Nagasaki.⁹

The current web of rules of engagement and the expectation of near-bloodless conflict are merely manifestations of mankind's eternal struggle to impose some rules and order on the most terrible of all human activity. These rules vary from generation to generation and are, inevitably the product of many factors: the art of the possible offered by the available means, the moral basis of the cultures engaged in the conflict and, crucially, the stakes – the higher the stakes, the less constrained we become. Our own antecedents have acted outside accepted boundaries on many occasions. In the middle ages, for example, a code of chivalry regulated the conduct of knights and the treatment

they could expect from their enemies. The code was shattered by the unchivalrous¹⁰ use of massed archers by the English from Crecy onwards and, later at Agincourt, slaying, rather than ransoming, captured French knights. While in their War of Independence the American rebels' use of ambush and hit and run tactics placed them entirely beyond the Pale at that time.¹¹

We cannot assume that our enemies will abide by our own moral codes, indeed we should assume the contrary and expect them to ruthlessly exploit our own constraints and sensibilities. Nor can we assume that our current legalistic construct will endure – faced with a clear and recognised threat of sufficient proportions it is quite conceivable that the West would adapt or break its own rules. Despite the civilising influence of the Ottawa convention, other horrific weapons will remain, or appear, in the arsenals of many conventional and unconventional forces – laser damage weapons optimised to blind opponents, chemical and biological weapons, flame and fuel/air explosives to name but a few. With or without rules, the information age battlespace will be a terrible place to be.

Causes of war abound today and will do so in the future, barring the realisation of some Utopian vision. An increasing world population will, inevitably, continue to battle for decreasing natural resources – whether water, oil, minerals, or any of the other elements necessary to sustain industrial or post-industrial economies and with hideously inequitable consumption. The great question of our century will be *'what to do about Lazarus?'*. We can no longer

throw him scraps from our table. In the information age, even the poorest peoples access information and know that we in the West are enjoying a most sumptuous banquet. Without a seismic shift in wealth, education and opportunity towards the developing world, the scope for genuine grievances escalating to conflict, and the exploitation of those grievances by ruthless maniacs, will abound.¹²

Beyond the potential for conflict between the *'haves'* and the *'have-nots'*, other, equally significant issues exist: religious conflict, the battles for national and cultural identity, tribalism, rogue states, terrorist states¹³ and criminal states¹⁴ will all be actors on the diverse stage of conflict in the information age. Nuclear states will become an increasingly painful hangover from the Cold War, especially those states possessing both nuclear weapons and the seeds of conflict – India and Pakistan being topical examples.

Against this backdrop, many countries around the world will continue to fund and man large standing Armies of varying quality, with many unsavoury countries equipping themselves with Western



Orphanage, Kigali, Rwanda

armaments or former Eastern Block equipment brought up to a formidable specification by the insertion of Western technology. If the UK wishes to act in its national interests abroad, and meet the obligations incumbent upon it as a P5 nation, it must field and maintain balanced forces capable of conducting the whole range of operations described above. We must be able to prevail against localised, highly capable conventional threats and to escalate rapidly as the situation dictates. Losing our conventional force on force warfighting capability – one possible, though so far improbable reaction to 11 September, – would mean that form of warfighting itself could become our asymmetric threat – ie the threat to which we had no credible response. Such an approach would be like cancelling one's fire insurance in response to a flood. This does not mean that the nature and balance of our conventional capabilities will not change, on the contrary, they must change, or we risk defeat by more adaptive adversaries.

If we accept that hypothesis, what kind of battlespace do we imagine conventional Western forces inhabiting when they are deployed on the inevitable expeditionary operations and what might tactical actions look like?

These tactical actions will occur in the multidimensional, limitless and ill-defined battlespace already described. Ground terrain will range from desert and mountain to jungle and sprawling urban areas – it is an increasingly, even bewilderingly, complex place to be. There will be coalitions, possibly shifting in composition during the

course of operations and alliances too, but these are likely to be replaced in the battlespace by coalitions of the willing. All of the national contingents deployed to any conflict scenario will bring with them a range of capabilities, agendas and interoperability issues (technical, doctrinal and cognitive). Other actors in the battlespace will include Non-Governmental Organisations, Other Government Departments, supranational, national and local agencies, as well as contractors servicing and supporting various parties to the conflict.¹⁵

We will operate, of course, within the rules that pertain at the time, but also in accordance with our doctrine. This will continue to be predicated on the Manoeuvrist Approach and Mission Command, which allows subordinate commanders at all levels the freedom to use their own initiative to achieve their commanders' intent. Manoeuvrism is not merely physical manoeuvre: it is conceptual and is about exploiting enemy weaknesses with the aim of shattering his will and cohesion. But it always has been about a careful balance between attrition and manoeuvre – in Sun Tzu speak, it is about the judicious application of Cheng '*normal*' and Chi '*extraordinary*' force in infinite combinations.¹⁶ Successful forces in the information age will continue to have the capabilities to apply both, indeed the most successful forces will be those that can combine a range of capabilities in the most effective way. However, although attrition will be necessary in certain circumstances and is to be expected and catered for, it is the application of '*extraordinary*' force to break the will of the enemy

that is *'the acme of skill – to subdue the enemy without fighting is the supreme excellence'*.¹⁷

Information superiority will be at the kernel of the application of both extraordinary and normal force. In itself, this is not new. Commanders have always sought the best possible information on their own forces, allies and their enemies, as they sought to peer through the *'fog of war'*. But information has sometimes added to, rather than diminished the fog – as Clausewitz observed, *'Great part of the information obtained in war is contradictory, a still greater part is false and by far the greatest part is of doubtful character'*.¹⁸ However, in the information age, space-based, aerial and remote sensors, harnessed to digital processing and communications, supplemented by more traditional capabilities, will provide commanders with unprecedented knowledge of their battlespace. The information age commander will be able to routinely do what Wellington always wished to do – *'see the other side of the hill'*. The classic *'reverse slope position'*¹⁹ of the Cold War era will be as observable in detail as it would be if it were on a forward slope or a flat plain.

Nevertheless, the battlespace will continue to be a place of immense danger, violence and chaos. As well as striving to regulate activities within it through Rules of Engagement and to operate in accordance with our doctrine (which must be developed and adapted as circumstances change), we will also seek to impose some order and structure on the otherwise chaotic and indefinable whole – as Norman Mailer would have it *'Keys in the left pocket,*

change in the right'. To this end there will continue to be some form of framework of operations, currently characterised by deep, close and rear operations – a conceptual tool to think with, rather than a spatial construct. As we move into the future this framework might begin to seem tired and quaint, but for the moment it serves as a useful means to categorise and describe actions in the battlespace and how they might change as we proceed further into the information age.

Deep operations are not simply about geography; they expand the battlespace conceptually and in both space and time. More significantly, deep operations are about attacking the enemy's vulnerabilities, shattering his cohesion and crushing his will to fight as well as – or even instead of – destroying his combat forces. Attack helicopters were shown to be able to do both brilliantly in the Gulf, but were, for a variety of reasons, impotent in Kosovo and played a limited part in Afghanistan. But neither are deep operations simply about long-range precision fire or air manoeuvre by combinations of attack helicopters and heliborne troops.²⁰ They are much more about the simultaneous attack of the enemy throughout the depth of the battlespace and on multiple levels – destruction, psychological attack, military support to economic embargo and so on. But precisely focused on his key vulnerabilities – isolating him, confusing him, degrading and overloading his command system and denying him options and opportunities.

Information operations will therefore play a major part in deep operations, in destabilising and de-

coupling the enemy from his support at home and abroad and in both shaping his perceptions and undermining his will. Combat operations may occur in support of information operations as well as information operations supporting action by combat forces. Indeed, in certain circumstances information operations may prove decisive. For example in Sierra Leone, British forces under (then) Brigadier David Richards conducted highly successful information operations that brought the Revolutionary United Front²¹ to heel and included a range of actions, embracing, inter alia, the demonstration of force and the will to employ it.

Effective, long-range links between sensor, decider and shooter along with truly integrated firepower are



Sierra Leone - Beach assault in support of info ops

already a battlewinning reality. The media has explained in great detail, to the widest of audiences, how unmanned aerial vehicles over Afghanistan acquired targets that were processed in Tampa, Florida, and attacked by missiles launched from the Indian Ocean, or by bombs dropped from aircraft based in continental USA, or the Middle East and, in some cases, guided onto target by Special Forces. This is the contemporary reality of deep operations in the information age.

Today, our doctrine talks about deep operations as shaping the conditions for successful close operations, but, as we move into the future, deep operations themselves will be increasingly decisive. Nevertheless, close operations will continue to be required in some form – it is all too easy, for example, to overlook the importance of the role played by the surrogate local ground forces in Afghanistan, who were needed to eject the Taliban from their various strong-holds and to alter the dynamics of the situation on the ground.

As the information age progresses, the nature and prosecution of close operations will change. The focus for this form of combat, in the terms of our current structures, will be the brigade level and below. But even at this level, high quality, relevant information will soon be provided by operational and strategic level assets, which, when combined with locally gathered information, will give brigade commanders and their subordinates an undreamed of information advantage over their adversaries. This will enable rapid decision-making and action and the application of appropriate and timely effects –

including joint firepower. In conventional 'force-on-force' armoured warfare, platforms will be more dispersed, commanders will manoeuvre with greater confidence and precision and there will be a shift in emphasis from direct to smart indirect fire. The third dimension will be exploited to the full, with unmanned aerial vehicles (UAV) providing a range of capabilities. Even at the lowest tactical levels, short range and micro UAVs, linked to smart indirect fire systems, will soon provide battlegroups with lethal organic indirect firepower that has the potential to supersede direct firepower as the decisive weapon of choice. The future infantryman will become much more of a 'sensor' or a caller for effect than the deliverer of firepower through crew served or hand held direct fire weapons. There will also be fewer infantry, possibly operating in smaller, more isolated teams. Tanks will be increasingly lethal and will continue to be important in some operations, not least from a force protection perspective and as a powerful statement of intent, but their predominance will fade as attack helicopters and UAVs proliferate with deadly links to a range of lethal indirect fire capabilities. Massed armour, by our enemies against us, will be a thing of the past – consigned to history on the Basra Highway and lost in the mythology of Cold War exercises on the Hanover Plain. In offensive operations, we can expect to engage dispersed, well concealed and protected targets – and this will have implications for our own equipment, organisation and tactics.

But the kind of armoured warfare described will not occur in isolation. It might be the manoeuvrist



British tanks in Kosovo

exploitation of conditions created by the use or threatened use of long range firepower, enabled by combinations of special forces, light forces and rapidly deployable light armour. It might also be a highly localised occurrence as part of the '*3-Block War*', occurring alongside, and enmeshed with, humanitarian and peacekeeping operations. Or it could occur in a defined time and space in order to change the dynamics of a situation, which would be exploited by other lines of operation, especially at the political level. It is much less likely to be seen again as mass on mass manoeuvre warfare in which the fielded land force of one antagonist is pitched against that of the other in order to decide an issue of strategy or policy.

There will also be enemies against whom we must fight, who will operate below the lowest threshold of our more technical warfighting capabilities and in terrain, especially urban terrain (Mogadishu and Grozny) but also jungle and swamps (Sierra Leone), where our advantages are minimised. Against such enemies, close combat will be essential. But even in such circumstances, information age technologies

must harness strategic and operational level assets to provide tactical commanders with the best possible information, actionable options and a decisive advantage. Even basic developments such as automatic positioning data, for example, will pay real dividends in scenarios such as Mogadishu, where one of the most vexing challenges was locating friendly forces in order to extract them from the maze of threatening streets.

Rear Operations are not just about what is going on behind us. The battlespace will be much less clearly defined in terms of linearity and geography. Rear operations can be defined as those that provide the commander with the freedom to act unhindered by the enemy and which sustain and protect his force.

The prevalence of cheap, but effective UAVs, for example, will provide new priorities for Ground Based Air Defence, which will need to be ubiquitous – perhaps leading to a revival of All Arms Air Defence capabilities with numerous platforms being able to switch into air-defence mode. They might also operate under the threshold of the air superiority fighters in which the West is currently investing \$billions. NBC detection, protection and decontamination capabilities will be enduring and crucial elements of force protection. Forces will be required, whose specific task will be to defend against the asymmetric attack of vulnerable rear areas, headquarters and logistics.

Information age technologies, particularly in the fields of asset tracking, remote diagnostics and predictive data will revolutionise logistics. It will

become much more focussed toward actual requirements with resources targeted or directed to match need, rather than over-insurance through inundation. This will allow reduced logistic drag and a smaller logistic footprint, while increasing flexibility and the ability to sustain expeditionary operations.

Increasingly, rear operations may embrace a wide range of mission support functions carried out in the home base – including intelligence, legal support, course of action analysis and operational analysis as well as rear-based logistics. At the strategic level, once a major expeditionary operation is underway, rear operations might also embrace operations, defensive or pre-emptive, to protect the Home Base and our interests abroad outside the immediate theatre of operations. But clearly such actions can constitute an operation in their own right and may even become the pre-eminent form of operation.

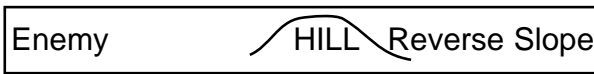
In summary, warfighting and conflict in general will be inevitable, and its characteristics will be enduring: bloody and complex with no immaculate warfare panacea or technological silver bullet that will allow this to be done without misfortune and loss of human life. Secondly, many of the old frictions and vulnerabilities will exist alongside new ones in a complex, ill-defined battlespace in which multiple forms of conflict will occur simultaneously. Thirdly and most importantly of all, there are new opportunities (technical, conceptual and organisational) that we must seize, if we are to successfully prosecute warfare, in all its forms, in the information age.

NOTES

- 1 H G Wells, *The War of the Worlds*, Penguin Books 1946, 'Dead London', p 174. The terrible imaginary scenes of devastated London that Wells describes were the work of Martians, but potentially they could be the work of any enemy whose alien moral values dehumanise innocent victims – indeed, only a few years before publication of Wells' book, similar horrors had been visited upon London by the Luftwaffe and V-weapons.
- 2 Qiao Liang and Wang Xiangsui, *Unrestricted Warfare*, Peoples' Liberation Army Literature and Arts Publishing House, Beijing, February 1999, pp 84 and 116.
- 3 Sun Tzu, *The Art of War*, Wordsworth Editions 1993, Chapter 6, 'Void and Actuality', p 113.
- 4 This has been widely envisaged as a form of conflict by numerous Western military think-tanks, although none would be so arrogant as to suggest that they predicted the precise form, timing or targets of Bin Laden's attacks on the US.
- 5 Interview for the BBC Today programme.
- 6 Christopher Bellamy, *Spiral Through Time: Beyond 'Conflict Intensity'* SCSi Occasional Paper No 35, 1998.
- 7 'In one moment in time, our Service members will be feeding and clothing displaced refugees – providing humanitarian assistance. In the next moment, they will be holding two warring tribes apart – conducting peacekeeping. Finally, they will be fighting a highly lethal mid-intensity battle. All in the same day, all within three city blocks. It will be what we call the three block war.' General Charles C Krulak, USMC.
- 8 Qiao Liang and Wang Xiangsui, *op cit*, pp 8 and 33 where they argue that understanding this concept has genuine revolutionary significance in terms of mankind's perception of war.
- 9 The Japanese surrendered 6 days after Nagasaki, but the impact of allied bombing on German war production and on the will of the German people and their leadership remains debatable.
- 10 See in particular M Knox and W Murray, *The Dynamics of Military Revolution, 1300–2050*, Chapter 2, 'England's 14th Century RMA'; J F C Fuller, *Decisive Battles of the Western World*, Volume 1, Grenada Publishing, London, 1970 (first published 1954), pp 295-319; and John Keegan, *The Face of Battle*, Jonathan Cape, London,

- 1976, pp 107–112 where Henry V's orders to kill of the prisoners is discussed (downplayed and justified).
- 11 The Americans engaged the British in View 1 and View 2 warfare simultaneously, using both fielded armies and guerrilla tactics as well as attacking the UK home base with privateers (notoriously, Paul Jones, who, for example, attacked and captured the Drake off the Copeland Islands near Belfast Lough on 13 April 1778). At Lexington and Concord 800 British regulars were harassed from the cover of trees, hedges and buildings, resulting in 273 casualties. J Fortescue, *The War of Independence, The British In North America*, Greenhill Books, London, 2001 (first published 1911), pages 213-232 describes Morgan and Sumter's effective guerrilla operations in South Carolina. Page 93 raises the issue of the mistreatment of British prisoners after Saratoga – officers were separated from men and many were never seen again.
 - 12 Former US President Bill Clinton, *Dimbleby Lecture, The Struggle for the Soul of the 21st Century*, 14 December 2001. "We have to make a world where there are fewer terrorists, where there are fewer potential terrorists and more partners. And that responsibility falls primarily on the wealthy nations, to spread the benefits and shrink the burdens".
 - 13 There is a view that state sponsored terrorism will decline and cease to be a real threat, as states respond to the 11 September wake-up call and side with their economic vested interest as part of the world community, rather than risk reproach and isolation.
 - 14 Ironically, even bizarrely, the nineteenth century Opium War, fought against the Qing Dynasty, forced the Chinese to accept the importation of opium and marks Britain as the world's first narcostate. An earlier example of British state-sponsored crime is Drake's privateering – underwritten by 'Letters of Marque' from his monarch at the time.
 - 15 It is conceivable, that at some point in the future, commercial companies will deliver support services to forces on both sides in a conflict – perhaps in the future we will need to give more thought to how we will treat contractors supporting our enemies with services and materiel.
 - 16 Sun Tzu, *op cit*, Chapter 5, 'The Posture of an Army', Page 109.
 - 17 *Ibid*, Chapter 3, 'Offensive Strategy', Page 105.
 - 18 Carl Von Clausewitz, *Vom Kriege*, 1832, translation published by Penguin Classics 1982, Page 162.

19



- 20 The complexities inherent in commanding and controlling such a capability across the boundaries of the Air, Land and Maritime components is not to be underestimated.
- 21 Information Operations in Sierra Leone included a helicopter lift of light guns that were flown across the beach, the overt movement and deployment of highly capable forces and maintaining a tough 'come and get it' attitude in the local media.

CHAPTER 3

NO REVOLUTIONS PLEASE, WE'RE BRITISH

By David Potts and Jake Thackray

'There is no weightier problem common to the General Staffs of all peaceably-minded countries in modern times than the decision for what year to plan the reequipment of its forces with a new armoury.'

Alistair Horne, *To Lose a Battle: France 1940*

"US Forces are gradually incrementing themselves towards failure."

Adm William Owens, USN (Retd), from an address to the Australian Land Warfare Conference, November 2001

Nowadays we do not have revolutions, we're British - we have a constitutional monarchy and a form of democracy that has evolved over some one thousand years. Revolutions, from the contemporary British perspective, are foreign inventions that result in the likes of Robespierre, Lenin, Stalin, Mugabe and other such grotesque and unforeseen outcomes. It is therefore wholly consistent with British national and military culture

that Liddell Hart and Fuller's thoughts and writings on the potential of armoured warfare would be slow to catch on in the UK, but would be seized upon elsewhere to devastating effect and to our very great cost.

Historical Perspective

But it was not always thus. The 14th Century saw a distinctly British Revolution in Military Affairs.¹ The longbow was the technology,² but it was not the only factor. In fact the English army at Bannockburn in 1314 was probably substantially composed of longbow-men and this defeat may have prompted a review of organisation and tactics.³ The massed archers (11,000 at Crecy⁴) worked in close co-operation with dismounted men-at-arms, whose chargers were used for pursuit after the battle was won. Crucially, the knights in the English army were paid by the King, while the French maintained the feudal model of Lords bringing large retinues of men-at-arms in discharge of feudal obligation. He who pays the piper calls the tune and so this was a key factor underpinning unity of command in the English army. The French could perhaps have taken refuge behind their city walls, but the countryside was laid waste in a deliberate stratagem to force them to come to battle on English terms.

The victories brought by this RMA were breathtaking – invariably outnumbered by around two to one, the English inflicted huge losses on their enemies at relatively little cost to themselves. In 1346 at Crecy, sixteen charges by French knights left 1,500 of them dead for minimal English losses. At Agincourt, 68

years later, Henry V's force of about 6,000 defeated a French force of 25,000, inflicting 5,000 casualties, including 500 noblemen at a cost of some 200 English casualties. A key ingredient in these astounding successes was leadership – leadership in battle, coupled with the leadership to develop and employ new weapons with new tactics and new organisations. In modern parlance, the English weaponry, organisation, strategy and tactics could be described as asymmetric.⁵ In terms of timescale, which is also instructive, the RMA can be seen to span about a hundred years.

Other RMAs have occurred from time to time – the progress of musketry is particularly insightful. The 17th Century RMA was precipitated by the matchlock musket and arguably began with the Dutch victory over the Spanish at Nieuwpoort in 1600. But it was not until the end of that century that pikemen disappeared from the order of battle to be replaced entirely by the flintlock fusil and the bayonet. Hardly a revolution in timescale, especially when one considers that musketry had been used to great effect in the Italian wars of the 16th Century – the Duke of Alba, for example, had introduced musketeers into virtually every unit in the 1550s.⁶

However, the late 16th Century saw new organisations and tactics emerge from the '*Dutch School*'⁷ with great rectangular battalions of pikemen being replaced by extended lines which gave greater flexibility to the use of cavalry, infantry and artillery and allowed more effective and sustained use of firepower by successive ranks alternating between firing and loading their muskets. These ideas were

developed further by Gustavus Adolphus, who introduced a shorter pike and a lighter musket that could be reloaded more quickly and did not require the support of a traditional forked rest. He also employed lighter artillery that could be moved about the battlefield and concentrated onto the enemy's most vulnerable points, coupled to new tactics for the offensive use of cavalry. The Swedes typically concentrated musketry and artillery against the opposing infantry, after which cavalry charges opened up the holes in the enemy lines and were followed up by the pikemen. These tactics underpinned victories for Gustavus Adolphus and his successors at Breitenfeld, Lützen, Wittstock and Jankow and gave Sweden a period of hegemony in Eastern and Central Europe.

But here again, if this period in the early 17th Century can be viewed as an RMA, we see a combination of innovations in technology, organisation, tactics and, crucially, leadership to envision, realise and employ effectively. The other striking similarity with the 14th Century RMA is the long timescale – more evolutionary than revolutionary – perhaps the modality is one of evolutionary timescale, but delivering a revolutionary outcome.

As we turn to our own era, when we think of an RMA in the information age we must ask where it all began. The seeds may have been sown in Bletchley Park, where the codebreakers gave the allies an information edge of strategic significance – but it was in America, not Britain, that the further development of the code-breaking

technology led to the computer age. Realistically, however, when we talk of the current RMA, we think of precision weapons, digital communications technology, satellites and micro-processing – which have combined to provide the technical impetus to an RMA.

The Current RMA

The possibilities offered by information age technology are tantalising. In the commercial arena those businesses that succeed have a developed understanding of how to exploit technology to commercial advantage in their field. Characteristically they innovate and adopt new business organisation and procedures without achieving the consensus to do so from every vested interest group.

But 80 – 90% of information technology projects fail to meet their performance goals. 80% of all such projects are delivered late and over budget.⁸ Commercial companies who make poor information technology investment decisions are liable to be placed at a competitive disadvantage: ultimately, they lose business and either go bankrupt or are taken over. Defence planners can ill-afford to be placed in similar circumstances. Against this backdrop, the reluctance of defence organisations to adopt wholesale, revolutionary change from platform- to network-centric warfare concepts is understandable. Military capability improvement has instead been largely dependent on incremental change to structures, processes and people in order to gain benefits from new technology, particularly

within defence organisations perceived as being successful at what they do (largely, those organisations successful in their last major conflict). Change models developed for business structures have a similar relevance for military capability. The Yetton⁹ model, for example, can be adjusted from business to military terms:

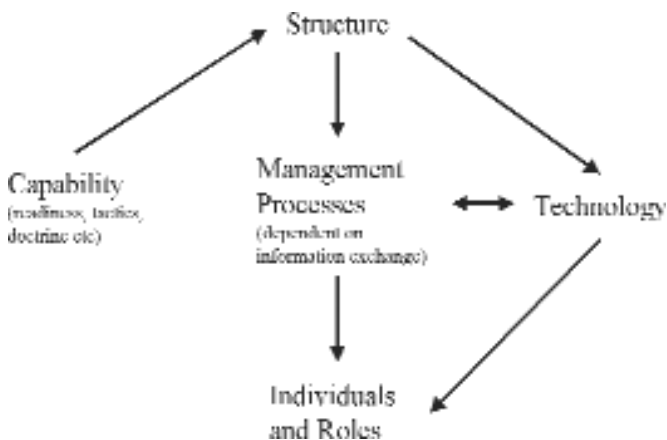


Fig 1 – The Yetton Model for Planned Incremental Change to Military Capability

In this case it can be seen that a description of military capability (such as, for example, that described in the SDR) leads to analysis and re-design of the structure which provides that capability. This re-structuring leads to change in the processes carried out within different parts of the structure, which in turn leads to a requirement for the recruitment, training and retention of people to carry out these new processes. New technology is then used to allow these people, processes and structures to provide the capability described. As such technology is introduced, user experience

allows for continued refinement of the processes, but only within the existing structure. A truly revolutionary change in military capability, however, based on emergent technology, requires the model above to be spun on its axis:

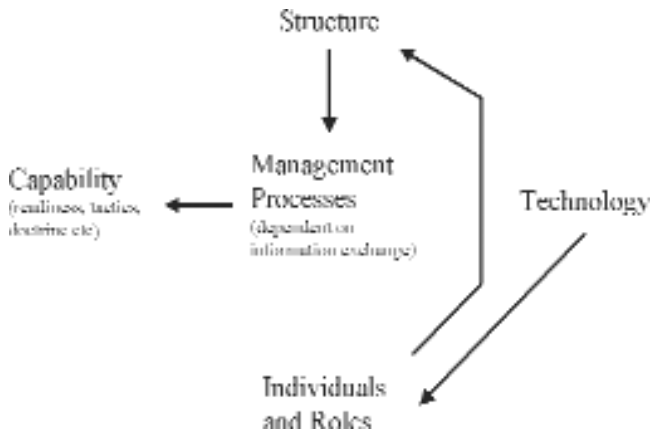


Fig 2 – The Yetton Model for Revolutionary Change to Military Capability

In this case, the existence of emergent technology forces the recruitment, training and retention of people able to envisage an entirely new structure which might allow most benefit to be drawn from it. Adoption of this new structure, just as before, forces adoption of new processes. This time, however, the capability produced has not been pre-described, and can therefore properly be considered revolutionary in nature. An historical example of such a change might be the development by the Wehrmacht of the concept of blitzkrieg.¹⁰

In this example, despite the fact that the British were the first to put tanks into the field (in 1916) and to establish a formation devoted to the

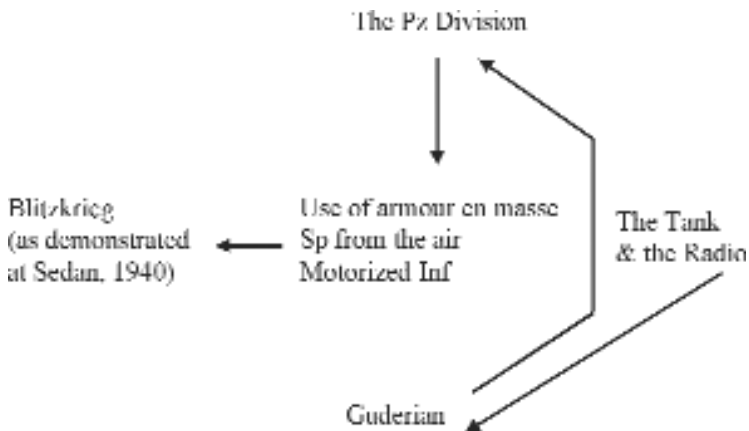


Fig 3 – The Yetton Revolutionary Change Model applied to the Development of Blitzkrieg

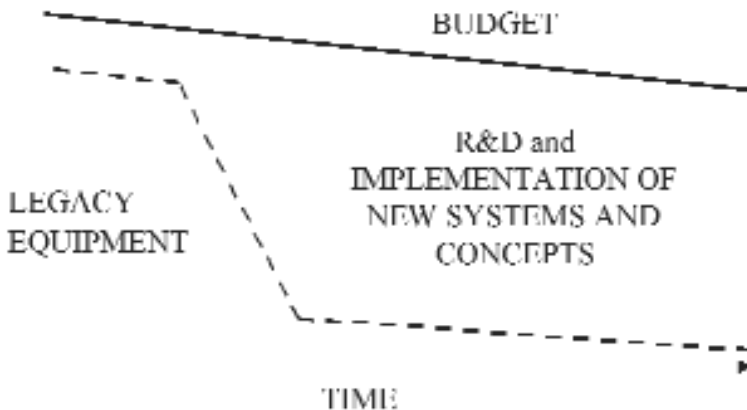
development of armoured warfare techniques, the Experimental Mechanised Force of 1927-28, a lack of resources and of commitment in the 1930s led to British capability in this area dropping badly behind in the runup to WWII. In Germany, however, Guderian's concepts, developed from Fuller's and described in his *'Achtung Panzer'* were seized upon by Hitler. Under Hitler's patronage, Guderian¹¹ was able to ensure the formation of three panzer divisions by October 1935. Process invention and refinement followed – careful and rigorous analysis of lessons from training and experimentation and from operations (Austria, Czechoslovakia and Poland) to continually innovate and develop.¹² Vindication of this revolution in warfare came with the fall of France over six weeks during May and June of 1940. Consideration of this historical example, moreover, indicates why such revolutionary change is difficult to achieve in successful military organisations. The impetus to

the development of all the elements of blitzkrieg was the defeat and humiliation of World War One and the size and capability restrictions placed upon the German Army by the Versailles treaty. Technology-based revolutionary change was a catalyst in a complex environment that included racist ideology, expansionist strategic intent and a military command culture of *'Auftragstaktik'*. Again, as with earlier RMAs, we see a dynamic synthesis of innovative exploitation of technology, allied to new doctrine, organisations, tactics and outstanding leadership. Similar circumstances did not prevail in either the French or British Armies, neither of which had the added impetus of recent national defeat and humiliation.

From the above analysis, therefore, it is evident that true revolutionary change in military capability cannot be planned for, but merely envisioned by forward-thinking theorists and developed towards over time, possibly decades. By and large, successful military organisations during periods of relative peace do not make large-scale shifts in funding and investment based on the musings of theorists: instead, proven technologies are used to allow incremental change. If Network Centric Warfare concepts are to be developed in order to better assess the revolutionary claims of their adherents, therefore, some method must be found of bearing the enormous costs of such development.

One European nation, for example has taken a conscious decision to let go (literally sell off) legacy capabilities that have no utility in the NCW concepts emerging for the information age, in order to be able

to invest adequately in more future-proof capabilities. The consequent defence spending profile is illustrated below:



But is the choice really that stark? What is NCW? Is it just American jargon, or is there substance to the concept that demands our attention?

Martin van Creveld, for example, mapped out the development of command into broad stages.¹³ He postulated a long 'Stone Age' period – everything pre-dating the Napoleonic system. Thereafter, he maps out progress with relatively rapid technological advance: the telegraph (American Civil War and Wars of German Unification), wire (World War One), radio (World War Two) and finally computers and helicopters of the Vietnam era. It might be tempting to imagine that digital technology primarily constitutes the next stage in the evolution of command. That its exploitation in the military

environment is essentially a communications, information system or staff process issue – the substantive outcome of which will be a more effective command and control system – and that it can be left primarily to those responsible for developing our command and control systems. This is emphatically not the case. Information age technology will allow us to fight in an entirely different way, if that is what we chose to do.

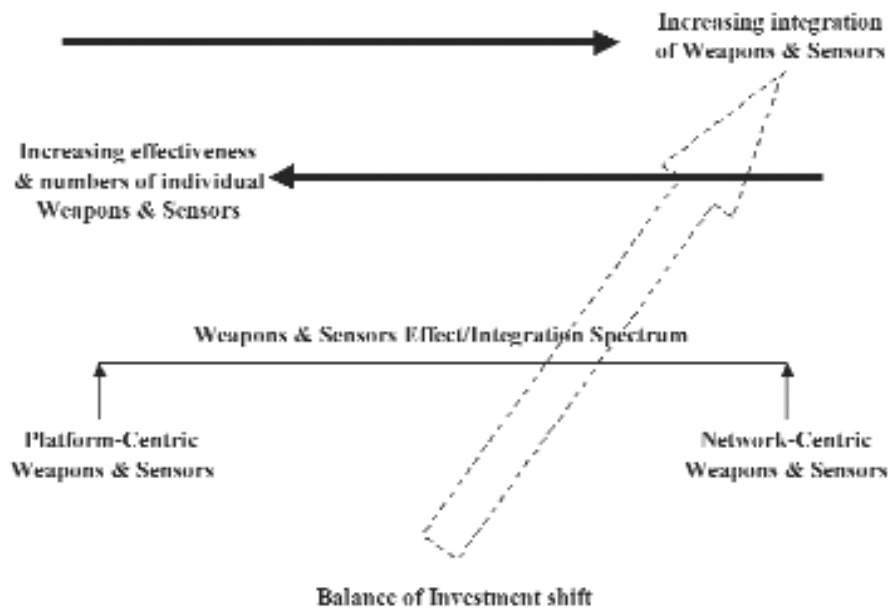
A robustly networked force will be integrated vertically by the network, through all command echelons – strategic to tactical and down to the lowest tactical level. It will also be integrated horizontally across all functions and components. The network will abolish constraints of geography, enabling robust integration throughout a theatre of operations and between theatres of operations – this will become especially important as enemies increasingly seek to operate outside the compartments we would wish to set for the battlespace. Finally, the network, through the immediacy of information, abolishes time delay between an event and knowledge of it, giving everyone the same ‘*event horizon*’ in time regardless of distance.

Over time, information age technology will allow effects based operations in a single integrated joint battlespace. The emphasis will be on exploiting networked capabilities to apply integrated joint effects to precise effect – which is not to be confused with precision, because an area weapon might be necessary, depending upon the desired effect! Potentially, any combination of means could be

brought together at will at any time and place in the battlespace in order to achieve a specific effect. There will be greater emphasis on connectivity between sensors, weapon platforms and C2 nodes and less emphasis on numbers of weapon platforms. As the balance of capability shifts from reliance on mass (platform centric) to reliance on effective integration and connectivity it becomes '*network centric*'.

The diagram on page 41 could be argued ad absurdum; it would clearly be nonsensical to imply that only tiny numbers of networked weapons and sensors are required. On the contrary, significant numbers are required and they are expensive. There is therefore a fundamental balance of investment shift required in every equipment project. In a '*platform centric*' environment the determinant is to ensure that the platform being procured is the best possible – that it has the best gun, ammunition, protection, engine and other platform specific features. The second determinant is to acquire as many of these platforms as can be justified and afforded. In a '*network centric*' environment the primary consideration becomes acquiring '*network-ready platforms*' that can be networked with other weapons and sensors and C2 nodes. By being part of the network the platform is more effective than either intrinsic platform capability or absolute numbers would provide.

This shift in emphasis is of such fundamental importance that it needs to be mandated as acquisition policy in any armed force that is serious about exploiting NCW and related concepts.



NOTES

- 1 C J Rogers, in Knox and Murray Ed, *The Dynamics of Military Revolution 1350-2050*, Cambridge University Press, 2001, Pages 15-34, of which this paragraph is a short précis.
- 2 Cannons were also used at Crecy (10 of them), but their effectiveness is not known.
- 3 The Flemish victory at Courtrai is widely recognised the genesis of the idea that, suitably organised, dismounted men-at-arms could defeat mounted knights.
- 4 At Crecy, the English fielded 3,900 knights, 5,000 men-at-arms and 11,000 archers. The French fielded 12,000 mounted knights, 6,000 Genoese cross-bow men and some 20,000 local militia and footsoldiers, plus a 'division' of cavalry under King John of Bohemia.
- 5 This is asymmetry within force on force warfare, as opposed to asymmetric warfare – a wider concept explored in Chapter XVII.
- 6 S J Lee, *The Thirty Years War*, Routledge, London, 1919, p 43.
- 7 Maurice of Orange, William Louis and Count John II of Nassau.
- 8 OASIG/DTI report to the Economic & Social Research Council UK, Jan 96.
- 9 Professor Philip Yetton of the Australian Graduate School of Management has written widely on leadership style, decision-making and information technology. 10 This historical example and the factors surrounding the development of Blitzkrieg have been much simplified in order to make this particular point concisely. Nonetheless, the tank was the cornerstone equipment of Blitzkrieg, and Guderian both its chief architect and executant. See, for example, Liddell Hart, *The Other Side of the Hill*, 2nd Ed, Cassell & Co Ltd, 1951.
- 11 Guderian was a career Signals officer.
- 12 Murray and Knox, op cit, pp 154-174.
- 13 Martin van Creveld, *Command in War*, Harvard University Press, Cambridge MA, 1985.

CHAPTER 4

THE HOLY GRAIL

By Jake Thackray

As it begins to *'digitise'* its command and control systems, the British Army will enter the information age. The benefits of this investment will pervade every aspect of military effectiveness; some potential benefits have yet to be imagined. There will be improved decision-making (better decisions faster), resulting in improved combat effects and, consequently, more advantageous outcomes in battlespace engagements. Initially, we will be better at operating in the way we do now, but over time, new concepts will become possible. This chapter therefore considers the initial benefits of digitising command and control systems and then looks ahead to longer-term possibilities.

Doing Things Better

To begin with, to aid understanding, it is necessary to think of the potential benefits of digitizing command systems in the context of the terms of reference within which we understand command and control now. In order to exercise command effectively, commanders at all levels must make timely decisions and take appropriate action. The outcome of digitizing the command system must be to inform, make, disseminate and act upon better

decisions faster. In terms of our present understanding of decision making models, the benefits sought for decision making and action can be understood with reference to the decision-action cycle – Observe, Orientate, Decide, Act – (the so called OODA Loop¹). The outcome should be an accelerated and qualitatively improved Decision/Action cycle, resulting in a significant, although as yet unquantified, capability enhancement to combat forces.

- **Observe** is primarily concerned with the collection of information on enemy forces and the environment. It requires a robust mix of ISTAR sensors on a variety of platforms, ranging from space-based systems through aerial to terrestrial systems.
- **Orientation** has two aspects. The first is the processing (collation, evaluation, analysis and dissemination) of the information provided by the ISTAR systems, including turning information into intelligence. This requires robust and effective C4I. The second aspect is the collection and processing of information on the status of own, friendly and neutral forces and agencies. The integration of both aspects = situation awareness (the understanding of the operational environment in the context of the commander's mission).
- **Deciding** requires the time and ability to think, plus the effective presentation of accurate, timely and relevant information, the capacity to seek supplementary information and freedom

from information overload through effective Information Management (IM) techniques.

- **Act** includes the rapid formulation and dissemination of orders and instructions through robust and effective C4I. Digitization should greatly enhance the commander's freedom of action by giving him greater scope in time and space and enabling the more rapid and effective focusing of integrated combat power.

The OODA loop model has limitations, not least of which is that it could be argued that it really begins with decide - decide what to look for, or at. It also has limitations as a model for C2 in the information age, when collaborative planning occurs simultaneously across functions and in several layers of the command structure. Similarly, the idea of competitive OODA loops breaks down in Other Operations, where the modality can be to spend a lot of time considering what to do and then having decided, chose one's moment to act in the most opportune circumstances. Some of these limitations of the OODA loop are returned to later.

Nevertheless, it is envisaged that these anticipated improvements to the decision-action cycle will in turn yield improved combat effects – specifically tempo, surprise and survivability, leading to better tactical outcomes. For example:

- Tempo is the rate or rhythm of activity relative to a conventional, symmetric enemy. The effective exploitation of situational awareness will enable better and faster decision-action relative to that of such an enemy allowing a commander to 'get

inside the enemy decision-action cycle' – a key objective of mission command – by exploiting information and acting upon it before the enemy has time to react. Linked to this, simultaneity seeks to overload the enemy commander, who is attacked or threatened from so many angles at once that he is denied the ability to concentrate on one problem at a time, or even establish priorities between problems. This can be achieved through better collaborative planning between components and levels of command and by the improved execution of co-ordinated action throughout the battlespace. Improved tempo is one of the single most important dividends from digitising the command system, consequently any attributes of a digitised force (platforms, structures, tactics) that inhibit tempo should be eschewed and those that enhance tempo should be embraced.

- But while increased tempo is the key benefit, other wide-ranging and linked benefits include: **surprise**, increased **lethality** and **survivability**. Surprise can be achieved through improved integration and more timely dissemination of intelligence, which will enhance situation awareness and tempo, enabling timely pre-emptive action and the apparently sudden massing of effects. Improved tactical agility in theatre will be based on situational awareness, greater tempo, quicker reaction and adaptable Combat Service Support. Lethality will be improved through the integration of ISR and firepower, including robust and effective sensor/decider/shooter links, better weapon

selection, rapid fire-planning and reduced speed of engagement timings. The emphasis will be on massing effects for the minimum decisive period through better synchronisation of indirect fire, direct fire, Close Air Support, Aviation and offensive EW. Longer-range precision engagement of targets will be enabled by new weapon and ISTAR capabilities entering service. Survivability will be improved through superior situational awareness, effective Combat ID,² increased tempo, improved C4I redundancy and resilience to command and control warfare. This will allow superior risk management, greater dispersion and hence reduced losses of both equipment and personnel.

These benefits can be said to flow from an overriding condition, described variously as information superiority, knowledge superiority, decision superiority or cognitive dominance. This is a condition where superior decisions and consequent battlespace actions are allied to superior information operations and perception management to create conditions where the adversary is frozen out of all options at all levels and is reduced to a condition of decision paralysis, cognitive inferiority and near perpetual surprise. The enemy is unable to manage the tempo of operations, or to effectively anticipate and proactively counter one's actions and he is psychologically isolated in the battle for perceptions both abroad and in his domestic constituency.

Doing Better Things

As we build on the initial introduction of digital technology, we will deepen our understanding of the technology and the challenges and opportunities it presents. In the US, the move toward entirely new C2 processes and structures has been described within the concept of Network-Centric Warfare. The key elements of the NCW Concept are: that a robustly networked force improves information sharing; that information sharing enhances the quality of information and shared situational awareness (SA); that shared SA enables collaboration and self-synchronization, and enhances sustainability and speed of command; and that, finally, all these in turn dramatically increase mission effectiveness.³ Adherents to NCW concepts have recognised that these do not yet represent a fully-developed warfighting capability; indeed, embodiment of these concepts has been described as '*...(a) monumental task (which) will span a quarter century or more*'.⁴ The risk inherent in attempting to embody these concepts, during a period of static or contracting defence budgets and competing priorities, is obvious. The cost, and loss in short-term capability required for any future shift in investment away from traditional areas (which NCW theorists have described as platform-centric capabilities), would be significant. Furthermore, such costs would be borne merely in order to explore the new capabilities which NCW might offer. Military planners are largely conservative by nature: a logical response to the unlimited potential consequences of their failure. Given that a revolution cannot, by

definition, be planned for nor achieved in stages, it appears highly unlikely that the truly revolutionary concepts envisaged within the theories of NCW will be achieved in the timeframe, unless some method of developing these within existing resource constraints is achieved. This is, arguably, the key research and development challenge facing modern military forces over the next two decades.

Unless a significant level of disruptive experimentation takes place, the coherent development of equipment capabilities to enable NCW will not occur. It is now widely understood that a properly planned and resourced joint experimentation strategy will be essential, otherwise we confine ourselves to the realms of hypothesis. Warfighting experiments will be essential to support the development of networked capabilities. The US experience with large-scale experiments suggests that the expense involved in establishing networks above the critical mass required prevents such establishment on a sufficiently regular basis to allow for assured conclusions to be reached. The UK experience, in merely attempting to establish a '*digitization focus*' within an existing deployable brigade demonstrated the difficulties inherent in resourcing experimental forces by the dual-hatting process. Multinational co-operation might offer one solution to this problem and in any event must be part of any effective experimentation strategy in an era of multinational expeditionary operations.

Much of that written about NCW hitherto has focussed on the use of information-age capability packages to improve existing military

effectiveness: in other words, process improvement, rather than process invention. The process improvements described make obvious good sense: few military theorists or practitioners would debate the value of greater situational awareness, allowing for better collaboration between disparate force elements, contingents and components, and thus increasing tempo. It is the wider, unproven assertion of the NCW theorists – that greater integration of C4ISR across time, space, function and echelon will allow for self-synchronization⁵ and thus the potential for a fundamental re-assessment of how the chain of command is used to direct military activities – that might truly be considered revolutionary in nature. The combat power delivered by forces, so networked, will be greater than the sum of the parts. This assertion appears revolutionary precisely because it makes little sense to military organisations defined by their existing hierarchical processes.

At the heart of the so-called NCW revolution is an emerging recognition by its adherents that the OODA Loop, used above to define the C2 process in military hierarchies, is not a model best suited to describe this process in the Information Age. The OODA Loop is too simple to model correctly the differing C2 processes, both in terms of function and timescale, which are carried out by HQs at differing levels of command. As a result, the assertion continues, the capabilities and functions managed at each of these levels are stovepiped and largely uncoordinated. An information age approach to

C4ISR, however, allows for the model⁶ in Figure 1 to be adopted.

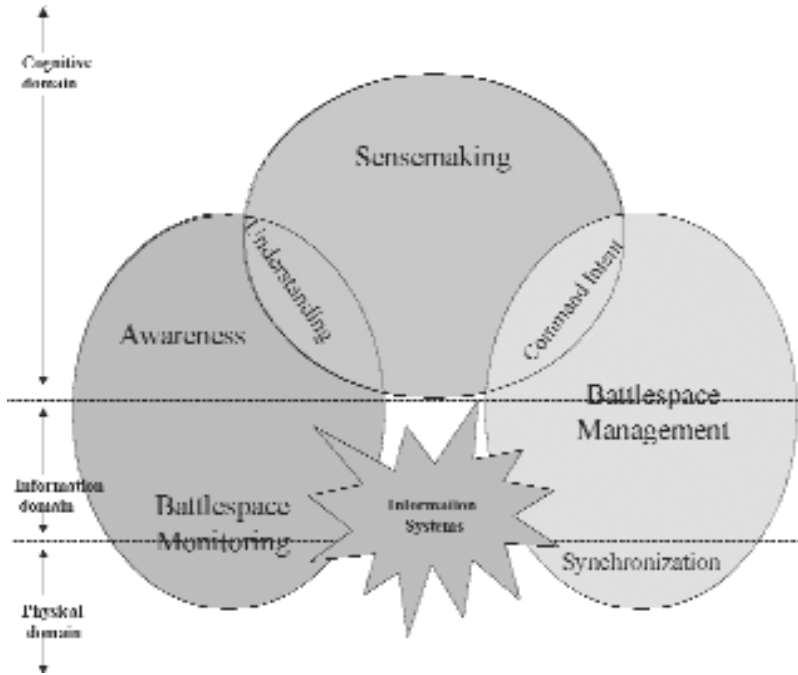


Fig 1 – The Information Age C2 Process⁷

In the model, three domains define military activity: the physical domain, consisting of the operating environment (all battlespace entities outside C4ISR processes and systems), the information domain (the C4ISR processes and systems themselves), and the cognitive domain (the minds of the participants – where perceptions, awareness, understanding, beliefs and values reside, and where, as a result of sensemaking, decisions are made). Within these domains, the

C2 process is adaptive, and consists of a number of interacting elements:

- **Battlespace Monitoring.** In the physical domain, monitoring systems of all kinds provide reports on the environment, friendly, enemy and neutral forces. These reports are then fused (either automatically or manually), transmitted, received, stored and displayed by systems in the information domain.
- **Awareness.** Awareness is the quality that the cognitive domain brings to the information provided by battlespace monitoring. It is a filtration of this information by the cognitive process – by previous knowledge and beliefs about the current situation.
- **Understanding.** Understanding follows awareness. It is a recognition of what the filtered information presented actually means – in essence, it is the ability of the brain to ‘lift the fog of war’: to correctly perceive the current situation and to understand its significance.
- **Sensemaking.** Once understanding has been achieved (and the amount of understanding required will be subjective, and dependent on the time available for cross-referencing information with other sources) sensemaking takes place. This is the process by which an understanding of the current situation is allied to a sense of how the situation might develop, how such development will impact on the end-state required, and what activity must take place if the required end-state is to be

reached. The completion of the sensemaking process is the making up of one's mind – arriving at a decision.

- **Command Intent.** Command intent is the outcome of sensemaking. It usually consists of a communication from commander to subordinates concerning the current situation, the end-state required and the steps needed to achieve it.
- **Battlespace Management.** Battlespace management is the process by which command intent – its first element – is translated into activity in the physical domain by force elements. It consists of action in the cognitive and information domains to pass instructions, directives, plans and orders to subordinate formations.
- **Synchronization.** Synchronization completes the process. Force elements, aware of what they are to achieve and supported by appropriate enablers, attempt to achieve the end-state described.

NCW terminology apart, there is, arguably, little to differentiate between the above model and the OODA Loop. Adoption of this model, however, and the richer concepts it contains, allows for a better understanding of the capability improvement offered if an information age C4ISR network is superimposed upon it (next page).

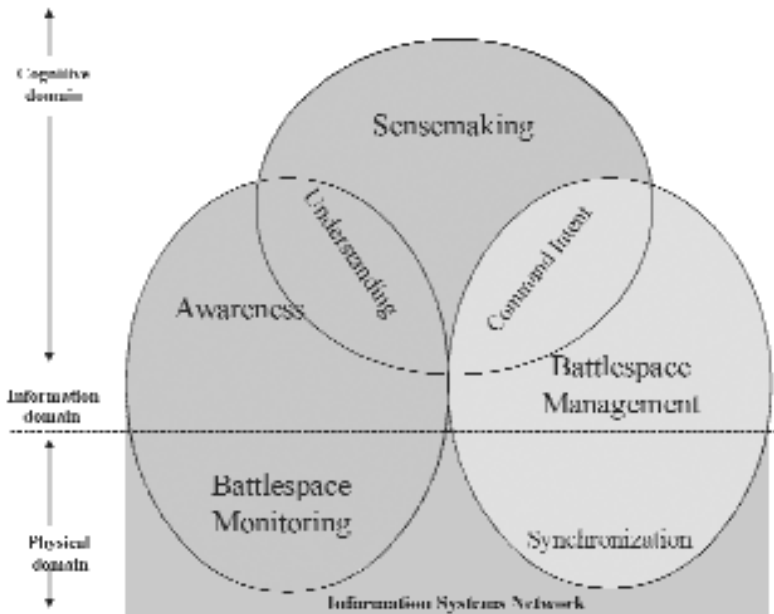


Fig 2 – Networked Information Age C2 Process⁸

The imposition on the above model of an information-age C4ISR network has the effect of ‘squeezing’ the activities in the cognitive domain – ie those activities which must take place before effective battlespace monitoring (now achieved through an ISR system of systems) is translated into effective battlespace management (now achieved through a seamless information grid). This means far less time is spent in preparing force elements for synchronization, because the C2 elements in these very units are privy to the same quality of information (and through collaborative working techniques the same decision-making processes), as their superior HQs. Effectively, they are able to prepare

themselves for action before being ordered to do so. Ultimately, as ISR capabilities and those of the information grid increase, this ‘squeezing’ effect would result in the battlespace monitoring and battlespace management ovals merging, allowing for immediate self-synchronization. Such self-synchronization would imply that the understanding-sensemaking-command intent oval would now be superfluous at that particular level of command, thus allowing for removal of that level. This is a revolutionary concept.

This improved understanding of the higher commander’s intent and a more developed and widely shared understanding of the operational situation at all levels of command should, it might be argued, provide the conditions in which mission command should flourish. It should also enable a force to achieve an unprecedented tempo of operations and effectiveness of manoeuvre and engagement.

Martin van Creveld and others believe that those who propound such revolutionary concepts are self-delusional. He argues that technologically-advanced command systems have never lived up to their promise of producing greater battlefield(space) certainty. Firstly, because warfare and the human activities within it are as often irrational as they are otherwise; and secondly, because warfare consists at its heart of a clash of wills, each with relatively unconstrained freedoms of action. Finally, he points out the self-defeating dilemma – that more information takes more time to process, meaning that at some stage in the

decision-making process intuitive judgement takes over (even if this is the intuitive capability to know when *'enough is enough'*).

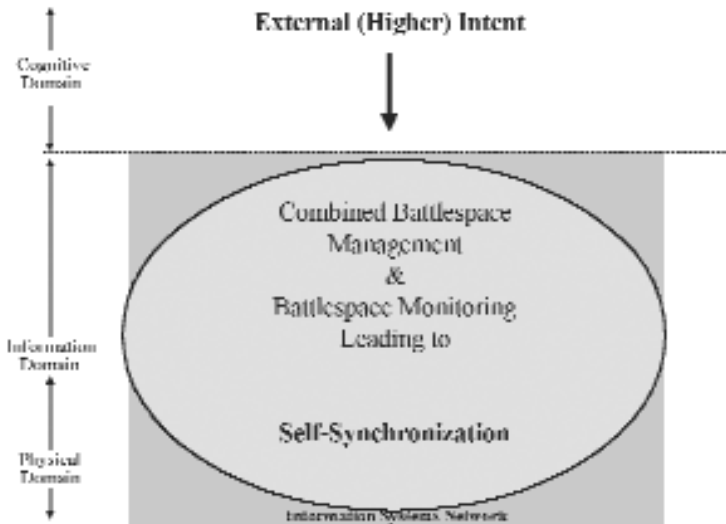


Fig 3 – Self-Synchronization and Command De-Layering

If, however, we are to believe that a technological revolution has taken place, and that van Creveld's views pre-date it,⁹ then NCW and its underlying concepts such as self-synchronization must be further investigated and developed. Candidate technologies include, but are not limited to: asymmetric communications methods (in order to allow for rapid dissemination of battlespace monitoring and management information); adaptive, self-managing networks (in order to allow force elements to quickly transit between *'superior'* entities in order to seize fleeting opportunities whenever they occur); a range of novel

communications bearers, antennas and electronic warning and defensive systems (to provide the ubiquitous information grid required for self-synchronization); and artificially-intelligent decision support systems.

The resultant command system will be characterised by a robust network of weapons, sensors and decision nodes. This in turn will lead to a networked combined joint force operating with agility and fleetness of foot, through delegation of execution within the command intent to the lowest practicable level. The entire combat power of the force will potentially be at the fingertips (pressel switch) of every individual soldier. This is the antithesis of the centrist *'long screw driver'* so many fear will be the outcome of digitizing the command system. But it is in the realisation of concepts such as self-synchronisation that the benefits of information age technology lies. This has particular relevance to the increasing emphasis on medium and small-scale operations in the prevailing strategic environment.

Experimentation will be the key to successful innovation and the key to successful experimentation, like all good things, will be to do it a little and often. Large-scale occasional binges will also be required, but the conditions for success should be set by a preceding series of smaller more focussed events to address specific issues. The potential impact of NCW might, therefore, be revolutionary, but the approach to realising it must be evolutionary and will take some time. Equally, however, we will also fail if we remain in our intellectual comfort zone and do not attempt to grasp

some of the more challenging concepts and possibilities that require us to *'think out of the box'*. This means that some disruptive largescale experimentation will be required that has little or no current training value because the capabilities and organisations envisaged in the experiment are not in being. We need to be open to envisaging entirely new ways of doing things and to rise to the doctrinal, organisational and cultural challenges thereof.

NOTES

- 1 The OODA Loop was derived from Lt-Col Boyd's observations on his own decision/action cycle as a USAF fast jet pilot fighting MIG-15s in the Korean War. It remains a useful tool but its limitations need to be understood.
- 2 Combat ID lessens the potential for fratricide. It is achieved through a combination of Tactics, Techniques and Procedures (TTP), Target Identification (TID), and Situational Awareness.
- 3 *NCW Report to the US Congress*, US DoD, Jul 01.
- 4 *Ibid.*
- 5 'Synchronization' in UK parlance, might be described as 'integration': the ability of disparate force elements to better support the activities of others, and in doing so create a synergistic effect.
- 6 This is a summary of the issues explored in more detail in Alberts, Garstka, Hayes & Signori *Understanding Information Age Warfare*, CCRP, Aug 01. (Download from dodccrp.org).
- 7 By kind permission of Dr David Alberts.
- 8 By kind permission of Dr David Alberts.
- 9 Command in War was written in 1985, well before NCW and the current RMA had been identified.

CHAPTER 5

NEO HEROIC COMMAND

By David Potts

*It was not the Legions that crossed the Rubicon,
but Caesar.*

Napoleon

*...he doth bestride the narrow world
Like a Colossus; and we petty men
Walk under his huge legs and peep about
To find ourselves dishonourable graves.*

William Shakespeare
Julius Caesar, I, ii, ll 134-7

John Keegan described commanders in the Cold War nuclear age as ‘*Post Heroic*’²¹– the imperatives of Mutually Assured Destruction and the static command infrastructure required commanders who were the very antithesis of the heroic Alexandrine model. An exception, arguably, was president Kennedy, a charismatic Commander-in-Chief in the heroic mould. However, it is doubtful whether the general public could name even a handful of senior military men from this era – in the US, Al Haig perhaps, but more so for his role as Secretary of State than as SACEUR; MacArthur of course for Korea and Westmoreland for Vietnam. From a British Army perspective, during the Cold

War there was a stove-piped UK national chain of command to Corps level and thence to the Northern Army Group, which was commanded by a UK 4-Star. In the UK today, the odd Cold War era GOC Northern Ireland might be remembered – Harry Tuzo for example, and others who commanded adventures outside the Cold War mainstream (Woodward and Thompson in the Falklands), but generations of senior British, NATO commanders have vanished into obscurity.

However, the end of the Cold War has heralded a new era of expeditionary operations that have imposed enormous challenges on our senior commanders, catapulting them into chaotic and dangerous situations in distant corners of the world² and, through television, into the homes of the nation. It is the synthesis of these special circumstances with the impact of information technology that defines the nature of command in the information age.

General Schwarzkopf heralded this new model – both he and the war he commanded were portents of what was to come. Whilst remaining more or less in his '*bunker*' in Riyadh, he nevertheless galvanised his forces, the Middle-east region and the coalition, while astonishing the world with Patton-like orations, illustrated by videos of the latest precision strike and beamed to a global audience his predecessors could never have imagined reaching. He commanded the last cavalry charge of its millennium and at the same time lifted the curtain on a new way of warfare for the 21st century.



British armour in the Gulf War

Although there have been a number of notable exceptions, the forces taking part in contemporary operations have been characteristically multinational in nature, usually *'coalitions of the willing'*. Coalitions must be built and maintained, capitals consulted, policy influenced, governments and heads of state in the theatre of operations assuaged and cajoled and a kaleidoscopic variety of military capabilities, cultures and agendas forged together. This brings special challenges for commanders today, and in the future, requiring what can only be described as *'vice-regal'* commanders³ in the mould of the long British tradition exemplified by Marlborough at Blenheim, Wellington at Waterloo, Mountbatten in the Far East and Alexander in Italy.

This chalice is not just passed to senior commanders, but, in the UK Armed Forces, is routinely passed to one-star officers, either as commanders of the standing Joint Force Headquarters, or to formation commanders whose headquarters are now routinely tasked to take on

the JFHQ role. In Sierra Leone, for example, Brigadier David Richards⁴ and his one-star successors there worked alongside the UK Ambassador in direct support of the Sierra Leone government, while shoring up the UN forces and commanding a UK joint force that fluctuated to some 5,000 personnel. As the commander on the spot, his actions shaped the strategic outcome of this national expeditionary operation. His progress could be followed daily by his political masters and by an interested viewing public. Even this apparently national operation had a fundamentally international flavour with UN involvement and the keen interest of Sierra Leone's neighbours.



**Gen Sir Rupert Smith (DSACEUR)
(right) with Lt Gen Reith, Task Force
North, Albania**

Leadership of the Allied Command Europe Rapid Reaction Corps (ARRC) has given UK commanders the opportunity to command expeditionary operations in a NATO non-Article V context (General Walker in Bosnia and General Jackson in Kosovo). But we have also provided senior commanders to major UN (Generals Rose and Smith in UNPROFOR) and OSCE (Maj Gen Drewienkiewicz in the Kosovo Verification Mission) operations. This is unsurprising – as a nexus power⁵ the UK is uniquely placed to perform a coalition-building role, providing both the political and military leadership for coalition operations. The UK's position, in geographic, linguistic and historical terms make it well-placed to play a leading role in

multinational military effort, and it is the central pier, both physically and intellectually, in the Atlantic bridge. International legitimacy will continue to be a political imperative for most operations, and as long as the political advantage offered by multi-nationality outweighs the military friction inherent within it, such operations are expected to be the norm in the future. This places especially demanding challenges on our commanders, who will require more than a touch of ambassadorial diplomacy, saintly perseverance and Churchillian strength of character.



Brig David Richards, Joint Task Force Commander, with the UK Ambassador to Sierra Leone and political and civil affairs advisors

Contemporary and future conflict will bring commanders some relatively new challenges and frictions, including political and legal constraints, media interest and the immediacy of information. This applies to any military involvement in all forms of conflict, whether undertaken on a national or multinational basis. War is an instrument of policy.⁶ Forces will be deployed on operations, of whatever scale and intensity, to achieve a political purpose. Political control and involvement is therefore both inevitable and legally necessary⁷ – interference and

involvement from the highest level in tactical issues is to be expected.⁸ Developments in communications now allow open video links between capitals and Theatre headquarters; Ministers, senior officers and officials will want to use them, and to speak to commanders, not their senior staffs. This may also apply to those in alliance or coalition capitals – the demands on the commander's time and attention are obvious. Commanders will need to be remarkably astute to avoid the innumerable political bear traps.



Gen Sir Michael Rose at Gorazde

Nevertheless, a commander should receive his formal political control from the international body under whose auspices the operation is being conducted. This could be from, for example, the UN, OSCE, NATO, EU or an ad hoc coalition – with each organization having a widely different capability to focus the political intent of its membership into the kind of guidance military commanders need. As one COMARRC observed, *'Political guidance can be really helpful – if you get*

it.⁹ Decisionmaking can be tardy at the strategic level: KFOR, for example, did not receive a NATO ACTORD until 10 Jun 99, by which time they were largely deployed in Macedonia, under national funding arrangements. Continued efforts are required to mature the Pol/Mil interface and C2 capability of international organizations, especially the UN,¹⁰ so that they can provide the kind of guidance military commanders need. Commanders will be required to operate in circumstances where the situation on the ground is complex, even chaotic, and the political guidance received is unclear. This calls for great wisdom and perspicacity.

Other Operations are increasingly multifunctional, and not necessarily dominated by a military agenda.¹¹ Diverse friendly and neutral actors are present on such operations. These agencies become additional points of contact for the commander, placing additional demands on his time and attention, and can have a significant impact on military planning and the outcome of key aspects of an operation. Commanders should be prepared for this impact, both by pre-deployment and institutionalised training, and supported by the better integration into multinational HQs of military or deployable civilian staff with expertise in these areas. More importantly, the complexity of Other Operations requires an *'integrated'* approach to the political, diplomatic, military, civil, legal, humanitarian and economic lines of operation. Commanders need to be able to think and operate across the full breadth of all lines of operation, creating unity of effort amongst all those involved.

Contributing nations, in both warfighting and other operations, will have their own national perceptions and political agendas. The commander of multi-national forces will need to be alert to this and will have a key role in promoting coalition cohesion and *'keeping everyone on-board'* – this is, in a sense, a classic *'rear operation'*. Timely liaison will be required with troop contributing nations' capitals, by the commander personally and by people with first hand knowledge of the operational circumstances. However, in pursuing coalition cohesion, a commander must not lose sight of his mission. Coalition cohesion will be the multi-national force's centre of gravity – opposing forces will realize this and are likely to adopt tactics to attack it: for example; Iraq's Scud attacks on Israel were probably intended to produce a reaction which might fracture the international coalition. Commanders need to recognise threats to coalition cohesion and develop proactive plans to counter them.

The realities observed in Bosnia by one UN commander will undoubtedly persist:

*'Every troop contributing nation had its own national command structure within the main UN staff, and each nation had its own political agenda as well as a chief of contingent who held the national red card.'*¹²

The need to achieve consensus on political and military strategic issues can create friction in the operational planning process and hinder the commander in allocating tasks and responsibilities to his force elements. Generating an effective and

harmonious headquarters takes time and commanders need to devote their own time and considerable personal energy to bilaterals with National Contingent Commanders and to building a close relationship with them. But however vexing modern command arrangements might be, they are unlikely to be as taxing as those in the Schellenberg campaign of 1704, which obliged Marlborough and the Margrave Lewis of Baden, as the pre-eminent national contingent commanders, to take turns as commander of the allied force on alternate days.¹³



Senior officers from five contingents working together

It is apparent, therefore, that the commander's time and energy will need to be directed towards dealing with the political level in various capitals and international bodies, building cohesion within the force through his personal efforts, interfacing with an increasing range of agencies and players in the battlespace and rising above the pressures of the media. Ever-increasing demands on their time and attention will challenge commanders to prioritise their own activities on matters additional to the

'normal' military business of operational command. Additionally, for linguistic and other reasons, subordinate national contingents may also need more time than is usual to comprehend and act upon their orders. This means the commander may have less time than he would expect for his own decision-making and planning; HQ ARRC, for example, operate on a $\frac{1}{4} - \frac{3}{4}$ rule rather than $\frac{1}{3} - \frac{2}{3}$.¹⁴



1st Bn Coldstream Guards, Vitez. 1993

A key challenge for commanders of multi-national forces is that of forging a common purpose across the breadth of outlook, training and capability found in the coalition. A number of tensions and frictions add complexity to the already daunting task of achieving unity of effort. Commanders must mesh different national doctrines, weapon systems, logistics and degrees of military expertise together, ensuring equality of risk and suffering across the coalition, playing to the strengths of the national contingents to make best use of expertise, capabilities and command states. They must also, somehow, ensure that the excellent performance of

some contingents is not seen in relation to under-performance by other contingents.

Operations are also inherently joint in nature. Operational Level commanders will be faced with an especially complex task of integrating multinational joint capabilities. C2 tempo and culture will vary significantly between services within individual contingents. There may also be widely varying degrees of *'jointery'* with some contingents being in stove-piped components, and this could impact on the commander's ability to conduct truly joint campaigns and thereby generally add to the frictions of command.

Arguably, in political terms, the importance of an operation will be directly proportional to the level of media interest, rather than to the scale of the operation. Operations will be conducted under the full and real time glare of the world's media – particularly when offensive operations are underway, casualties are taken, or setbacks occur. Commanders must be able to handle the international media directly and through appointed staff. This can be a matter of personal style, in that some commanders (General Smith) have preferred a staff interface, whilst others (General Rose) appeared to favour direct personal engagement with the media. Regardless of personal style, the battle for public opinion may mean added pressure for the commander himself to interface with media, rather than leaving it to a spokesman; but preparing properly for a press conference or interview can be tedious and time consuming. All commanders in expeditionary operations will require a responsive

and comprehensive media operations capability, including staff, communications and IS.¹⁵ It will continue to be vital to transmit information rapidly to the strategic and political levels of command in order to counter potentially adverse near-real-time media reporting. The use in media briefings of imagery from the theatre of operations is now common. The burgeoning demands of Information Operations Campaigns may also be expected to increase in the future. This vital requirement brings with it the added pressure of ensuring that all constituencies – including multinational contingents – in the Area of Operations are addressed appropriately.

Targeting can be a highly political activity. From our own national experience, the sinking of the *Belgrano* stands out as a stark example with political resonance nearly 20 years later. Involvement of the political level in targeting is to be expected and catered for in circumstances where the attack of the selected target, or the means chosen to attack it, can be expected to have a political impact. The less intense the operation, the more likely that the political level will be able to involve itself in targeting – and the discernible trend is very much toward less intense operations than were envisaged in the Cold War or witnessed in the Gulf. The process and procedural, including media and evidential, issues that this implies can be assisted greatly by modern communications and information technology. The most challenging aspect is the degree of implicit transparency, conflicting as it will with operational security, timeliness and other operational factors. Commanders need to be supported by staff who can

handle the political and inter-linked media dimensions of targeting and its outcome.

Peace Support Operations pitch commanders against each other intellectually and face to face. In warfighting, one could postulate that commanders, particularly senior ones, tend to sit on top of a military chain of command and direct the lower level commanders who then take the action that impacts directly upon the enemy. Commanders, in a sense, fight each other through the medium of the forces under their command. In Peace Support Operations, opposing commanders and leaders at all levels tend to deal with each other face to face. The emphasis is on personal interaction in talks and negotiations. This is backed up by knowledge of the capabilities at each others' disposal, an understanding of each others' willingness and capacity to use those capabilities effectively, and a profound awareness of the political significance of the dialogue and its impact on other factions and actors - in the theatre and outside it. Commanders will be personally tested to see how they and their troops react to specific, sometimes well orchestrated, incidents. Thus, whilst command in Peace Support Operations has innumerable similarities with command on all other forms of operation, there are subtle differences that need to be understood and prepared for. Commanders will require prenegotiation information and knowledge of their adversary's intentions, second and third agendas, options, state of mind and even the advice they have been given.

At the lower tactical level, the Balkan *'road block'* is of course the classic example of this sort of scenario.

British forces often joke that the ambition of every Serb youth was to run his own 'road block'. In the Kosovo campaign, Pristina airport was, in a sense, General Jackson's 'road block'. General Clarke has subsequently accused General Jackson of failing to see the strategic picture and of viewing the issue from the narrow perspective of an operational commander.¹⁶ In General Clarke's view, action by troops on the ground to confront the Russians was essential, both for the success of the mission and to put the Russians in their place, thereby determining the basis of NATO's relationship with Russia thenceforth. Arguably, this approach is indicative of a Cold War, or warfighting mind-set. General Jackson saw no merit in confronting the Russians on the ground – the airport had no role to play in his plans and the situation could easily escalate unpredictably, from confrontation to conflict. Instead, he established a direct personal relationship with the Russian commander on the ground and thereby altered the dynamics of the whole situation. This approach is indicative of the crucial importance of commander-to-commander personal relationships in multi-faceted PSO. Arguably, General Jackson's tactics, far from being overly focussed at the operational level, had real strategic impact and helped shape a more co-operative relationship with Russia that has paid dividends in Afghanistan and been a milestone on the road to NATO's new relationship with its old adversary.

However, the recent warfighting phase of the Afghanistan conflict has given us a quite different insight into the nature of command in the information age. General Franks has orchestrated the military

campaign in central Asia from his headquarters on the other side of the world in Tampa, Florida – surrounded, even cocooned, by literally thousands of supporting staff. His role has appeared to be closer to that of a coordinating maestro than anything recognizable as command in the heroic mould. His media appearances, initially infrequent and uncertain, became more confident as the operation unfolded and more recently he has been posing easily for the cameras with his Commander in Chief, confirming his status as the man of the moment. His command modality may exhibit many Post-heroic traits, but he could not truly be described as a Post-heroic commander – because he waged offensive operations, projecting the combat power of a super power into the heart of a far away continent. This is the antithesis of Post-heroic command. But above all else, he has exhibited the defining characteristic of all great generals – he delivered victory. He might also be illustrative of a new command paradigm for the information age – he saw and he conquered, without personally going there.

But the war also saw a more familiar, direct and tangible command and leadership style provided by others. At the tactical level, General Dostum and his fellow khans and warlords provided a kind of medieval command and leadership to their tribal armies. Junior commanders of US and British Special Forces and Marines will have undoubtedly had their leadership tested in the most challenging of circumstances. While at the strategic level, Mr Blair's presidential tour de force of personal diplomacy appeared to galvanise the coalition. Finally, as the emphasis in the conflict switched rapidly from

warfighting to nation building, Major General John McColl arrived in Kabul in circumstances he could not have imagined only a few months previously.



Maj Gen John McColl in Kabul

In ancient Greece a hero was a man of superhuman strength, courage or ability, favoured by the Gods. These are, in a sense, the qualities we demand of our commanders in the information age. Superhuman strength of character to face the immense challenges of contemporary operations and to rise above the daily frustrations and the political and media exposure. Courage to do what needs to be done in the face of critics and doubters and despite the inevitable setbacks and mishaps. Ability founded on demonstrable expertise – a track record of successful command at relevant levels in the widest possible range of operational circumstances. And favoured by the Gods – as Napoleon said when he heard favourable reports of the young Ney, *‘Yes, he might be good, but is he lucky?’* From a military perspective, the information age will be defined as much by the passing of the Cold War and the resultant blossom of conflict and terrorism around the world, as by the technology. The mask that command will wear in this era is forming as the era unfolds, but the indications are that it is already displaying many qualities that could be fairly described as *‘Neo-heroic’*.

NOTES

- 1 John Keegan, *The Mask of Command*, Random House, London, 1999 (first published 1987), pp 311 – 351.
- 2 Some not so distant – witness Brig Alec Birtwhistle in Cumbria winning the admiration of the nation in the Foot and Mouth battle!
- 3 Although historically in the UK, with the notable exception of Wellington, we seem to retire them from public life at the apex of their powers.
- 4 Now Major General Richards.
- 5 The UK is a member of the UN P5, G8, NATO, EU, OSCE and Commonwealth and is the nexus of these organisations.
- 6 Carl von Clausewitz et al.
- 7 For the UK, 'the authority of the Crown is represented by the Government of the day and in mechanisms established by law and the Royal Prerogative. A range of powers is vested by Statute and Letters Patent in the Defence Council under the chairmanship of the SofS for Defence', *British Defence Doctrine* (JWP 0-01), 5.11.
- 8 Goose Green is perhaps the most controversial example in recent British history – a battle, in particular its timing, fought at the behest of politicians to show early military success to a wavering world, rather than out of military expediency.
- 9 Taken from an after-dinner speech given by General Sir Mike Jackson, published in Gary Sheffield and Geoffrey Till (Eds), *The Challenges of High Command in the 20th Century*, SCSi Occasional Paper No 38, based on proceedings of SCSi/JSCSC/Dept of War Studies RMA Sandhurst Joint Conference, Bracknell, Oct 1998.
- 10 'The UN Secretariat is not structured to fulfil the role of what could be described as a strategic or operational level HQ' – 'Command, Control, Cohesion and Coherence in Peace Support Operations' in Sheffield and Till, op cit.
- 11 *Ibid.*
- 12 Sir Michael Rose, *Fighting for Peace*, Harvill Press, London, 1998, Page 106.
- 13 See for example, F Taylor, *The Wars of Marlborough*, Oxford, 1921, pp 147-185 and F W O Maycock, *Marlborough's Campaigns*, Allen and Unwin, 1913, pp 34-47.
- 14 This means the superior HQ uses $\frac{1}{4}$ of the time available, allowing $\frac{3}{4}$ of the time for subordinate HQs to conduct their

planning – a $\frac{1}{3}$ to $\frac{2}{3}$ ratio would be a norm in UK national operations.

- 15 Media management is a wider issue than the provision of media advisers in HQs. The UK's Media Operations Groups, which may be tailored to meet the requirements of different operations, and can include Mobile News Teams, provide commanders with the ability not just to manage the reporting of news, but to create and transmit their 'own' media reports.
- 16 Wesley Clarke, *Waging Modern War*, Public Affairs, New York, 2001, pp 397-403.

CHAPTER 6

A COMMAND PHILOSOPHY FOR THE INFORMATION AGE: THE CONTINUING RELEVANCE OF MISSION COMMAND

By Jim Storr

Introduction

British Military Doctrine espouses Mission Command, a philosophy of decentralised command based on trust and initiative. Its origins can be traced at least as far back as the Napoleonic Wars, although not necessarily in British practice. Its more immediate provenance lies in German practice in both World Wars. It was adopted formally by the British Army in 1987 and subsequently became a cornerstone of British Defence Doctrine.^{1,2}

The twenty-first century brings new challenges, new perspectives and perhaps also new opportunities. There must be some doubt as to whether a

command philosophy born in high-intensity warfare and adopted in the closing years of the Cold War retains its relevance. This chapter considers the nature and origins of mission command, discusses some of the challenges facing it, and then discusses whether it is still valid as a doctrine for British forces in the first decades of the twenty-first century.

The Nature of Mission Command

Mission Command is fundamentally a decentralised style of command, relying on initiative, the acceptance of responsibility and mutual trust. Its key elements are:

'timely decision making, the importance of understanding the superior commander's intention and, by applying this to one's own actions, and a clear responsibility to fulfil that intention. The underlying requirement is the fundamental responsibility to act, or in certain circumstances to decide not to act, within the framework of the commander's intent'.³

The key elements are those of responsibility, intent and the contract of trust. The responsibility of commanders of all ranks is well understood and established. The responsibility to act as bid is not new either; it is, in effect, duty. The identification of the commander's intent per se is relatively new, and 'intent' is perhaps an issue that still requires further analysis. However, put simply, commanders have long expressed their intent in the orders they give.

What is perhaps novel is the identification of a contract of trust. The superior trusts his subordinate to act; to act within the commander's intent; and to act sensibly in the circumstances he finds himself, which are not necessarily those the superior envisaged when composing his orders. Consequently the subordinate may act in a way the commander did not envisage, but which the commander would endorse were he aware of the circumstances. Conversely the subordinate trusts that the superior has given him the direction and resources appropriate to the job, and that the superior will support him in exercising his initiative.

The existence of a contract of trust is important. Under Mission Command superiors should state a minimum of control measures, so as not to constrain subordinates' freedom of action.⁴ This grants the subordinate considerable latitude. In an environment of trust and initiative, such latitude also speeds the production, dissemination and comprehension of orders, thus increasing tempo. Mission Command is intended to avoid the production of long and detailed orders, and to allow initiative and the seizure of fleeting opportunities. It can only work where both parties trust each other to act appropriately.

Mission Command is endorsed doctrine. This does not imply that it is '*right*' nor '*wrong*'; but that it is agreed, is authoritative, and is taught. It implies that the Services collectively wish their commanders to act in accordance with its tenets where appropriate. Importantly, it is espoused behaviour: the way the Services wish their commanders to act. Similarly it is doctrine, not dogma; hence guidance, not

instruction. It acknowledges that there may be situations where a commander does not employ Mission Command and (for example) issues long and detailed orders which tell the subordinate exactly how to act. There is a risk that such a possibility may become an excuse for not employing Mission Command at all. That eventuality would illustrate a difference between espoused and enacted behaviour.

The Origins of Mission Command

The Revolutionary and Napoleonic Wars were the first conflicts in which large bodies routinely manoeuvred separately off the battlefield, but combined to fight at the same time and place. The concept of the *'corps d'armée'* was made to work across significant distances, up to several hundred miles, with only rudimentary communications. Although campaigns might be planned in detail in advance, once corps were on the move only occasional dispatches carried on horseback could guide the actions of their commanders. Yet corps could be manoeuvred to meet on the battlefield or, perhaps more importantly, to fix or delay an enemy until sufficient strength was assembled to bring about his defeat.

Trust was clearly a key issue. Commanders-in-chief trusted their corps commanders in part because they had to. Armies were too big to move en bloc, and generals learnt to act in concert not least through hard experience. Analogous circumstances also obtained at sea. Nelson wrote to Collingwood:

'I send you my plan of attack, as far as a man dare venture to guess at the very uncertain position of the enemy may be found in; but it is to place you perfectly at ease respecting my intentions, and to give full scope to your judgement for carrying them into effect'.

Nelson's only signals at Trafalgar were, firstly, his inspirational *'England expects ...'*; secondly, an instruction to anchor after the engagement (ie, not to break into a general pursuit) and, thirdly and finally, *'Engage the enemy more closely'*. Having expressed his intent in conference prior to the battle, Nelson clearly expected his *'band of brothers'* to get on with it. And his intent was quite categoric: *'No captain shall do very badly who lays his ship alongside that of an enemy'*. Mission Command is anything but an exclusively land concept.

The provenance of Mission Command can be followed most easily in Prussian and subsequently German Army practice. Scharnhorst had taught at Staff College in 1809-14 that the French successes of 1806-7 had been won by the

'complete and aggressive responsiveness of French commanders to the will of Napoleon ..., even without orders, and miles distant'.⁵

Moltke the Elder observed the sheer difficulty of controlling armies of 200,000 men or more in the mid-nineteenth century and considered that commanders should be

'assigned general missions, related to fundamental, clearly understood objectives, and

then instructed to accomplish those missions by carrying the fight aggressively to the enemy'.⁶

After the Franco-Prussian war Moltke wrote that

'a favourable situation will never be exploited if commanders wait for orders. The highest commander and the youngest soldier must be conscious of the fact that omission and inactivity are worse than resorting to the wrong expedient'.⁷

The First World War eventually saw decision making decentralised down to the lowest possible levels. The infiltration tactics which were the German response to the conditions of trench warfare relied on the section commander, and possibly even the individual soldier, acting on his own initiative in support of the commanders' intent. On the 21st March 1918, the first day of the Spring Offensive, a German stormtrooper was captured after penetrating nearly as far as a British brigade HQ. On questioning as to his orders he said simply '*so weiter, so beßer*' – '*the further, the better*'. A more concise statement of intent would be hard to formulate. He and his comrades worked in an environment of trust: trust that his superiors would support and reinforce any penetration that they made (although in his particular case, something clearly didn't quite work).

The effectiveness of the Wehrmacht at the tactical level is almost legendary. That effectiveness, if sometimes perhaps more legendary than real, is the product of many factors. Nonetheless it seems reasonable that the Wehrmacht's command style –

‘Auftragstaktik’ or *‘mission command’* – was one such factor. The Wehrmacht’s ability to generate ad hoc battlegroups from fragments of units, to counterattack strongly even before the precise nature of a threat had been identified, and the tempo its units often demonstrated all indicate a loose, flexible and decentralised command philosophy. That philosophy is very much at odds with the stereotype of the inflexible and dogmatic German officer portrayed in films.⁸

It is perhaps a truism that the victor learns least in war; or at least that the loser learns most. It does appear that post-war British and US practice adopted little from the Wehrmacht. Indeed it was not until a generation of officers who had no personal experience of the Second World War came to power in the British Army that issues such as command philosophy even began to be considered.⁹ As Commander 1st British Corps and subsequently Commander NORTHAG (and CinC BAOR), General Sir Nigel Bagnall studied both Wehrmacht and Israeli command philosophies.¹⁰ The introduction of Mission Command into British Army practice and subsequently British joint doctrine flowed directly from General Bagnall’s work in the late 1970s and early 1980s.

Challenges in the Early Twenty-First Century

We can identify five challenges to the doctrine of Mission Command in the early part of the twenty-first century. They lie in the areas of the spectrum of

future operations; the information revolution; asymmetric threats; blame culture and litigation; and the need to sustain the human quality of the British armed forces.

If Mission Command was born in high-intensity warfare there must be a question as to its relevance to a wider spectrum of operations. The question is whether decentralised decision making, trust, responsibility, and shared intent, supporting higher-tempo operations, is relevant or appropriate in Peace Support Operations (PSO), not least because of the possibility that actions at tactical levels can have operational or even strategic impact. This possibility has been described as the concept of the '*strategic corporal*'.

The answer must be an emphatic 'yes'. The strategic corporal in PSO may be required to think just as quickly, and his action may have equally momentous consequences, as if he were being shot at. Indeed, on occasion, he may be shot at. Arguably what makes today's scenarios different is not the range of possible operations so much as the possibility of immediate and direct communications from government to section commander: a consequence of the information revolution.

The time and space aspects of the information revolution require consideration. It may be technically possible for a government minister to communicate directly with a section commander: but only one at any one time. All the other section commanders deployed in that and other theatres, and their commanders, have a job to do 24 hours a

day. Governmental involvement may be appropriate in some instances (a topic to be considered later), but across a whole expeditionary force it is simply not practical. For most commanders most of the time, the established chain of command will be their normal source of direction. Evidence from PSOs suggests that armies which are obliged to refer all tactical decisions back to national capitals cannot display the flexibility and tempo which their less constrained peers enjoy.

This is the domain of the *'long handled screwdriver'*; the ability of the senior commander, or perhaps more worryingly the government minister, to closely monitor and direct low-level activities in a faraway theatre from his desk in his capital city. In part this issue arises because *'he can'*. Not only does modern IT allow it, but the relatively low level of activity in PSO (compared with war) gives him a relatively limited range of incidents to get involved with at any one time. Therefore he can involve himself with the one roadblock, the one shooting, the one targeting decision that is happening when his attention falls that way. When conflict becomes more intense his ability to get involved in all such incidents decreases.

This might be called the Province of the Five *'Ins'*: Interest, Involvement, Influence, Intervention and Interference. Governmental interest in military activities is a sine qua non. It is highly desirable to have some ministerial involvement. Ministerial influence in military operations is normal, and not least transmitted through CDS' Directive to the Joint Force Commander. In a democracy the possibility for ministerial intervention must always

exist, not least when things start to go wrong. However, at what point do all these become ministerial interference? Is it merely when the minister insists on something with which the tactical commander disagrees?

A more reasoned view is that managing the political interface (the Sixth 'In', which encompasses the other five) is the operational commander's job.¹¹ Increasingly, not least through formal measures such as attendance at the UK Higher Command and Staff Course, senior commanders are learning to manage such political involvement. In some cases it may be a case of gently educating the ministers involved. That is far from suggesting that the problem will go away, and never recur. But it does suggest that Mission Command can, and should be allowed to, prosper. To do so senior military commanders must manage the Five Ins, allowing junior commanders to do their jobs whilst ministers do theirs.

Asymmetric threats are a further issue. Much of the high-intensity warfare in which Mission Command evolved was broadly symmetric. Can we extrapolate from there to highly asymmetric threats? Again, the answer is probably 'yes'. Arguably, to a major western democracy, the chief concern raised by asymmetry is that of surprise. Given warning, western nations can deploy their sophisticated intelligence services to identify and investigate the threat. Their defence scientific bases can develop technical counters, and their sophisticated industrial capabilities can manufacture them. They have highly trainable armed and police forces with which to

respond, once the appropriate response has been developed. However, taken by surprise, considerable damage can be done before the counters are developed and deployed. If surprise occurs, the best defence is rapid and appropriate counteraction. The commander on the spot must act quickly and appropriately; probably in a novel manner, but one which supports his superiors' overall intent. That will only happen in a command environment in which he is trusted to use his initiative and act effectively. In other words, all the requirements of Mission Command remain valid.

A further threat to Mission Command lies in the twin areas of blame culture and litigation. Their combined effects are insidious and potentially corrosive. On the one hand, if something goes wrong, somebody is usually blamed. There is a *'fall guy'*, not least because the Media, with their need for immediate but often simplistic messages, want someone to be seen to be blamed. Mission Command only works in an environment of mutual trust. One important element of that trust is acceptance by the superior of well-intentioned mistake. Maintaining that element requires that the superior shoulders any blame himself if necessary. A further element of trust is loyalty upwards. If a superior makes a well-intentioned mistake the subordinate can sometimes act to mitigate its consequences (if he understands the overall intent). In both cases, for either party to blame the other erodes trust and hence the social fabric of Mission Command.

The prevalence and the fear of litigation are similarly corrosive. If a commander feels that he may be

taken to court as a consequence of his actions, he will tend to be highly conservative; to plan in great detail; to allow subordinates little freedom of action. He will tend to seek precise direction from superiors. Conversely, in some circumstances a superior might deliberately be so vague that he cannot be held accountable for what his subordinates actually do (*'...ah, but, I didn't tell him to do that.'*) In both these cases the social fabric of Mission Command is once again torn.

The prevalence of litigation in modern society makes the fear of it insidious: it is reflected in articles by junior officers.¹² Overcoming that concern requires, firstly, that it be recognised. Secondly, it requires the chain of command to take visible steps to support those at risk (in the courts if necessary), and possibly a review of legislation to identify if and where such risks occur. It may be that new legislation is required to protect junior commanders engaged in legitimate and well-intentioned activities which do not yet enjoy protection under the law.¹³

A further issue is the need to sustain the human quality of our armed forces. Mission Command requires initiative. If we are to retain high-calibre people capable of thinking and acting quickly and effectively under stress, we need to retain a doctrine or philosophy (such as Mission Command) that supports those characteristics. If we do not, the good will leave and only the obedient, subservient and unimaginative will stay.

There is here however an element of circular argument: we see those who display initiative and

can think and act quickly as good; and we promote a doctrine that supports those characteristics. This is not actually a problem: it suggests that our basic values, evolved over centuries of conflict around the World, are accurately reflected in a doctrine that we have enunciated only recently.

Continuing Relevance

The relevance of Mission Command to the twenty-first century can be considered from a number of directions. Firstly, it is a sensible response to an environment which is seen to be increasingly complex. Complexity theory suggests that the most effective way of managing highly interrelated and dynamic problems is by the decentralisation of decision making and action to close to the source of the complexity.¹⁴ War and armed conflict of any nature is hugely complex, dynamic, adversarial and human. If anything, it will become even more complex and dynamic as IT allows greater and more immediate connectivity between people. Thus decentralising decision making to close to the people who are at the seat of the conflict is the best long-term strategy.

Complexity has another aspect which the information revolution exacerbates. Complex problems generate huge amounts of information. That information, which can often be dealt with adequately near to the source of complexity, risks that the local actor responds inappropriately from a global context. One response to this is to ensure that the actor understands the overall intent. That is, Mission Command once again. The other alternative

is to centralise by passing all the information upwards. Unfortunately, the amount of information passed between a group of people increases roughly with the square of the number involved (a consequence of many-to-many information strategies), whilst their ability to deal with it only increases linearly. Thus increasing the number of people dealing with complex situations (for example, by increasing staff sizes in HQs) is flawed in the long run. This is a somewhat simplistic explanation; and IT can and does assist the transmission, handling and storage of information; but it highlights a significant issue. Decentralisation and local flexibility within the overall intent are the best options.

Pragmatism is a further issue. Pragmatically, Mission Command seems to work, with caveats. It may have taken the British Armed Forces a long time to enunciate, but it does seem to reflect what they have learnt that does actually work in practice. Pragmatism is a peculiarly Anglo-Saxon virtue.^{15. 16} Although armed forces have often been charged with excessive conservatism (which might explain the British Army's seeming reluctance to adopt doctrine at all in the 1980s), it is perhaps fairer to say that, fundamentally, they tend to be pragmatic. Realising that what works in conflict is institutionally neither easily learnt nor easily remembered, they err towards caution. Since Mission Command seems to work, the British Armed Forces would be justified in being very reluctant to abandon it.

However, there are caveats. Firstly, armed forces must practice what they preach. Espoused and enacted behaviour are rarely identical. The latter,

when observed objectively, tends to be a fairer reflection of deeply-held values than the former. Research and substantial anecdotal evidence indicates that, in the Army at least, there have been occasions where commanders talked Mission Command, but in practice allowed their subordinates little freedom of action. There may be many reasons for this, but it is a matter for concern.

Secondly, Mission Command requires a certain minimum standard of training. There is no point in giving subordinates freedom of operation when they simply don't know what to. It can sensibly be argued that the highly orchestrated plan for the Battle of the Somme was at least in part a recognition that many of the Kitchener Divisions in the BEF were relatively untrained, and capable of little more. The results speak for themselves. The deduction is to reinforce the need for thorough training. That may be a valid long-term objective, but may not help in immediate circumstances.

Thirdly, not least because Mission Command requires a contract between both parties, it can be problematic when working with other forces or with the forces of other nations. Not only must both parties accurately understand the overall intent, but their understanding of Mission Command must be reasonably similar. There have been well-described (if slightly sensitive) examples of where forces from other nations have simply not comprehended the freedom of operation which the British practice of Mission Command affords. Conversely this author (for one) has been more than mildly surprised by the

ruthlessly literal interpretation of Mission Command displayed by the Bundeswehr, for example.

As we have seen, Mission Command empowers people. This might sound a trite managerial sound-bite, but it has real value. People who are allowed to exercise their own judgement are generally well-motivated compared with those who are not. They tend to make better subordinates, better superiors in due course, and where appropriate learn from their mistakes because they have (within reason) been allowed to make them. A subordinate who is never allowed to make decisions may never make mistakes, but equally surely will never learn from them.

Mission Command and Self-Synchronisation

Finally, as we introduce information-age command systems we should see an improved understanding of the higher commander's intent. We should also see a more developed and widely shared understanding of the operational situation at all levels of command. These are the conditions in which mission command should flourish.

Moving beyond our contemporary understanding of mission command, is the US concept of self-synchronisation – an essential element of Network Centric Warfare. This envisages commanders and even section level teams and individuals, armed with the commander's intent and highly developed situational understanding, doing what needs to be done without traditional orders.¹⁷ The nomenclature

jars somewhat and gives the concept, to British ears, an air of improbability. But in essence, this idea is not new. German doctrine in the 1930s stated that *'the emptiness of the battlefield requires fighters who think and act on their own and can analyse any situation and exploit it decisively and boldly'*.¹⁸ The German system demanded that when necessary artillery, infantry and other supporting [arms] should co-ordinate and act together without direction from above.¹⁹ Self synchronisation involves the broadening and deepening of such a developed form of Mission Command throughout every level and across every functional area of a Combined, Joint Force.

The paradox, therefore, is that while many will fret that the information age spells the end of mission command, it actually creates conditions where such a command philosophy is the essential bedrock for success. We can therefore look forward to a renaissance of Mission Command.

NOTES

- 1 *Design for Military Operations – The British Military Doctrine*, Army Code 71451, 1989, pp 41 and 49.
- 2 *The British Defence Doctrine*, Joint Warfare Publication 0-01, 1996, pp 4.8-9.
- 3 Army Doctrine Publication (ADP) Volume 2 *Command*, Army Code 71564, April 1995, Paragraph 0210.
- 4 *Idem*, Paragraph 0210d.
- 5 *A Genius for War. The German Army and the General Staff, 1807-1945*. T N Dupuy, London 1977, p 35.
- 6 *Idem*, p 67.
- 7 *Idem*, p116.
- 8 *Idem*, p 10.
- 9 FM Sir Nigel Bagnall was commissioned in February 1946 and commanded an Armoured Division from 1975 to 1977.

He and his peers were the first divisional commanders to have had no personal experience of WW2.

- 10 *Deterrence and the Defence of Central Europe: The British Role from the Early 1980s to the End of the Gulf War.* Sangho Lee, PhD Thesis, King's College London, August 1994, pp 80-83.
- 11 Interviews with General Sir Rupert Smith, Admiral Sir John Woodhouse, Major General David Richards and Commodore Christopher Craig, May–July 2001.
- 12 'Attack!!! Attack... Attack ???' James Coote, *Army Doctrine and Training News (ADTN)* 14, Winter 2000-1, p 41.
- 13 'Tempo and the Minimisation of Casualties', J P Storr, *ADTN* 15, Spring 2001, pp 20-1.
- 14 *Coping with the Bounds. Speculations on Non-Linearity in Military Affairs.* Tom Czerwinski, Institute for National Strategy Studies, Washington, 1998, pp79-95.
- 15 *Philosophy*, Richard H Popkin and Avrum Stroll, Heinemann, London 1989, p235.
- 16 *The 17th Century Philosophers: The Age of Reason.* Stuart Hampshire, New American Library, New York, 1984. pp 17 and 20.
- 17 The disruption caused by the fuel tanker strike in the UK during winter 2000 is an example of selfsynchronisation. Lacking any national leadership or formal organisation, but armed with an intent to move the government on the fuel tax issue, and informed by mass media, telecoms and the internet, disparate groups acted in concert to create havoc. Another non-military example is the international anti-capitalism movement, which appears leaderless and unorganised, but does produce concerted anarchic action.
- 18 'Truppenführung', published in 1933, in Knox M and Murray W, *The Dynamics of Military Revolution 1300 – 2050*, Cambridge University Press, 2001, p 159.
- 19 *Idem*, p 160.

CHAPTER 7

THE COMMANDER AS EXPERT

By Jim Storr

British military doctrine describes the three functions of a commander as leadership, decision making and control of assigned subordinates.¹ Good commanders are seen as expert decision makers, in addition to any qualities as leaders and directors of their forces. Tactical decision making may take place in situations that are dangerous, dynamic, confusing, unclear and possibly overloaded with information. It is in that environment that good commanders are required to be expert decision-makers.

Digitization is intended to support commanders, and hence support (and possibly assist the development of) expert decision-makers. This suggests a need to understand how decision makers become expert. That would allow us to help commanders become expert decision-makers, and in the longer term improve the quality of tactical decision making in the Army. This is primarily a mental and not a technological issue. Information Technology (IT) may, or may not, assist the process.

This chapter considers how decision makers become expert, in order to establish implications for

training future commanders. It starts by considering how armies currently train commanders to make decisions. It then discusses how commanders actually do make decisions and compares the two. It considers how decision-makers develop expertise, and makes deductions for training and learning.

Rational Choice Strategies

Most Armies have a methodology for decision making that has been described as traditional, theoretical, predominantly prescriptive. They provide a procedure for *'how to do it'*.² The standard method for making decisions, typical to many armies and businesses, is to decide on an aim, consider all the relevant options, define all the important evaluation criteria, weight the importance of each criteria, evaluate each option on each criterion, and select the winner. They can be described as *'Rational Choice Strategies'* (RCS); the Estimate is one such process.³

However, rational choice strategies are not necessarily the best suited to tactical decision making. Such strategies should be reliable (all things being equal, they should give good and consistent results); they can support quantitative analysis; they inform novices of things they do not know; they are rigorous; and they are very widely applicable. They are useful in teams, since they allow all members to come to a common understanding of the advantages and disadvantages of each option. However, observation of exercises shows that there is rarely time or information to make rational choice strategies work as well as they should. Research

indicates that they do not ensure that novices make good choices (although it does help them describe their choices subsequently), and they are usually not helpful for experienced decision-makers. The latter are often frustrated at being shackled to a process, when they already know what they intend to do.⁴ Indeed there is evidence that if people are forced to use rational choice strategies they make worse decisions, not better.⁵

Naturalistic Decision-making

There is extremely strong scientific evidence that most decision makers do not use rational choice strategies as taught, and that expert decision makers should not do so.^{6, 7} The relevant field of research is called Naturalistic Decision-Making (NDM). It addresses the way that people actually make decisions in natural or realistic situations. There is a large body of research in this area and a number of overlapping acronyms. NDM theory is an alternative view to rational choice strategy. It counters many traditional theories of decision making. It attempts to understand how individuals and teams actually make decisions in complex environments, and is particularly applicable to expert decision-makers.⁸ This chapter will use the term *'naturalistic methods'* to refer to the methods that decision-makers normally use in tactical situations.⁹

Naturalistic methods apply to ill-structured problems in uncertain, dynamic environments in which the goals are shifting, competing or ill-defined. Those situations also have action or feedback loops, are time-pressured, have high

stakes, multiple players, and organisational goals and norms. Naturalistic methods are highly appropriate to many tactical situations.¹⁰

Rather than generating and comparing alternative courses of action (COAs), as in rational choice strategies, naturalistic methods depend on the recognition of a situation as being similar to, or typical of, situations with which the decision maker is already familiar. The decision maker can then envisage a solution to the problem which, based on his experience, is probably *'about right'*. With further thought, that *'about right'* solution can be developed into a highly suitable plan. *'Recognition'* and *'envisaging'* are not entirely conscious: decision-makers frequently become aware of a problem and *'just know what to do'*. Sometimes they are not even aware that they have actually made a decision.

Naturalistic methods therefore only consider one solution, until and unless the decision-maker realises that that working solution won't work. That realisation then prompts the identification of a subsequent solution, and so on. This is a very short description of naturalistic methods, and does not necessarily do justice to their power and value.¹¹ None of these aspects should be seen as criticisms: the next section describes how NDM and RCS compare in appropriate circumstances. It is important to stress that NDM is an effective description of how the human brain appears to actually work, even when engaged in rational choice strategies (for example, when conducting an estimate). In using rational choice methods, the decision-maker often becomes aware (and often

quite early) of what his intended solution will be. He then spends considerable time justifying the choice he has in practice already made – *'situating the appreciation'*. To that extent rational choice strategies as taught have been described as a charade or even a pantomime.¹² That is not to say that rational choice strategies are not useful. Their use is discussed in the next Section.

An understanding of naturalistic methods helps us understand intuition, or at least intuitive decision making. Contrary to assumption, intuition is probably not inherited (there is no evidence that one is *'born with it'*³) nor is it necessarily the preserve of senior officers. Indeed it is entirely possible that some senior officers will never develop it.

Intuition depends on the use of experience to recognise key patterns that indicate the dynamics of the situation.¹⁴ It is largely subconscious: the decision-maker *'just knows what to do'*. Since it is largely based on experience of similar circumstances, one can see how some senior commanders, with the appropriate experience, may have intuition that works in those circumstances. However, some types of people are more likely than others to reflect on their experiences, and perhaps more likely to develop intuition than others. People who do not reflect are perhaps unlikely to develop intuition, even if they are quite experienced. Some senior officers may fall into that group.

Comparisons

Naturalistic methods may describe what decision-makers actually do, but that does not imply that it is the most appropriate approach in all circumstances. On some occasions it will not be. Naturalistic methods will be suited to situations of greater time pressure, where the decision maker is more experienced, where the situation is dynamic, and where goals are ill-defined. Conversely, rational choice strategies are better suited to situations where the selection of COA must be justified; where conflict of opinion within decision-making teams must be resolved; where the best possible solution must be obtained; where time is not at a premium; and where greater computational complexity is required or (perhaps) is simply available.¹⁵

Note that there is some evidence that in tactical decision making the best possible solution is not necessarily the most desirable: the '80% solution now' may well be more effective than the best possible solution obtained some time later.¹⁶

Critically, however,

*'Recognitional strategies [that is, naturalistic methods] that take advantage of experience are generally successful, not as a substitute for the analytical method [ie, rational choice strategies] but as an improvement on them. The analytical methods [ie, RCS] are not the ideal; they are the fallback for those without enough experience to know what to do.'*¹⁷

This is highly significant, and has several major implications:

- Firstly, although some rational choice methods must be taught to novice decision makers, after an initial introduction, training for decision making should concentrate not on the methods of decision-making but, on the building up of relevant experience.
- Secondly, in the appropriate circumstances experienced decision makers will make better decisions when they use naturalistic methods and, in due course, rely on their intuition. There are pitfalls to naturalistic methods (for example, prior experience may be misleading), but there are ways of training decision makers to recognise and account for them much of the time.¹⁸ And just because naturalistic methods or intuition sometimes provide a wrong solution, there is no guarantee that rational choice strategies used in the same circumstances would have produced a better solution.
- Thirdly, naturalistic methods can give solutions that are just as detailed as rational choice strategies, if the decision maker has a sufficiently rich bank of experience.

However, enthusiasm for naturalistic methods must not be allowed to overtake all use of rational choice strategies. One does not develop the requisite experience without exposure; there are circumstances when naturalistic methods are not appropriate; and the cry of *'intuition'* does not excuse sloppy decision making.

It is perfectly reasonable to expect, and allow, commanders to use naturalistic decision making methodologies in the right circumstances. Given those circumstances, they will tend to make decisions that are equally good or better, and be able to make them quicker, than when using rational choice strategies.

Experts and Expertise

Experienced decision-makers, using naturalistic methods, are highly likely to generate good first decisions without having to develop and evaluate several options. They can do so under extreme time pressure.¹⁹ It is not that they refuse to consider alternative courses of action; they don't have to.²⁰ Thus not only can they decide well using naturalistic methods; in many occasions they should and will. Research into naturalistic methods has allowed an understanding of how decision makers become expert. The decision-maker engages in deliberate practice, and each opportunity for practice has a goal and evaluation criteria. By doing so repeatedly, he compiles an extensive bank of experience. In doing so he must obtain accurate, diagnostic and timely feedback. He also enriches his experiences, by reviewing past situations, in order to derive new insights and lessons from mistakes.²¹

A very few people appear to be able to generalise and abstract enormously, and become highly expert based on very little personal experience. However, biographies seem to suggest that expert battlefield decision-makers become so largely because they consciously reflected on their experience. Patton,^{22, 23}

Manstein,²⁴ Rommel²⁵ and possibly Zhukov²⁶ are particular examples. There are a few historical exceptions. Napoleon appears to have been a highly rational thinker (he excelled at maths and sciences at school²⁷), but also seems to have been exceptionally (and possibly giftedly) intuitive.²⁸ So although he pored over maps and returns for long hours, he does not appear to have consciously reflected on past experience to any great degree. Instead, typically, he would ride out onto the battlefield before dawn and his battle plan would come to him. He would *'just know what to do'*. Conversely, some experienced commanders may never become expert decision-makers. If they lack the predisposition to reflect on their experiences, those experiences will afford them little advantage. To become expert, decision-makers must build up a library of relevant experiences. The gifted few need relatively little experience, because (subconsciously or consciously) they can extrapolate and learn much from relatively little experience. Veterans will often be expert decision makers in situations within their past experience. However, not least because this process is partly subconscious, they may not be able to explain why they would make certain decisions; they *'just know what to do'*. This would suit them well, but hinder the process of passing on expertise to subsequent generations.

Thus not only is it entirely sensible to allow and encourage commanders to use naturalistic decision making methods, but it is necessary to do so if we hope to make most of them into expert decision makers. Expert decision-makers do use naturalistic

methods in the appropriate circumstances, and tend to reflect consciously on their experiences.

Training and Learning

The implications for training future commanders stem directly from an understanding of how decision makers become expert. It is important to repeat that there is evidence that if people are forced to use rational choice strategies they make worse decisions than if they are allowed to use naturalistic methods.²⁹ It is also important to note that training in rational choice strategies does not make expert decision-makers. On the contrary, that risks slowing the development of decision-making skills.³⁰

The sheer number of instances of decision-making in relevant situations will be a key driver in producing expert decision-makers. The need is for more, not longer, instances of decision making. A training exercise which requires a commander to make one decision laboriously, being forced to use rational choice strategies, will be of much less value than one which requires him to make several decisions about a raft of similar situations in succession. This has major implications for the training of commanders.

Rational choice strategies allow the novice to expose his thinking to his instructor, which is often seen as an advantage. However, it is arguably irrelevant, since training in rational choice strategies does not make novices into expert decision makers. It is relatively unimportant that a novice explain how he has made a particular decision. What is more

important is feedback as to whether or not it was an appropriate decision. There are three deductions:

- Firstly, feedback is crucial, and it must be timely, relevant and informative.
- Secondly, extensive feedback as to method is virtually irrelevant. The criticism that a novice did not perform a particular step in an Estimate does not help him become a better decision maker. What is important is that the decision maker becomes aware of the key aspects of the situation which prompted the decision. Such 'cues' are what allows him to recognise an appropriate solution: hence 'Recognition Primed Strategies'.
- Thirdly, the decision maker should become increasingly aware of how he actually makes decisions. This is a highly individual issue, but it is a key aspect of developing expertise.

Teaching decision-making methodologies should move away from process-related towards output-related assessment. Furthermore, part-task teaching of decision-making methodologies is only of value to the absolute novice, because one of the key issues of any decision making is the integration of all aspects of the situation.³¹

Feedback is important, but so is an environment which tolerates well intentioned mistake. If junior commanders are to be encouraged to make rapid, naturalistic, possibly intuitive and '*about right* ('80%')' decisions, then those decisions they get wrong should be seen not as failures but as valuable

opportunities from which to learn. Tolerance of well-intentioned mistakes is also an important feature of Mission Command. Tactical Exercises Without Troops (TEWTs) are an easy way of allowing junior commanders to make decisions in a benign environment. In a TEWT the consequences of *'right'* or *'wrong'* are equally imaginary.

There is a serious risk in employing naturalistic methods that the feedback provided will teach false lessons, which will in effect be a template for subsequent decisions. That is a valid and relevant criticism, but three counter-arguments can be raised.

- Firstly, given solutions that are believed to be valid, naturalistic methods constitute a better way of teaching decision making than rational choice strategies. The key is the identification of valid solutions in the first place, not the decision-making methodology employed.
- Secondly, naturalistic methods allow for a wider range of potential situations to be experienced within a given amount of time, because more situations can be considered than when using (and debriefing) rational choice strategies. Thus training using naturalistic methods is more likely to result in the selection of a valid solution in a subsequent decision, because the decision maker has a wider library of experience.
- Thirdly, much of the concern over teaching false lessons reflects the fact that many instructors, themselves taught using rational choice strategies, are not particularly experienced decision makers (whatever else they may be).

In practice, instructors who themselves are exposed to a larger number of solutions from their students learn from that exposure themselves. Systemically, training using naturalistic methods would benefit both the students and the instructors in the middle to long term.³²

Tactical decision making is relatively difficult, important and infrequent for many commanders. It may become frequent on operations, but the issue is how to prepare them for operations prior to deployment. Difficulty, Importance and Frequency (DIF) analysis is a standard tool of training design.³³ In general, a skill that is difficult, important and infrequent should be over-taught. Long training courses and in-barracks training should give repeated opportunity for decision making, in the knowledge that skill fade will occur. Training for tactical decision making should concentrate on a large number of instances, give immediate feedback as to output not process, and be permissive of well-intentioned error.

In summary, to train commanders to become expert decision makers requires a revised approach. The first few steps, perhaps in the first term or two as an officer cadet, will be to teach the mechanics of rational choice strategies. Thereafter training should concentrate on exposing him to a large number and wide range of problems, and give him feedback as to the outcome of his solution. The trainee should be encouraged to reflect on his decision, and what features of the situation prompted the given solution. He should not be criticised on his decision making

methodology, but rather on the suitability of the solution to the problem as presented.

Relevance to the Information Age

A potential challenge to the use of naturalistic methods arises from the advent of battlefield digitization. The argument is that IT will allow a commander a better understanding of the battlespace on which to base his decisions, and more time to make them. Judgmentally, commanders will not need to rely on '*hunches*' and '*guesses*' because they will be at liberty to do things '*properly*'. To use a strong analogy, before digitization, command is like stud poker: you know what some, but not all, of your own cards are, and have little idea what cards the opponent holds. With digitization, command is like chess: you can (potentially) see all the pieces. What remains largely unknown is the opponent's intentions.³⁴ Grand Masters are expert decision makers, and routinely employ naturalistic methods. Even in major matches they can make moves as fast as once per six seconds, not least because they practice a lot.³⁵

However, although chess is adversarial and dynamic, the consequences of taking longer to make a better decision are not critical in most matches, whereas operational (hence decision making) tempo is a major factor on the battlespace. Digitization is intended either to allow them to have a better understanding of the situation, or allow them to make decisions even earlier; or possibly both (ie, better decisions faster). Furthermore, the benefit of better understanding of the situation is not the ability

to make a better decision, but to be more confident that his chosen solution is the right one (because it fits the real situation). We should design IT to support expert decision makers and enable a competent decision maker to become expert. Rational choice strategies do support situations where greater computational complexity is required or, perhaps, is available.³⁶ However, that suggests that we should adopt rational choice strategies because they support the use of IT. The real object is to have IT support decision makers in the art of making a decision, rather than primarily supporting a decision making process managed for a commander by his supporting staff. This suggests a need to use IT to allow commanders to fight a large number of engagements in varying scenarios in different environments. It could also allow them to use experience captured in an online record as well as from memory.

The formal military decision making process for the information age must also support naturalistic decision making. Steps are being made in this direction by the ongoing development in the Army, for example, of a new effects-based process³⁷ framed around the way in which it is believed commanders actually approach tactical problems. In the Joint arena, as our understanding of Effects-Based Operations matures an effects based approach to campaign planning will follow. As this occurs, it will be important not to snare commanders in staff-managed, computer-supported processes, but to develop methodologies to support the commander in exercising his intuitive judgement and

to exploit the depth of experience and expertise embodied in his persona.

If the information revolution delivers anything to our commanders, it must free them up to think about problems and to exercise their judgement.³⁸

NOTES

- 1 Army Doctrine Publication Volume 2 *Command*, Army Code 71564, April 1995, Paragraphs 0107-0110 and Figure 1.1.
- 2 'Towards Better Knowledge: a Fusion of Information, Technology and Human Aspects of Command and Control.' Kallmeier et al, *Journal of Battlespace Technology* Volume IV Number 1, March 2001. ISSN 1440-5113, pp 34-43.
- 3 This Paper will generally avoid the use of the acronym 'RCS' in order to assist readability. On occasions its use will be appropriate.
- 4 *Sources of Power: How People Make Decisions*. Gary Klein, MIT Press, London 1998, pp 28-9.
- 5 *Idem*, p 34, quoting Wilson and Schooler.
- 6 'Evidence of Naturalistic Decision Making in Command and Control'. Raphael Pascual and Simon Henderson, in *Naturalistic Decision Making*, Caroline E Zsombok and Gary Klein ed, Lawrence Erlbaum Associates, New Jersey. ISBN 0-8058-1873-1, 1997, pp 217-66.
- 7 Klein *op cit* p103.
- 8 Kallmeier *loc cit*.
- 9 The acronym NDM will, like RCS, generally be avoided: see Footnote 3 above.
- 10 Kallmeier *loc cit*.
- 11 For a fuller (and very readable) description, see Klein, Chapters 1-3.
- 12 *Coping with the Bounds. Speculations on Non-Linearity in Military Affairs*. Tom Czerwinski, Institute for National Strategy Studies, Washington, 1998, p152.
- 13 Klein p 31.
- 14 *Ibid*. Italic throughout original.
- 15 Klein, p 95 and table 7.1.
- 16 J P Storr, 'Real People, Real Decisions: Designing HQs to win Wars.' *British Army Review* Edition123, Winter 2000.

- 17 Klein p 103. Italics added.
- 18 Klein describes a particular methodology known as Recognition-Primed Decision Making.
- 19 Klein p 167.
- 20 *Idem* p 17.
- 21 *Idem* p 104.
- 22 George S Patton Jr, *War as I Knew It*, Riverside Press, Cambridge MA, 1944, passim.
- 23 Martin Blumenson, *Patton – The Man Behind the Legend* William Morrow, New York 1985, passim.
- 24 Erich von Manstein, *Lost Victories*, Presidio, Novato, California, 1994, passim.,
- 25 David Fraser, *Knight's Cross, A Life of FM Erwin Rommel*, Harper Collins, London 1993, passim.
- 26 Aaron Lieberwitz, *Zhukov: Man of Legend*, Presidio, Novato, California, 1974, passim.
- 27 Richard Holmes (ed), *The Oxford Companion to Military History*, Oxford University Press, Oxford, 2001. pp 620-1.
- 28 Professor Richard Holmes, personal communication. Professor Holmes wrote the entry at Footnote 27.
- 29 See above, and Footnote 4.
- 30 Klein *op cit* p 30.
- 31 *Idem* pp168-9.
- 32 Major Jim Ball, US Army Exchange Officer, (British) Army School of Training Support, personal communication. The Author is grateful to Major Ball for his input into this section.
- 33 *Ibid*.
- 34 Marc Widdowson, [VEGA plc], *Lecture: The Principles of War in the Information Age*. RMCS Shrivenham, Sep 2000.
- 35 Klein, *op cit* p 273.
- 36 See above and Footnote 15.
- 37 Developed at the Combined Arms Staff Trainer (North) in Catterick.
- 38 The Author is grateful to Mrs Liz Wheatley and Dr Simon Henderson of the QinetiQ Centre for Human Sciences for their most helpful comments on this paper.

PART TWO – POSSIBILITIES

**The Commander-centric
Approach**

Beyond Interoperability: Part 1

Beyond Interoperability: Part 2

The Divine Threads

3D Vision

**The Case for Manned
Reconnaissance**

The Delilah Factor

CHAPTER 8

THE COMMANDER-CENTRIC APPROACH TO MODERNISING COMMAND STRUCTURES

By Jake Thackray

In the British System, a field commander is supported. Period. That is the rule. A field commander is given mission-type orders, not detailed and continuing guidance. It is a wonderful, traditional approach, one that embodies trust in the commander and confidence in his judgement as the man on the scene. The American military has always aspired to this model, but has seldom seemed to attain it.

Gen Wesley K Clark
Waging Modern War

Introduction

General Clark's observation was made in reference¹ to his well-publicised disagreement with General Mike Jackson during the Kosovo campaign. It is tempting to react to it with a degree

of self-satisfaction: it does, after all, coincide exactly with current British defence doctrine. It should instead, perhaps, be taken as a salient warning. It is an observable truth that the introduction of our digitised command technologies is largely a response to the US concept now widely known as Network-Centric Warfare (NCW) and their various army programmes of change, now under the banner headline of Transformation. We must be, and are, grateful to our American colleagues for their continued generosity and willingness to share with us their experiences and ideas of their '*Revolution in Military Affairs*'. But the wholesale adoption of procedures which suit their way of commanding and controlling operations might possibly constrain ours, leaving us less, rather than more, capable.² It is therefore imperative that we modernise our command structures in ways that suit our command culture and way of operating with the planned capabilities that will actually be available to our commanders.

The Commander-centric Approach

The purpose of a command structure is to enable the commander to exercise effective command, through leadership and decision making and to access and co-ordinate rapidly a range of organic and supporting capabilities to achieve his intent. In essence, therefore, command – comprising leadership and decision making – is enabled by Command and Battlespace Management, one of whose products is the co-ordination of Joint effects. All of this is underpinned by Command Support,

comprising Communications and Information Systems, and life support. The UK 'style of command' places significant emphasis on the qualities of individual leaders, imbued with intuitive decision making skills developed through training and experience, supported by staffs whose role is more mechanistic in nature. Such a style can be described as '*Commander-Centric*' and gives rise to three premises:

- **Leadership.** Leadership is a personal quality, and any future command structure should be adaptable to different leadership styles. The appropriate style will also vary with the level of command. The key is for the structure to provide the commander with as many command options as possible, to allow maximum flexibility within affordable limits. The training and development of leaders to populate the structure must also be seen as an integral part of the overall command system.
- **Decision Making.** Commanders need timely and relevant information in a form that supports their personal decision making process, including their intuitive judgement. Intimate support must be provided from only those staff whose role is to provide such information and directly support decision making; others do not require close physical contact with the commander.
- **Co-ordinating Capability.** The command structure must enable the commander to access and co-ordinate rapidly a range of organic and

supporting capabilities to achieve his intent. This is a 'control' function that is carried out by the staff on behalf of the commander, though the commander must retain an element of control to deal with major changes to the situation, thus allowing him to carry out continuous mission analysis.

The Span and Levels of Command

The span of command is the number of subordinate organisations given to one commander to command directly. Factors acting to increase the span of command include: an increased rate of information processing, increased delegation of authority to subordinates, increased freedom of action of subordinates and a greater availability of information and intelligence in which the commander has confidence. Arguably, these may all be delivered by information age digitized technologies. Other factors might include a more benign operational environment or the close mutual understanding and bond of trust between commanders and their subordinates that has developed through working together over a long period of time.

Conversely, a greater complexity of tasks and forces (multinationality for example), increased battlespace dynamics and a range of physical, psychological and interpersonal stressors³ on commanders all conspire to narrow the span. Other factors acting to narrow the span include the complexity and demands of the chain of command in which the commander finds himself operating – for theatre commanders in multinational PSO, the arrangements can be

bewilderingly complex. The number of points of contact is another factor and could include, for example, local police, government authorities, agencies, Non-government organisations and any one of a number of other in-theatre actors or factions. Added to which are the demands of the media and the need to visit and '*glad-hand*' multinational contingents. All of these factors reduce the time available for the commander to '*command*' and consequently constrain his span of command.

Therefore, although it is recognised that in benign environments, certain types of operation allow for a widening of the span of command, there are real world imperatives counterbalancing the weight digitization may lend to arguments for its widening on a universal basis.

For UK forces, it is also difficult to envisage how digitized command and control capabilities would sensibly enable the removal of a level of command during the next decade. Whilst information could flow freely up and down a chain of command, it would not necessarily add to '*knowledge*' at each level if it is not interpreted in some way to draw out the relevant factors. But, as the flow of information improves and as collaborative planning tools begin to enable multiple layers of command to contribute simultaneously to the development of a plan, it is likely that levels of command will become more porous. Nevertheless, levels of command exist in part to provide a hierarchy of manageable spans,⁴ but, more crucially, they exist because different functions are carried out at each level – functions that would need to be aggregated either up or down

the hierarchy if de-layering took place. Brigade level HQs are, essentially engaged in the close battle. At the divisional level we see deep operations taking pre-eminence, rear operations coming into play and, increasingly, multinational factors impacting on the command structure. At the corps level we see a fundamentally multi-national HQ orchestrating the efforts the national contingents and, unless there is a 4-star Land Component HQ, being heavily involved in campaign planning.

Within the close battle, we might see a change in the relationship between brigade and battlegroup headquarters as brigade commanders acquire their own ISTAR assets and gain access to better and better information. This coupled with the capability to rapidly develop plans and disseminate intent and orders, might lead to circumstances where the battlegroup headquarters will add less value to the overall process, as sub-unit commanders will be able to act within the brigade commanders intent. This will be especially so in simple terrain where the whole brigade area is a single environment. In complex terrain there are micro-environments, which create frictions at the lowest levels, the full engagement of every level of command would be required to develop plans that will work at each level. In these circumstances (Northern Ireland, for example) the emphasis on developing and executing plans can move down to the battalion or company level, or even below, with brigades providing more of a co-ordinating framework.

Again, as with the span of command, there is no conceptual or practical basis for removing a

particular layer in the tactical chain of command on a universal basis. This does not mean that a slavish structure is envisaged from brigade level to corps in every operation. On the contrary, command echelons have already evolved as indicated below. This shows that, theoretically, any tactical formation HQs might have to command at the operational level in certain circumstances.

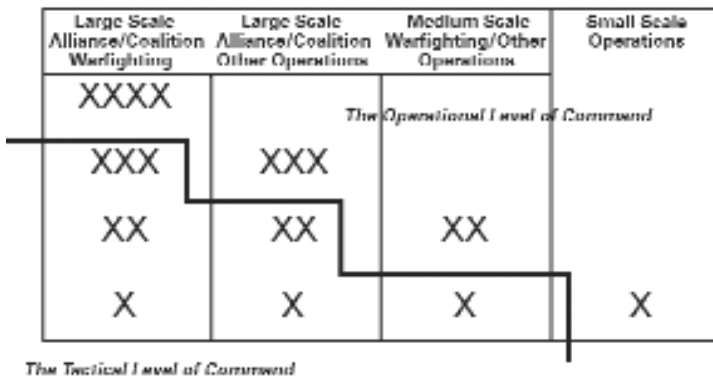


Fig 1 – The Evolution of Command: Levels For Differing Operations

When this occurs, its superior tactical level formation HQs in the peacetime structure are dispensed with and the headquarters, with appropriate modular augmentation, works directly to the national command in the home base.

Headquarters Design

A modular approach such as that in Figure 2 would allow HQs to concentrate or disperse, depending on the situation and would allow them to take on extra responsibilities when needed. Such an

approach would provide the inherent flexibility needed to allow formation HQs to flex between acting as tactical HQs or at the operational level. All formations and units require a 'core' set of modules that give them a tactical warfighting capability, optimised for the delivery of Joint effects. A second set could be those modules required to enable a LC tactical HQ to play its part in the Joint command structure, as either a JFLCC or JTF HQ. A third set might be those modules required for multinational operations, particularly outside an ARRC context and the fourth set comprising those modules required for Other Operations at the tactical level. As every HQ would have a 'core' Joint warfighting set, the number of sets required would be driven by the force structure. Sets 2 – 4 could be drawn upon for training⁵ and operations on an as required basis, and so the overall number of these sets would be driven by Defence Planning and Concurrency Assumptions.⁶

Current HQ structures at formation level do not provide the C2 capability needed to support sustained warfighting.⁷ They have neither the staff nor the expertise to allow for continuous operation or a seamless transfer of authority on change of control. Disparities exist between the output possible at one level of command, and the input which the next level down can utilise. Planning capability at Divisional Level, for example, *'can become quickly exhausted in comparison to that achievable within HQ ARRC'*.⁸ In the future, fully empowered headquarters capable of 24-hour operation are likely

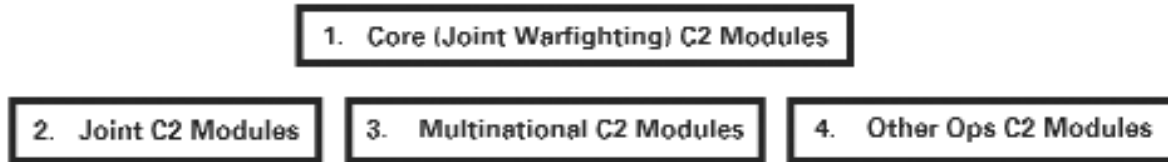


Fig 2 – Modular HQ Structure

to be essential (in order to allow for fleeting opportunities to be grasped at all levels). Mechanisms for providing these need to be explored. Distributed databases (and the necessary pool of expertise) may enable reserve or flanking HQs to temporarily assume command of other formations. The desegregation of planning and execution at certain levels might also be considered. Equally, the possibility of *'pairing'* formation HQs to provide identical shifts, each tasked with planning and execution might be considered.⁹ Such developmental work should also include exploration of the separate but linked issue of the provision of alternate HQs at all levels. Innovations such as distributive planning and collaborative planning, where different levels of command and horizontal functional areas all participate concurrently in the development of a plan, will have implications for HQ structures, as there is an inevitable relationship between process and organisation.

HQs also evolve during campaigns. Initially, enabling capabilities allow for the arrival and Reception Staging Onward movement and Integration of force elements. As the campaign progresses, Transfer of Authority where appropriate, preparation¹⁰ for and then the conduct of operations is followed by campaign termination, extraction and, finally, recovery; or, equally, transition through conflict prevention, conflict and post conflict activities. The activities – and their relative importance to each other – and hence of staff divisions can differ considerably during different stages of the campaign. Ultimately, any HQ facing the changing requirements of a campaign must have the capability

to grow, reduce, divide and merge seamlessly both in terms of its infrastructure, staff activity and functionality therein. Similarly, the rank of the commander will need to change during the course of an operation as its complexity, profile and scale wax and wane. This could be achieved by adjustments within the deployed HQ rather than necessarily involving the deployment of a new HQ as well as a new commander.

Command Post Design

CPs at all levels of command must promote human interaction (and particularly the need to generate shared intent and shared SA), support the rapid flow of information into, out of and throughout the Command Post, and enable the management of the integration of effects in the battlespace. There are a number of different models under development or in service with the armies of different nations to meet these requirements. The US and most of our allies have already digitised their Army C2 systems. IBCT TOCs, for example, provide a multi-screen briefing wall for commanders and staffs. On the other hand, the Swedish ROLF¹¹ development project provides an electronic birdtable solution, derived from an exhaustive human factors study to derive the best CP solution that would promote human interaction in multi-disciplinary groups. This form of CP environment would be more instinctively familiar to those schooled in the UK *'bird table'* style of working.

The Staff

The competition for skilled manpower will continue to be an intense one, especially within the information technology fields. It may therefore be necessary to concentrate expertise where it is required, rather than making it available to all regardless of need. Such a methodology might be facilitated by a modular approach, though this brings with it a concomitant risk of a lack of trust and understanding between commanders and non-permanently attached staff, without which mission command is impossible to achieve. For such an approach to succeed, therefore, the need for core HQ elements to train alongside other modules – either physically or electronically – will be central.



During the next decade, the volume of information available is unlikely to be matched by a comparable increase in automated processing capacity. HQs could, therefore, increase in size (the current US experience) which would increase vulnerability and lead to a requirement to disperse staff cells. The challenge is to so utilise technology as to allow this increased volume of information to be managed and used, whilst bearing down on overall numbers of staff, or risk oversized and unresponsive HQs.

Decision support systems could in the future provide a significant increase in operational tempo, by reducing the processing time required by specialist human staffs. Such technologies and concepts are already well-developed, and increasingly capable of being used within specific military applications. Unsurprisingly, given the nature of their environments, these applications have up to now been of most value to the air and maritime components. Land Manoeuvre support systems, however, are now available commercially, offering, for example, integrated battlespace intelligence frameworks which allow users, inter alia, to project future enemy movement from current behaviour and doctrinal expectations. Systems such as these are known as inference engines, and can provide the link between data fusion techniques (whereby object tracking data can be fused by the use of powerful mathematical algorithms) and artificial intelligence (AI) systems. AI systems are underpinned by the development of techniques such as neural networks¹² and are increasingly sophisticated.

As new capabilities enter service and we begin to envisage possibilities of fighting the Land Manoeuvre Joint battle in different ways, we may find that our traditional staff structure constrains effectiveness. New responsibilities might be added incrementally to the existing G1–G9 and functional cap-badged staffs. This may involve duplication, and an increased use of cross-staffing and ad hoc groupings – but it is an evolutionary approach. An alternative would be to develop a staff structure based on analysis of the C2 processes, which need to take place at HQs at different levels. Models

which describe C2 processes, their dependencies and the information flows between them already exist, at the single-Service and Joint levels. Such tools could be exploited to support process modelling that might be predicated on the effects sought in the battlespace and analysed against the core and enabling capabilities each HQ is required to co-ordinate. One example of a resulting staff structure might therefore be *effects based*. It is recognised that such an approach would require much development and experimentation, and could not take place without consideration of multinational issues.

Deputies

The demands placed upon leaders and their staffs are likely to increase in the future as operations become more complex. The need for a deputy in some form, anathema to the command-led and Chief of Staff focussed system bequeathed by Montgomery and Guingand, is therefore likely to become a fruitful and interesting area of debate. There is a question mark over the quality of officer that could be found for the Deputy role, is he to be of commander in waiting quality, or more in the mould of the traditional unit second in command? As Clausewitz observes:

'An immense space lies between a General and his Second in Command, for the simple reason that the latter is in more immediate subordination to a superior authority and supervision, consequently is restricted to a more limited sphere of independent thought... and in whom

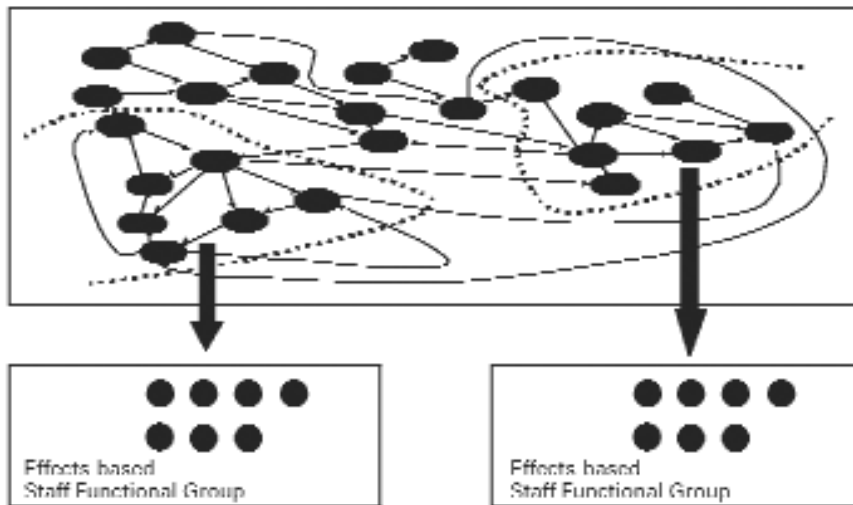


Fig 3 – Process Modelling for Staff Structures

constant discharge of routine duties has produced a decided poverty of mind'.¹³

The function of such an individual is unclear in circumstances where the commander is available for much of the day (and night) and it is arguably best taken on by an officer who is in his commander's mind, but who has a 'day time job' to do too. A viable option might be to formalise the arrangement whereby the senior 'effects officer', or fire support officer takes on the role. But the growth in importance of ISTAR, as operations perhaps become more 'Find led' is such that the deputy might be better placed and more in the commander's mind if he was the principal ISTAR officer. But that implies that 'Find' is an end in itself, rather than the servant of firepower and manoeuvre?

A possible generic role might be planning for future operations within the commander's intent. At the unit level such a role would sit well with the unit Second in Command. While at component level, a suitable role might be to represent the commander's interests at the CJTFHQ, with an emphasis on influencing the campaign plan, targeting and information operations, particularly if our sister services were to opt for placing their component commanders there. If the Deputy does have to place himself somewhere to represent the commander at some interface, it is difficult to see how, on operations of even moderate intensity, he can be so represented by an officer with a busy day-time job of Finding the enemy or orchestrating fire support at the tactical level. In large-scale operations, with a land component deployed in a number of countries,

but engaged on the same operation, it might be appropriate for the Land Component Commander to locate himself at the CJTFHQ. In which case a number of deputies or assistant commanders might be required to deploy forward in order to look after specific geographical or functional areas.

Liaison

Liaison is a requirement of any command support system. Strong liaison teams should be deployed upwards, downward¹⁴ and sideways to support the rapid dissemination and understanding of the commander's intent. In the future liaison down will assume critical importance, especially in multinational operations.

Liaison teams may bring with them the capability to access digitised C2 and decision support capabilities from the superior HQ. More crucially, they should be in their commander's mind and culturally tuned to the receiving HQ. Such teams, led by experienced officers at the appropriate level, have a key role to play in ensuring a closeness of fit¹⁵ between the commander's understanding of his own plan and his subordinate commanders' understanding of it. It is an emerging truth that, in an era of increasing CIS capabilities, the need for personal interaction between different units, formations, components and contingents remains as much of an imperative as it has throughout history. Future structures must ensure that liaison capability, enabled by digitised CIS but focussed on human representation, is at the heart of HQ design.

Reachback

It will become technically feasible, though not necessarily desirable, for elements of some staff functions to be conducted outside the traditional area of operations; either in a more secure area in-theatre or in the home base. One key attribute of reachback is that it might allow deployed forces to access powerful national capabilities such as J2/G2 fusion and COA Analysis tools. Other advantages include a smaller C2 footprint in theatre and the ability to concentrate expertise at key nodes.



Disadvantages include a potential for a loss of mutual understanding, the co-ordination of effort difficulties apparent when one rear-based agency serves more than a single customer, vulnerability of links to C2W and a potential lack of in-theatre capability to cope with worsening situations. The approach to the use of reachback on operations should be pragmatic and stem firstly from an analysis of those functions that must be carried out in the Area of Operations in order to achieve the mission. This is particularly so in Other Operations where so much of the C2 function is about interaction with a wide range of actors in the battlespace.

Reachback can then be used to obviate the requirement to deploy other C2 capabilities unnecessarily, or to access powerful capabilities that cannot or should not be deployed to theatre.

However, it is interesting to speculate as to how command structures might be affected by the theoretical evolution of a future reachback capability. In Figure 4 below, the *'today'* row shows the current HQ structure for Land Component formation HQs. At each level of command, a small forward HQ exists, with a main and rear HQ based inside the area of operations (alternate HQs have been omitted for clarity). No in-theatre capability exists for rear-basing (other than at Component Level), nor may any HQ element organic to, or in support of, deployed formations be home-based (direction is, of course, received from higher level HQs in the home base). Clearly, the lower the level of HQ, the less opportunity exists for reachback, in order to preserve the integrity of smaller HQs.

Initially, better situation awareness, underpinned by a robust CIS, allows for the small *'Tactical'* HQ to become an improved, more capable *'Forward'* HQ. Main HQ also enjoys an improved capability to integrate Joint effects throughout the battlespace.

Further improvements (stage 2) to CIS resilience, capacity and coverage might allow the Rear HQ to be relocated from its location in the area of operations, to a rear-based secure area in-theatre. The requirements of logistic SA (a combination of 'J3 SA', asset picture and monitoring of the logistic process) would entail some elements of logistic

Option	Forward In the AO	In the AO		Rear-Based (Safe area in Theatre)	Home-Based
Initial	Fwd	Main	Rear	None (except at LCC Level)	None
Stage 1	Improved Fwd	Main Improved capability joint/integrated Ops	Rear	None (except at LCC Level)	None
Stage 2	Fwd		Main	Rear	Embryonic, but increasing
Stage 3	Control		Control (Fwd/Tip)	Support (Increasing)	Significant & Increasing
Stage 4	Control		Control (Optimized)	Support (Substantial)	Fully Developed

Fig 4 – Possible Impact on Deployed HQ Structures of a Maturing Reachback Capability

staffs remaining forward, however). Simultaneously, more capable inter-theatre CIS allows an embryonic support capability to be home-based.

Later (stage 3), significant improvement in C2 capability embedded within the Fwd HQ could allow much of the effort conducted in Main HQ to be transferred there. Similarly, Main HQ could pass other functions to the Rear HQ in-theatre, whose responsibilities would incorporate a range of Mission Support activities. The home base now has a substantial range of capabilities (eg J2, COA Analysis, legal and logistic) on which deployed component and formation commanders can draw. The transfer of capabilities between HQs by this stage is such that the new nomenclature becomes appropriate: 'Fwd' HQ becomes a Comd HQ; 'Main' is the Control HQ, and 'Rear' is the Mission Support HQ.

In a further development (stage 4) the C2 requirements of the operation are examined and only the C2 capability required in-theatre is deployed. Factors would include: the nature of the operation; the C2 connectivity required in theatre and the threat to strategic CIS links. C2 capabilities not required in-theatre would remain in the home base. In addition, staffs would now be able to draw on powerful home-based analysis and planning capabilities.

Finally, (not shown in the diagram) it is possible to conceive of a very small forward 'Command HQ' deployed in the theatre of operations, with a larger 'Battlespace Management HQ' carrying out control

functions from a relatively safe area in, or close to, the theatre of operations and substantial Mission Support being provided from the home base. These ideas will take some readers outside their comfort zone, but the potential will exist to exploit such concepts in circumstances where a small, rapidly deployable command footprint is essential. The capability to exercise effective command in such a configuration should be the desired end-state of a command-centric approach to modernising command structures.

NOTES

- 1 Wesley Clarke, *Waging Modern War*, Public Affairs, New York, 2001, pp 397-403.
- 2 Evidence other than anecdotal as to UK/US differences in the 'way of command' also exist: see, for example, the US Defense Communications Agency report into comparative national command methods *Headquarters Effectiveness Program summary* Task 002 (McLean, VA: Defense Systems Inc, Sep 83).
- 3 Glynis Breakwell and Keith Spacie, *Pressures Facing Commanders*, SCSi Occasional Paper No 29, p 5.
- 4 Both the US 'Pentomic Division' restructuring and BAOR's Ex WIDE HORIZON experiments, both of which involved the removal of the brigade level of command, foundered, largely due to a perceived inability for command to be exercised effectively over such a broad span.
- 5 'Bolting on' modules will not allow an effective C2 capability unless sufficient training between modules takes place.
- 6 The significant resourcing issues associated with the provision of these extra modules, and the additional burden placed on, inter alia, the training organisation, are not underestimated. Cost/benefit analyses of the modular option, and any others developed, will be required as part of developmental work in order to better inform investment decisions.
- 7 During Op GRANBY, the strength of 1 (UK) Armd Div Main increased from 45 oftrs and 46 ORs to 76 oftrs and over 100 ORs. At the same time, 7 Armd Bde Sig Sqn Gp

trebled in size. Despite such augmentation, C2 capability was, arguably, largely exhausted by the end of the 100-hour Land Operation. It is, however, noted that the current 1 (UK) Armd Div HQ establishment is larger than its predecessor's at the height of the Op GRANBY deployment.

- 8 Anecdotal evidence from HQ ARRC.
- 9 Such an approach is seen within the JRRF Concept, which might be further developed.
- 10 Force preparation, in its widest sense, also includes the peacetime management of resources, also carried out by most LC tactical HQs. A debate is required into whether operational C2 would be improved if deployable HQs were divorced from routine resource management (in the manner of the JFHQ and others). That debate is not explored further here.
- 11 *ROLF 2010: the way ahead and the first step*, The Swedish National Defence College, Stockholm, 2000.
- 12 A computational technique (normally a software emulation rather than a piece of hardware) which achieves enormous processing power through the multiple interconnection of simple processors, rather than operation of a single, powerful processor. In the brain, neurons send synaptic messages to each other, continually modifying their level of excitation on the basis of messages received, resulting in 'learning'. Neural networks are therefore very useful in pattern-matching problems, and in decision-making where input data is imprecise or incomplete.
- 13 Carl von Clausewitz, *On War*, edited by Anatol Rapoport, Penguin Classics, Page 155.
- 14 This is, in broad terms, a new requirement, made necessary by increasing complexity of forces (especially MN) and tasks.
- 15 General Sir Rupert Smith believes that lack of this 'closeness of fit' is a key factor in command breaking down.

CHAPTER 9

BEYOND INTEROPERABILITY: PART 1

By Tim Blad and David Potts

'History testifies to the ineptitude of coalitions in waging war. Allied failures have been so numerous and their inexcusable blunders so common that professional soldiers had long discounted the possibility of effective allied action unless available resources were so great as to assure victory by inundation. Even Napoleon's reputation as a brilliant military leader suffered when students... came to realise that he always fought against coalitions – and therefore against divided counsels and diverse political, economic and military interests.'

Dwight D Eisenhower¹

Those who espouse an expeditionary ethos and expect to operate in a joint/multinational environment must endeavour to achieve interoperability with their allies. Achieving C2 interoperability is a complex undertaking, made critical by the rapid pursuit of digitization, the increasing frequency of operations and an ever-wider range of bedfellows. *'Unity of Command'*

under a single commander whose authority is clearly defined and absolute, is increasingly accepted as being almost Utopian in the context of the practical realities of contemporary multi-national operations, largely due to national chains of command reaching into theatre headquarters and below.

The traditional NATO understanding of C2 interoperability has been largely based on technical issues such as common message formats and data presentation protocols.² Such an understanding is unsuited to post-Cold War multinational operations. An emerging US concept, which describes the richer conceptual depth of interoperability required is that of '*co-operability*'.³ The term describes the shared understanding which only cognitive and doctrinal interoperability can provide. In the UK, this is termed '*interoperability of the mind*'. A similar German concept is '*einheit im denken*', – literally, '*unity in thought*'. This implies a depth of common military education and training to produce officers of quality who approach problems in the same way – it does not imply a lack of originality or flexibility of mind, but rather a confidence and mutual understanding based on shared military education and values.

Wellington commented that the '*battle of Waterloo was won on the playing fields of Eton*' – meaning that the officers had all gone to the same school. This is what our national staff college and higher command courses provide nationally today. In an era of multinational operations we must look at ways of doing this internationally – one way of developing '*co-operability*' or '*unity in thought*', for example, would be to establish a world class institution to

develop commanders and senior staff for multi-national appointments.

Unity in thought should contribute to *'Unity of Approach'* to a given set of circumstances founded on common doctrine and procedures. Achieving this can be challenging, even in an alliance context where a body of alliance doctrine exists, but it is all the more challenging in ad hoc coalitions where there might be no previously agreed doctrine. In both alliances and coalitions the challenge is compounded by the need not just to have written doctrine, but a common understanding of the meaning and practical application of that doctrine. This can be developed through good working relationships and training.

Whilst Unity of Command on multi-national operations might be a chimera, Unity of Effort will be an essential pre-requisite to success. This requires everyone to be working to achieve the same ends within the commander's intent – which must be disseminated and understood throughout the Combined Joint Force. There will be innumerable electronic aids to disseminate intent: video conferencing and whiteboarding (live sketching and planning using map overlays and NATO symbology) are enjoying a vogue. There is also a considerable body of anecdotal evidence to suggest that symbols laid over a map convey commander's intent, plans and orders more readily in a multi-national environment than text. However, understanding intent will be a richer and more complex issue compounded by linguistic and cultural differences as well as divergent *'implicit understanding of intent'*.

This arises from different expectations of action required or effort needed to achieve the mission from one contingent to another – ranging from giving up at the smallest setback to surmounting all obstacles. Direct personal contact, whenever possible, between commander and commanded, will therefore be essential to ensuring Unity of Effort and a common understanding of command intent.

Command philosophy too will vary from contingent to contingent. Some nations have ingrained the concept of *'mission command'* into their military cultures, allowing subordinates considerable freedom of action to take the initiative within the commander's intent as circumstances change. Others expect to command, and be commanded, by detailed orders – with a commensurate need for frequent reporting back to superiors and further direction as circumstances change. As Drs Alberts and Hayes observed in *Command Arrangements for Peace Operations*:

'When forces with fundamental differences in understanding of the degree of information they should report, the detail that should be contained in directives, and the degree to which subordinate organizations should take the initiative, are placed in one organization; the potential for confusion is massive'.

So, for the foreseeable future, we must work towards a common understanding of Mission Command to maximize our effectiveness on multi-national operations, while recognising and accommodating different approaches. We also need to understand

that Mission Command is not a dogma to be adhered to slavishly, it is a philosophy to be applied intelligently. In particular, we must recognise the need in Information Operations, for example, for a central message and acknowledge the challenge of articulating intent with clarity in the complex scenarios in which multinational forces often find themselves. Mission Command also requires subordinates to have considerable contextual information with which to frame the higher commander's intent. In PSO this will include political awareness and a very broad situational understanding at quite low levels of command – from which flows a multitude of training, educational and information needs issues that are unlikely to be able to be addressed as '*on-the-job*' training with coalition partners who are strangers to this kind of command philosophy. Commanders will, therefore need to recognise that sometimes subordinate HQs from other nations require more detailed orders and that equally, there will be occasions when the superior HQ is either from another nation or is an unfamiliar multi-national HQ and differences in command culture will have to be accommodated.

States of command are the device by which coalitions are subordinated and organized. They give legitimacy and confer authority. NATO Command States, developed for the Cold War, have only been tested in the Bosnia and Kosovo deployments, where, arguably, they have been found wanting. COMKFOR reported recently, for example, 39 operational employment variations and limitations amongst his 39 contingents. There is also evidence that national caveats would survive in

a multinational warfighting coalition. CinC CENTCOM⁴ and COMBRITFOR⁵ both reported that the move of 1st (UK) Armoured Division into the OrBat of VIIth (US) Corps, during Op DESERT STORM, had more to do with ensuring a pivotal role for the UK contribution to the operation and force protection issues, than it did to any improvement in force correlation. Whilst ideally, commanders should have sufficient freedom to deploy force elements at the tactical level without reference back to Capitals, in reality, constraints on the employment of national forces are a fact of life. Illustrative national caveats should be applied in peacetime training to practise commanders and staffs in managing their impact on plans and operations. During preparations for specific operations, whenever possible, commanders should work to minimize the extent to which such restrictions are applied, ideally pre-transfer of authority, by investing time in ensuring that national authorities have confidence to place their forces under their command. Once deployed, the caveats become yet another complicating factor to take into account in the employment of national capabilities.

Force Protection (FP) and Rules of Engagement (ROE) can be areas of friction and misunderstanding.

*'If commanders learn through experience that force preservation is valued more by the organisation than is boldness, with its attendant dangers, an entire army's approach to war will reflect as much.'*⁶

Nevertheless, a greater focus on FP and ROE issues is an inevitable consequence when wars are a matter of national choice, and not national survival.⁷ The human cost of war (on both sides) will influence public support for its execution. Multinational operations will compound this issue, since different nations will be more or less susceptible to changing levels of public support for their actions, and particularly those nations with a powerful, independent – and often sceptical – press. An agreed lexicon of ROE/FP measures could be completed under the direction of an international body such as the UN⁸ as a force preparation measure. It would provide a useful tool for commanders, and greatly simplify these complex – and therefore time-consuming – issues. Whilst commanders must work toward establishing a common basis for ROE and FP postures, they must also be prepared to work in circumstances where ROE, ROE interpretation and FP policy varies from contingent to contingent. ROE and FP posture must therefore be considered as an integral part of the capability of each element of the force and as a factor in the allocation of missions and tasks.

As forces modernize and introduce information age (digital) technology, they will adopt new ways of fighting - in particular they will trade mass for tempo. The difference in operating tempo of the most digitized forces (the US) and that of analogue⁹ forces will be stark. Superficially, a digitized US force could reduce its tempo to accommodate the battle rhythm of less digitized contingents. But digitized forces rely on tempo as the source of their combat power. Slowing down forfeits that advantage and risks

increased casualties.¹⁰ Therefore, whilst force modernization has the potential to increase opportunities for interoperability, it also brings with it new challenges which could potentially undermine Unity of Effort in multi-national forces – potentially low tempo may remain one of the greatest military disadvantages of multi-nationality, especially when facing a single nation opponent. For this reason, whereas multinationality at company level may be possible in Other Operations, multinational formations at brigade level or below would be unlikely to generate the tempo required for warfighting. The challenge for the commander is balancing loss of tempo by the most capable elements of the force, with the risks inherent in that for them, against the inclusion of the least capable, in a way that achieves the aim. Part of the answer lies in treating C2 capability as a factor in assigning missions and tasks – just as a commander would consider the numbers and effectiveness of a contingent's tanks or artillery.

It will also be necessary for digitally capable superior HQs to provide digitised liaison teams downward to bring appropriate links and functionality to subordinate HQs. Paradoxically, therefore, the requirement for human liaison in the information age will be greater than ever before – especially in multi-national operations. The key will be empowered, trained and equipped Liaison Officers of appropriate rank that can provide the *'lubrication'* to make the system work smoothly.

Special arrangements will have to be made for the sharing of intelligence in the new information

environment. *'Intelligence is guarded very jealously nationally and very understandably so.'*¹¹ The swift, transparent and honest passage of information between the CJTFHQ and contingents within a multi-national force is vital to the generation and fostering of the spirit of trust, which in turn leads to Unity of Effort. Despite this, nations and long-standing allies will not be persuaded to share their entire intelligence picture with all coalition partners. Greater co-operation and experience may allow releasability to be reviewed, but such reviews will themselves only take place within national circles. Commanders must walk the tightrope of preserving security, whilst at the same time ensuring that no contingent or individual government is presented with significant surprises. This will become ever more challenging as we conduct operations with increasingly unusual bedfellows – information sharing with the Russians, for example, is something we will need to get used to.

But in the longer-term, all of these efforts will be at best marginal if nations develop divergent concepts for the exploitation of information age technology. A common understanding of the potential impact of the technologies and the opportunities to exploit them will lie at the heart of interoperability. There is a need for an internationally agreed vision of coalition operations in the information age, shared at least by those countries that are able and willing to lead such operations. This needs to be underpinned by multi-national experimentation, otherwise it remains an untested hypothesis. Such experiments would have explicit benefits leading to solutions to specific problems, but they would also have an invaluable

implicit benefit – a shared understanding of how the operational art might evolve in the information age.

But irrespective of advances in information technology, there are some human interoperability issues that simply will not go away. The most obvious of these is language. English is now very much the ascendant language in business circles and in international popular culture. It has consequently emerged as the language of choice of NATO's nascent multi-national High Readiness Force Land headquarters. This means it is all the more important for native English speakers to be able to speak other languages, in order to build mutual understanding and respect.¹² Language training must therefore become an integral part of officer development if the UK is to continue to play a leading role in the kind of operations envisaged in the information age.



The other great enduring issue will be food. All armies march on their stomachs and taste varies widely. Anecdotal evidence from a number of recent events indicates that food will remain a key interoperability issue. In our rush to digitise

everything else, we must not forget the chefs – they need to access the finest ingredients!

NOTES

- 1 Dwight D Eisenhower, *Crusade in Europe*, New York, Doubleday, 1948, page 4.
- 2 Interoperability: 'the ability of systems, units or forces to provide service to and accept services from other systems, units and forces and to use these services so exchanged to enable them to operate effectively together'. (APP-6)
- 3 *Coalition Military Operations – the way ahead through co-operability*, US-CREST/FRS/RUSI/SWP Report Apr 00.
- 4 H Norman Schwarzkopf – *It Doesn't Take a Hero*, Bantam, Oct 1992, p. 449.
- 5 Sir Peter de la Billiere – 'The Gulf Conflict: Planning and Execution', *RUSI Journal*, Winter 1991.
- 6 'Take no Prisoners', Eikenberry, *Parameters*, Summer 1996, pp 109-118.
- 7 'On the other hand, the less intense the motives (for war), the less will the military element's natural tendency to violence coincide with political directives', Clausewitz, *On War*.
- 8 This work is currently being scoped in ABCA.
- 9 Analogue forces are forces that have not been digitized.
- 10 Maj Gen J P Kiszely – ' Battlespace Digitisation – The Implications for Interoperability' RUSI 15 Nov 00. Gen Kiszely observes that "analogue forces might become Sun Tzu's cheng, ordinary force (useful role might be fix). Digitized: Sun Tzu's chi, extraordinary force (best suited to strike); but fix = close = large casualties"
- 11 Taken from an after-dinner speech given by General Sir Mike Jackson, published in Gary Sheffield and Geoffrey Till (Eds), *The Challenges of High Command in the 20th Century*, SCSi Occasional Paper No 38, based on proceedings of SCSi/JSCSC/Dept of War Studies RMA Sandhurst Joint Conference, Bracknell, Oct 1998.
- 12 At a recent conference in Paris, Maj Gen Quiel, COS EUROCORPS, delivered his formal speech in French and answered questions in English, French and German depending upon the native tongue of the interrogator. When asked about language he said, to rapturous applause, "I am not here as a German officer, but as a

multi-national officer and as such I should be able to converse in the language of a force's major contingents".

CHAPTER 10

BEYOND INTEROPERABILITY: PART 2

By Paul Lefever

Nothing helps a fighting force more than correct information. Moreover it should be in perfect order, and done well by capable personnel.

Che Guevara

The advantages are nearly all on the side of the guerrilla in that he is bound by no rules, tied by no transport, hampered by no drill books, while the soldier is bound to many things, not the least by his expectation of a full meal every so many hours. The soldier usually wins in the long run, but very expensively.

Field Marshal Lord Wavell

Introduction

The events of 11 September 2001 heralded a new form of terrorism in which the unthinkable becomes the possible. The willingness of religiously motivated terrorists to engage in a policy of self sacrifice in order to achieve their perceived aims has

brought a new dimension to criminality. The concept of an adversary prepared to abandon all the previously held tenets of self preservation in pursuit of an objective throws many of our preconceived and accepted military theories into disarray and necessitates a review of many aspects of our approach to combating this threat.

The immediate examination of events leading up to September 11th has highlighted a lack of coordination between various security and other agencies worldwide. It has also identified the lack of an international ability to integrate disparate pieces of information and intelligence about people and events into a coherent picture of terrorist activity. Closer to home, the emerging chain of events leading up to 11 September demonstrated the ability of both foreign and British nationals with connections to terrorist organisations to move freely between the UK and other countries. Many in the media express concern at how difficult it can be to keep track of people in the United Kingdom whether they be terrorists, asylum seekers, benefit fraudsters, paedophiles or simply common or garden criminals. A further complication is that fundamentalist terrorists operate within the folds of the fabric of society.

The United States is following a policy of attacking the heartland or root of terrorism, the states that sponsor terrorism or harbour terrorists. The UK, by its support of the US in this endeavour, has aligned itself with this same policy. It seems likely therefore that the UK will find itself increasingly involved in operations of a similar nature to those in which it

has been variously involved in Palestine, Malaya and Northern Ireland over half a century; operations falling under the generic title of Counter Terrorist (CT) operations. Nations' realisation of their exposure to fundamentalist terrorism has brought a new willingness to band together in common opposition to terrorism. This has resulted in the previously unthinkable sharing of information and intelligence between the NATO countries and Russia, nations of the Indian sub-continent and a range of other unlikely bedfellows united by the new threat.

In the UK, one result of this new appreciation of the nature of fundamentalist terrorism has been a realisation that more must be done nationally to identify and counter the threat. The Armed Forces have always been charged with the last ditch task of repelling invasion in the defence of the home base. Now, it seems entirely possible that the Armed Forces and more specifically the Army will have an additional role, that of defending the nation from the '*enemy within*'. CT operations will therefore have two dimensions; Search and Destroy in the terrorist homelands and Protection of the Home Base.

Good intelligence is the key to the effective conduct of all military operations but in CT operations intelligence is fundamental to success. Typically, the information from which military intelligence is derived is drawn from military sources; collected by national and international military collection assets and exchanged with the Armed Forces of other nations. But the nature of terrorism is that the terrorist works alone or in discrete cells concealed

within the fabric of the population of a country. He has no recognisable deployment pattern or signature equipment to betray his presence neither has he conventional tactics or doctrine. He presents an unquantifiable threat operating within the most tenuous of geographical boundaries.

Meeting the intelligence requirements arising from CT operations is probably the most difficult task facing the intelligence community in the whole of the Spectrum of Operations. The key to fulfilling this task is information. Information derived from '*conventional*' military sources and agencies and '*New Information*' which will be derived from new sources different from those from which military information is normally derived. The majority of this information will be about people and the patterns of their lives for it is through detecting anomalies in these patterns that the terrorist can be identified. Fortunately, very large stores of information about people exist today, stored in extensive databases scattered across a variety of national and international commercial and governmental organisations throughout the world. It is the sharing of this '*New Information*' that must now be addressed.

Information in the Civil Environment

Information is regularly shared between commercial companies, usually for a price. Extremely large databases exist recording many millions of consumers' intimate details: sex, age, address,

comprehensive likes and dislikes, financial classification, spending patterns and much more. These enable marketing organisations, retailers and manufacturers to build consumer profiles of considerable depth and accuracy enabling them to target appropriate products at likely customers.

Increasingly, interfaces are being established between commercial and law enforcement information systems. Linkages between Motor Insurance databases, those operated by the Statutory Vehicle Licensing Authorities and the Police carry clear advantages. Other areas where potential exists for meaningful linkages are between Customs and Excise, the Inland Revenue, banks and airline ticketing systems. The potential benefits accruing from linkages of this nature are positive and clearly make a direct contribution to the conduct of the business of law enforcement in which those on one side of the interface are involved. However, this is not a one way information flow and there are readily identifiable commercial benefits to organisations who agree to share their data with these statutory bodies; a reduction in false claims on insurance companies is but one obvious benefit of this type of arrangement.

Information about people is also held by a wide range of Other Government Departments (OGD). The Security Service and SIS, the Immigration Service, the Inland Revenue, HM Customs and Excise, DHSS, NHS, the Office of National Statistics, Regional and Local Authorities and many other government organisations maintain large databases

of information covering numerous aspects of an individual's life.

In the main, information in the civil environment is about people but increasingly, large amounts of data about physical entities is being digitised and stored; construction details of roads, railways, bridges and tunnels, building plans and details of communication and distribution networks. Information is also freely available about shipping movements and details of airline and road and rail transport schedules are freely available. Environmental information is increasingly stored in databases: meteorological records, river and tidal flow records.

Quite clearly, much of this information has military relevance to the conduct of Counter Terrorist operations both within the country and overseas. However, before any use can be made of this data a survey would have to be made in order to determine the location, format and relevance of such databases. This would be a major task and a scoping of the size of the problem and the development of contingency plans for its resolution would be a sensible precautionary move. The implementation of such plans would almost certainly require changes in primary legislation to allow access to these databases.

Information in the Military Environment

Over recent years, NATO has embarked on a series of initiatives for the sharing of information and intelligence between Alliance nations. These include

standardised formatted messages, common intelligence database structures and data standards, Alliance wide bearer systems and Strategic Command C2 systems enabling the sharing of information and intelligence between the components of Strategic Commands. Well understood protocols are in place for the protection of national intelligence and NATO agreements exist for the maintenance of the security of information and intelligence released for use within the Alliance. In addition to arrangements for information and intelligence sharing within the Alliance, individual member nations have bilateral and multilateral arrangements for information and intelligence sharing with other Alliance partners.

Much of the most basic infrastructure required for information and intelligence sharing between the nations of the Alliance is either in place now or exists in conceptual form and could be implemented relatively quickly. As with most matters in the Alliance the impetus for progress depends very much on political will and the events of 11 September will have sharpened the imperatives in this area very considerably. The state of affairs within NATO whilst not perfect, does allow the exchange of information and intelligence in a relatively seamless manner and the potential exists for an expansion and upgrading of these facilities.

With one or two notable exceptions such as treaty organisations around the Pacific Rim, formal arrangements for information and intelligence sharing outside the Alliance have been virtually non-existent. There is now a new willingness on

the part of nations such as Russia to share information with others. This highlights the need for the development of technical and procedural protocols to ensure that the maximum benefit is gained from what is potentially a major expansion in the amount of information and intelligence available for use in CT operations. Languages will present problems in the sharing of information and intelligence for the immediate future. The time taken to acquire a language skill at a level appropriate to interrogating a foreign language database or evaluating a foreign language intelligence report is years rather than months. However, the rapid development of linguistic translation software coupled with a targeted programme of language training would alleviate this problem within a year or two of its inception.

The Technological Challenge

In the commercial world data about people is a saleable commodity. Names are sold for a few pounds a thousand, companies are bought and sold for prices based on the contents of their customer databases. Physical data is equally highly regarded, Ordnance Survey, the Hydrographer and the Meteorological Office sell their data to customers the world over either as bits and bytes or as products; maps, charts, weather forecasts. The majority of commercial databases are configured for the convenience of their owners and with very few exceptions such as in banking and other financial institutions, they are rarely engaged in the routine exchange of data. There is therefore very little

impetus towards data standardisation across the commercial world.

It is likely that commercial databases will be based on one of the more widely used software packages. In this case, the use of some form of translation software would allow the straightforward importation of civilian data into military databases where necessary. Civilian data may also be held in custom built databases for which no translation software exists and in this case purpose built translation software would have to be commissioned. This would impose time and resource penalties some of which could be avoided by early identification of those essential databases which are configured on non-standard software. Once these have been identified, either some alternative source of the data can be identified or an assessment of the resource implications of using data from these databases can be made.

Two major routes to gaining access to shared data present themselves for consideration:

- **Wholesale Data Import.** If very large quantities of commercial data are to be made available to the Armed Forces from outside sources, then arrangements for the military storage, retrieval, interrogation and transmission of the data must be in place before the outset of CT operations. The provision of large volume data storage does not present a problem today but decisions about the format in which it is to be stored and the compatibility of the storage format with national C2 and G2 systems will have to be made before

any data is transferred. Bandwidth problems bedevil military C2 systems and the need to move very large volumes of data into and between military organisations will present problems requiring early resolution. The provision of large bandwidth bearer systems between static locations is relatively straightforward but if these same quantities of data are to be provided to locations which are either mobile or have the potential for movement, then Direct Broadcasting by Satellite (DBS) or some other more advanced technological solution will have to be employed.

- **A Networked Solution.** An alternative approach to the acquisition of data would not involve the transfer of the contents of databases but would require the acquisition of the rights to search for data in existing databases through interfaces. This would, to all intents and purposes, involve networking the relevant databases. Whilst this would pose an element of technological challenge, it would remove the need for the Armed Forces to move very large quantities of data, and to store and manage them. It would in fact remove many of the high cost overheads of data ownership. The legal implications of such an arrangement are far reaching and clearly many guarantees of data security would have to be in place before commercial organisations would agree to allow the Armed Forces access to their databases.

On balance the Networked Option offers the more attractive solution but in practice, because of the

difficulties involved in setting up networking arrangements with databases in non-NATO nations and with commercial organisations, it is likely that a mix of both methods of sharing data would form the eventual solution.

The possession of large quantities of data or having the ability to access the same data through a network is a potent tool for meeting the intelligence requirements of CT operations. The wider the baseline of information that is available to the analyst, the better the intelligence that he produces will be. However, information is only one part of the intelligence equation and if the best use is to be made of the information, then appropriate software must be in place. Earlier mention has been made of link analysis software which enables relationships between any entities to be defined. There will be a requirement for other software capable of pattern detection and matching, of keyword search and of other means of assisting the analyst to correlate and visualise the vast amounts of information which will be presented to him. All these applications will be linked to powerful intelligent search engines capable of scouring very large databases containing disparate types of information and retrieving data of significance to the analyst.

It is unlikely that Artificial Intelligence (AI) will be available to the intelligence analyst for the foreseeable future and the human analyst will remain at the very core of the process for at least the next five if not ten years. There will be a degree of information fusion available which will help to reduce the volume of information retrieved from networked

or individual databases into a manageable flow but in the near term this is likely to be a relatively crude tool and it will be some years before truly sophisticated information fusion is possible.

The introduction of complex IT systems; databases, networks, search engines and analytical applications will bring in its wake a new hierarchy of support personnel; systems managers, systems engineers and systems designers all of whom will have to be accommodated either in existing budget provisions or through new money. In this same vein, the costs of widening access to information will be considerable and until the data which will be needed can be identified and quantified the resource implications will remain unknown. Data sharing and the enhancements that this will provide to CT operations will come at a price and that price may be high.

The Military Benefits of Information Sharing

The basic CT intelligence requirement can be crudely summarised as '**Who** does **What** with **Whom**, **When** and **Where** do they do it, and **Why**?'. These are very complex questions but, provided that one small part of the equation can be identified, then with access to very large stores of data and with the appropriate software, linkages and associations can begin to be teased out into a comprehensive picture from which the intelligence requirements can be met.

In order to identify the benefits of information sharing, it must be placed in the context of possible CT operations. These can be divided into two principal categories:

- **Search and Destroy.** Operations conducted outside the United Kingdom. Taking the fight to the terrorists' home base and destroying their infrastructure, training and sustainment organisations. Punishing the sponsors of state terrorism and deterring potential sponsors and paymasters. Detaining terrorist leaders, demoralising terrorist followers and destabilising linked terrorist groupings.
- **Protection of the Home Base.** Undertaken within the United Kingdom as Military Aid to the Civil Power (MACP) operations and therefore under police primacy. Encompassing activities appropriate to the operational situation including KP and VP Guards, Cordon and Search, VCP and PCP checks, escort duties and patrolling of urban and rural areas including reconnaissance and surveillance operations.

Illustrative of the intelligence requirements linked to CT operations are those shown in the matrix (next page) and from this it can be seen that much of the information required to meet them will be held in non-military, non-governmental databases.

The Intelligence Process in CT operations is no different from the same process conducted in any other type of operation. The difference lies in the sources of the information from which the intelligence is derived. What September 11 proved

Operation	People	Places	Events	Others
Search and Destroy	Names Addresses Travel Patterns Banking Spending Donations Associates Airline Bookings Languages	Terrorist States Sponsor States Third Party Sponsors Fellow Travellers Suspect Destinations Repetitive Destinations Host and Sponsor Country Basic Intelligence	Coincidental Dates Events linked to Presence of possible Players Precursor Events	Health, morale, welfare Foreign Policy perceptions Links to personal and world events
The Enemy Within	Names Addresses Profession Education Travel Patterns Banking Spending Donations Associates Languages	Visits to locations of known Players Recognition at potential KP and VP locations	Meetings Demonstrations Unexplained absences Precursor/ Purchases/ Acquisitions/ Possesions	Health, Morale, welfare Links to personal and world events Clubs, religious and other groups

was that much of the information relating to events on that date probably already existed in a database somewhere. Had that information been available to an organisation with the ability to retrieve and make use of it, it is conceivable that the outcome might have been different.

There is little doubt that if wholesale access were available to '*other military*' and commercial databases then both the ability to meet CT operations' intelligence requirements and to provide meaningful and timely indications and warnings about terrorist activity would be greatly enhanced.

An Endstate

It is clear that if we are to effectively pursue internal and external CT operations in the future, access must be gained to existing but previously unavailable sources of information and intelligence. In order to make these available, it may be necessary for new primary legislation to be enacted and in some areas for old shibboleths to be laid to rest. Access by the military to the information contained in civil databases must be accompanied by unequivocal guarantees of data security. These will be essential to gaining the acceptance of both the public and of law makers to the military use of the information contained in civil personnel databases.

We are fortunate in the United Kingdom that the first demonstration of raw fundamentalist terrorism took place somewhere else. It might however just as easily have been here. The question that must be

asked is whether we would have been any better informed or prepared than the United States to meet the threat of such an event or indeed, after the event, whether we are now much better prepared today. The provision of new information for use in the derivation of military intelligence is ultimately, like all military decisions, one that will be dependant on political will. The potential exists for a quantum improvement in the provision of intelligence support to CT operations. The implications of putting in place the arrangements that would enable that improvement to take place are far-reaching but not overly intrusive when compared to the effects of a major terrorist act.

The choice presented here is somewhat stark. The potential for information sharing exists, the benefits are undeniable but there are costs both in financial resources and loss of civil liberties. These must be balanced against the potential effects of terrorism.

'The will to conquer is the first condition of victory!'

Marshal Foch

CHAPTER 11

THE DIVINE THREADS

By Graham Le Fevre

*'...it is the divine manipulation of the threads and is the treasure of the sovereign...'*¹

Sun Tzu

(on information gleaned from networks of spies)

In the future Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR), supported by effective Command, Control, Computers and Communications (C4), must provide timely, accurate, relevant and assured information and intelligence in the right form to support decision making, planning and execution of operations by commanders at every level of command. Supporting commanders is the primary function of C4ISTAR. When manoeuvring and executing operations, especially at the lower tactical levels, commanders will require precise, real time intelligence on the enemy and the environment and may even need to have a *'dialogue'* with a specific sensor or its controller. Precise requirements of commanders will of course vary with the level of command at which they are operating – decision-making timescales, for example, will expand at higher levels.

C4ISTAR must also serve other related purposes, such as supporting Information Operations and

Media Operations, where a capability to rapidly exploit imagery will be essential. Information for evidential purposes can be expected to assume increasing importance, but the crucial factor here is the audit trail² for the handling of information that may be used as evidence, rather than the quality of the information. Battle Damage Assessment (BDA) will be an enduring requirement with BDA for non-lethal capabilities, including Information Operations, bringing new challenges. ISTAR will also have a role in Combat Search and Recovery Operations.

Future operations will require a better understanding of the environment and it is expected that considerable amounts of environmental data and fused environmental information will become readily available to all users.

C4ISTAR must support the application of single service and joint effects, especially firepower, which has unique demands of immediacy, responsiveness and resolution. Any changes to our future close battle capabilities will inevitably be predicated on an enhanced ISTAR capability, supported by capable C4, linked to precision attack. This places a high premium on providing timely and accurate information for targeting, and putting effective Sensor-Decider-Shooter links and processes in place.

A '*System of Systems*' approach must be taken to the organisation of collection assets³ across components and in the multi-national environment. Such an approach is where each collection capability is considered as one element of a larger

whole, the whole being co-ordinated and controlled to ensure maximum efficiency is gained from each element. The mix of ISTAR assets must be robust ensuring that the essential interplay between them, including cross-cueing, can be achieved, but there must be no over reliance on any one type of asset. A cultural shift is required from reliance by commanders on *'owning'* the collection assets as the only way to meet their intelligence needs. They must have confidence in the service provided by highly capable assets, as well as access to information, held at higher and joint levels of command, supplemented by those assets under the commander's direct control.

Traditionally intelligence has been developed using the Intelligence Cycle, with greater emphasis placed on Direction, Processing and Dissemination rather than Collection, often because of the paucity of ISTAR collection assets at all levels of command. The increase in collection capability that is already being fielded demands a change in emphasis, where due weight is given to collection planning and the co-ordination of the collection effort in a way that has not been possible or necessary up to now. This must be applicable across the levels of command as well as within each level, requiring staffs to take a much broader view of collection requirements and available collection assets than has traditionally been the case.

Whatever happens organisationally as capabilities and processes develop, the commander will still require intimate, expert intelligence staff support to help him define his Critical Information

Requirements, '*...of all those in an army close to the commander, none is more intimate than the spies*'.⁴ They must also be able to present the intelligence product to him that they have drawn from all available sources and to which they have applied expert judgement.

The ISTAR collection assets allocated to each level of command must be commanded at the level commensurate with their reach (in both time and space) and co-ordinated. ISTAR must be mission orientated and commanders must ensure that missions allocated to lower levels of command are matched by appropriate ISTAR collection assets and C4. Individual system mission planning is likely to remain within the command element of that system, but co-ordination between systems will be vital to ensure that sensors are in the right place at the right time and can provide the coverage necessary to meet the commander's requirements. This needs to be achieved whilst also minimising duplication of effort, and taking full account of the capabilities and limitations of the various systems in the light of the prevailing operational circumstances.⁵ ISTAR staff must be augmented when additional ISTAR assets are allocated to ensure that the commander can co-ordinate and integrate the resources he has been given.

Figure 1 illustrates a generic C2 structure that could be applicable at all levels of command. Information and intelligence is received from assets controlled at levels above and below any given level of command, as well as from assets controlled directly by the subject level of command. The ISTAR Cell is

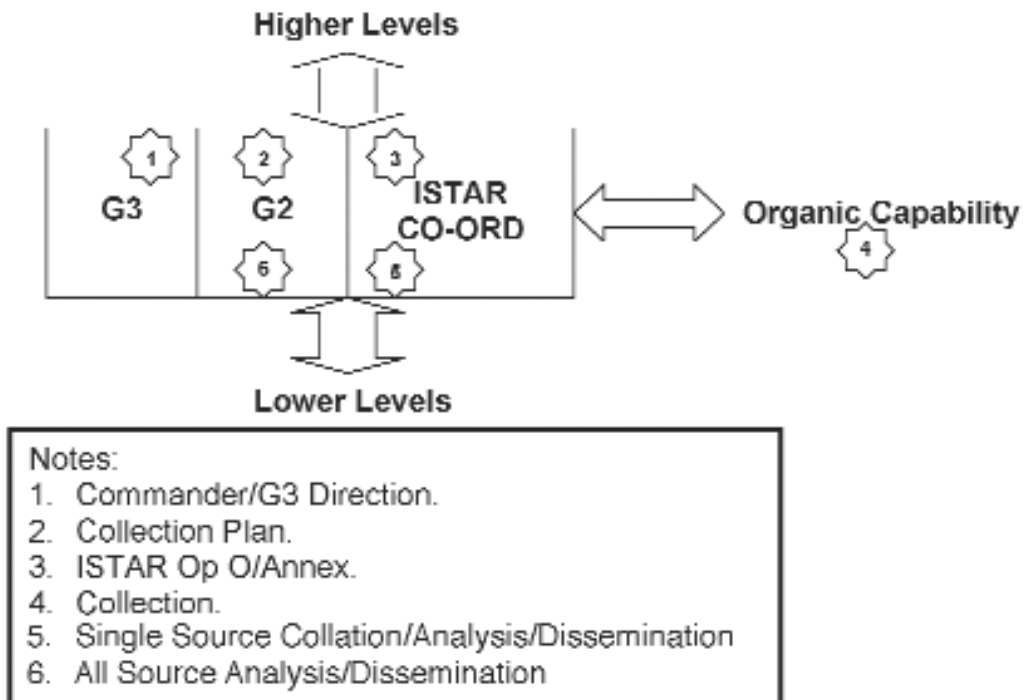


Figure 1. Generic ISTAR C2 Model

responsible for the 'System of Systems' coordination of organic collection assets, including coordination with assets at differing levels of command. It also carries out single source analysis of reports from individual systems under control of the subject level of command. It could be a cell embedded in the Main HQ, or remoted from it, as a satellite HQ, depending on the operational situation and level of command. At the Corps level it would remain embedded, as there is little imperative to remote it. Whether remote or embedded, from an ISTAR process perspective, it and the G2 cell should be seen as a holistic entity. The ISTAR Cell receives direction from the G3 and G2 staff, but is also closely linked with other branches to support both manoeuvre and fire support, for example.

A single nominated officer, with the necessary staff support, should be responsible for ISTAR at every level of command. He should be mission focused, ensuring that assets are deployed to best effect and dynamically re-task assets to achieve the commander's intent as circumstances change. He must not impede the passage of information between the collection assets and those who need the information, nor should he allow ISTAR to develop into a 'stovepipe'.

The C2 model, replicated at each level of command, would sit within a wider C4ISTAR architecture. The architecture should allow access to information wherever it may be held, the ability to pass Requests For Information (RFI) and tasking to different levels of command, the ability to control the collection assets within a level of command and to disseminate the intelligence produced. There are a number of

possible options for an overall C4ISTAR architecture, which are described below:

- **Reachback** is where supporting processes are carried out at a location out of theatre.⁶ Reachback might provide an overall reduction in ISTAR manpower, but would require major investment in strategic communications⁷ and a home based supporting intelligence infrastructure and would also risk a loss of *'theatre feel'* by analysts. It would also require an in-theatre reversionary capability should communications fail.
- **Centralisation** is where all of the staff processes are carried out at a single location in the Area of Operations. It would remove processes from lower levels of command, and help reduce footprint, but this might affect the timely passage of information as well as responsiveness. It would require a considerable change to the operational level architecture and place a burden on theatre communications. Like reachback it would require a reversionary mode should communications fail and, in itself, would provide a single point of failure.
- **Dispersal** is where individual, or groups of processes are carried out in different locations at all levels of command. Dispersal would fragment the infrastructure, would place a significant extra burden on tactical communications, and would make the co-ordination of the ISTAR *'System of Systems'* more difficult.

A federated architecture is effectively a combination of reachback, centralisation and dispersal. It ensures that key processes are centralised at each level of command, but aspects of reachback and dispersal are also embedded. It would allow the commander, at each level, to control his ISTAR assets while accessing and contributing to the rich web of information available from assets held at other levels of command.

It is expected that the future C4ISTAR architecture will be based on the federated approach as shown in Figure 2. The diagram is a fantastic simplification and does not, for example, capture the cross-cueing between sensors, or sensor to shooter links. It could apply at each level of command from battlegroup to corps.⁸ It shows the linkages that need to be made across levels of command, and it supports the C2 model shown at Figure 1. Importantly it feeds, and is fed, by the Common Operational Picture (COP), understanding that at the higher tactical level it coalesces into the Purple COP or Joint Operational Picture (JOP) whilst at the lowest tactical level it is clearly single service. The intent of such an approach is to enable commanders at the tactical level to benefit from the investment in operational and strategic systems, whilst at the same time enabling assets controlled at the tactical level to be employed and exploited to best effect.

Such an architecture is not radically new, but is evolutionary. Importantly it provides flexibility and the basis for further development as our collection capabilities improve. From the commander's perspective it should provide him with confidence

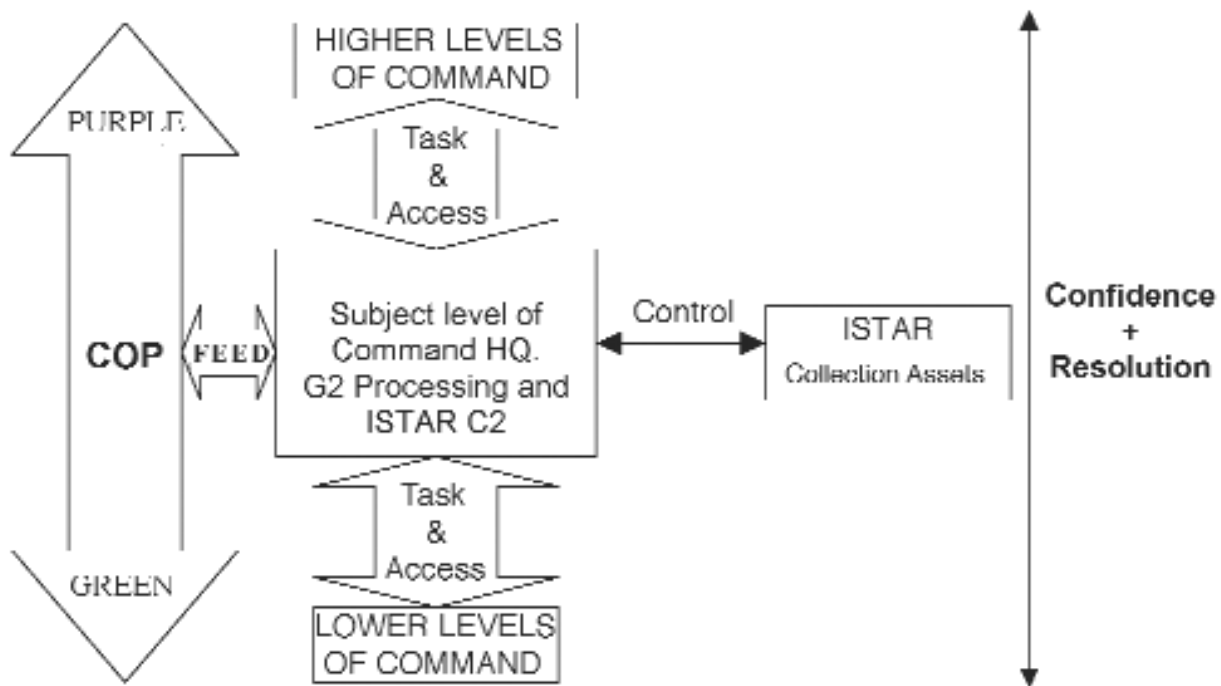


Figure 2. Generic ISTAR C2 Model

that his direction is being met and that the resulting intelligence is timely, as robust as possible and of the ‘*resolution*’, or level of detail, that he requires.

Development work is already underway to realise a future Federated C4ISTAR architecture, with much effort focussed on the improved co-ordination of what are currently disparate stove-piped elements. The key challenge will be to deliver the processing power (human and digital) and the Communication and Information Systems (CIS) infrastructure to realise the intent of the ISTAR architecture - to allow the tactical level of command to benefit from investment in operational and strategic systems, while enabling tactical assets to be employed and exploited to best effect.

NOTES

- 1 Sun Tzu, *The Art of War*, Chapter 6, ‘The Use of Spies’.
- 2 Often referred to as data tagging.
- 3 Potentially all organisations have a capability to collect information but for the purposes of this paper the focus is on those organisations whose primary role is I, S, TA or R.
- 4 Sun Tzu, *ibid*.
- 5 For instance the employment of manned systems requires consideration of additional factors such as personnel protection.
- 6 There is no formal definition of reachback, but it is considered to mean reaching back to capabilities out of theatre in the home or Alliance/Coalition base. Drawing on capabilities placed in a safe, or relatively safe, area in-theatre is considered to be part of centralisation.
- 7 Despite the US military’s major investment in military satellite communications almost 60% of DoD satellite communications are passed via non-military satellites (source US Space Warfare Centre).
- 8 It could equally apply to command levels in other components and in the Joint Environment.

CHAPTER 12

3D VISION

By Graham Le Fevre

'...the technology that is available to the US military today and now in development can revolutionise the way we conduct military operations. That technology can give us the ability to see a "battlefield" as large as Iraq or Korea – an area 200 miles on a side – with unprecedented fidelity, comprehension and timeliness; by night or day, in any kind of weather, all the time. In a future conflict, that means an Army corps commander in his field headquarters will have instant access to a live, three-dimensional image of the entire battlefield...'

Admiral Bill Owens, USN.¹

Rommel was so determined to see the enemy's dispositions for himself that he often flew over the front line in his Storch reconnaissance plane, sometimes taking his Chief of Staff with him on these perilous excursions.² A number of aerial surveillance systems entering service will provide commanders with the bird's eye view Rommel so desperately sought, without them having to leave the relative safety of their command posts. The Airborne Stand-off Radar (ASTOR) and the Reconnaissance Pod for Tornado (RAPTOR) will

provide commanders with near real time imagery and when combined with Unmanned Aerial Vehicles, soon to be ubiquitous, will revolutionise land force commanders' perspectives at every level of command. Gone is the aerial photograph as a stale snapshot in time – perhaps delivered too late – and in comes still and moving imagery, real time, where you want it, when you want it to support planning, manoeuvre and target engagement. This is perhaps the single most significant change to a commander's ability to see his own battlespace since Frederick the Great raised a telescope to his eye and was able to establish his headquarters in a fixed location overlooking the battlefield, rather than having to rush around it, as was the practice of Gustavus Adolfus a century before.³

But this particular '*revolution*' in capability has been a long time coming. At the beginning of the 20th Century, technology, tradition and force structures meant that the capability to acquire information within the military ground environment was delivered by ground based reconnaissance forces and espionage. The First World War saw many changes in military technology and methods of operation but, from an ISTAR perspective, was probably most noticeable for the introduction of mobile⁴ air reconnaissance and observation platforms. The use of air reconnaissance increased between the First and Second World Wars and by 1945 air reconnaissance was an important and well established collection capability.

However the next real conceptual and technological leap did not come until the second half of the 20th

Century. The Cold War, and the requirement for intelligence gathering at ‘*strategic*’ ranges by superpowers divided by oceans and the polar ice cap, drove the development of high flying, long range and long endurance airborne reconnaissance and surveillance systems. These systems carried sensors supporting imagery, Signals Intelligence (SIGINT) and other more specialist areas. The rapid development of satellites from the late 1950s onwards meant that sensors could be placed outside the atmosphere providing greater endurance, range and coverage with less platform vulnerability.



SR-71 Blackbird

Fielded airborne ISTAR systems within NATO now carry a very wide variety of sensors supporting Imagery Intelligence (IMINT), SIGINT and Measurement And Signature Intelligence (MASINT). The UK itself has an extensive airborne collection capability. These systems, linked to further development of other tactical as well as strategic and operational level airborne systems, will provide the UK military with a really comprehensive airborne reconnaissance and surveillance capability. The Army has traditionally focussed on its ground based collection assets, developing its processes based on a fairly two dimensional view of the battlefield. At the strategic level the balance has already shifted to a much more multi-dimensional view of the

battlespace. The challenge the Army faces is how to change its mindset to become properly 3-dimensional and exploit the strategic systems and the newer operational and tactical level airborne systems to improve its Situational Awareness.

ASTOR

The ASTOR programme has been underway for some time, equipment is now being built and the first elements of the ASTOR unit will start to form at RAF Waddington next year. It has a maturing Concept of Operations and all of the principal elements of the system are well defined. ASTOR will be an all-weather, day/night radar imaging surveillance system able to detect and recognise moving and stationary ground targets in Near Real Time (NRT).



The system will comprise high-flying air platforms, exploitation Ground Stations (GS) and the associated communications architecture. The air platforms are based on the Bombardier Global Express business jet, equipped with a long range, dual-mode Radar System (DMRS). ASTOR's GS will be capable of supporting levels of command from a deployed Joint Task Force HQ downwards. The ASTOR system will have a comprehensive communications suite that will enable the target area

data to be passed directly, in near real time, from the air platform to those HQs with ASTOR GS where the exploitation will, for the most part, take place. This methodology is designed to overcome much of the delay traditionally associated with airborne imagery collection systems. However, the system will retain a capability for data exploitation on-board the AP.

ASTOR will be able to provide radar coverage of significant areas of ground for long periods of time. It will be fielded as a Joint capability and is likely to be commanded as a national asset. There will be competing demands placed on the system with the UK National Contingent Commander (NCC) or Joint Task Force Commander (JTFC) providing direction. However in order to support tactical commanders it is expected that direct tasking authority could be allocated to the brigade level. GS should be allocated down to brigade level, but the limited number to be acquired will not be able to support all formations within a division sized force. On warfighting operations, when formation HQs need to move, two GS will be provided to ensure 24 hour coverage. Any GS within range of the aircraft can receive moving target indicator (MTI) data but synthetic aperture radar (SAR) is limited to only two GS at any one time. The need for line of sight between aircraft and GS will influence siting of the latter. GS can be located up to 1 km away from the HQ they support but require a direct line connection to pass information.

The fielding of ASTOR means that for the first time within the British Armed Forces an operational level system will provide broad area radar imagery

coverage of the battlefield. The ability of ASTOR to monitor and accurately locate activity over a relatively large area will permit rapid tactical planning and the efficient cueing of other sensor and attack systems. ASTOR, in the vast majority of its operations, will be working as part of an integrated and Joint '*system-of-systems*', covering several levels of command all the way down to brigade level. It will directly contribute to the development of the Land Component situation awareness as well as being able to effectively cross cue other collection assets.

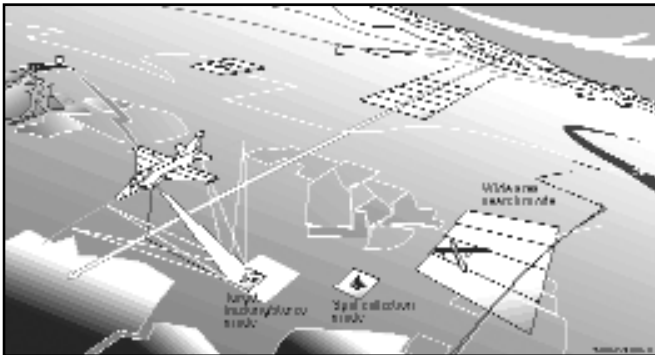


RAPTOR

RAPTOR is a new generation air reconnaissance capability that is now coming into service. It will consist of a number of pods and Data Link Ground Stations (DLGS). The pods have a sophisticated electro-optic/infra-red capability that can be used at low and medium flight levels. The pods are self-contained, with their own integral communications suite, and can be carried by the GR4⁵ variant of Tornado. The pod will be able to execute a large number of tasks per mission, comprising spot, stereo, area and line searches. The system will support the taking of swathes of imagery of

considerable width per pass with airborne re-tasking co-ordinated by the navigator.

The pod will be able to communicate its imagery via a line of sight downlink to a bespoke DLGS. In-flight exploitation and tethered or selective data link will allow rapid exploitation of the imagery and dissemination of the resulting IMINT. The DLGS is an air transportable and NBC compatible cabin suitable for a Main Operating Base (MOB). It can be deployed elsewhere if there is a requirement to reduce the data link range, however its ground mobility is very limited. RAPTOR products and information and intelligence gleaned from them will be disseminated through the CIS architecture to those who need them.



UAV Developments

The UK's current experience of UAVs is based on the Phoenix system, NATO experience with US UAVs in the Balkans and views of how other countries have been using their UAVs. Phoenix has only been in service for three years and yet the

concept of how it should be used has already changed quite considerably. It is no longer seen as just a Target Acquisition system, but as a multi-capable system with broad ISTAR utility.

UAVs have the potential to establish a persistent dwell over a target area. This allows the enemy, or object of interest, to be tracked continuously until they are engaged by strike or manoeuvre assets, or other appropriate action is taken. By being under the control of every level of command, commanders will potentially have their own aerial view of precisely the area they are interested in for as long as they remain interested, subject to system limitations and operational circumstances. This is a truly revolutionary capability, the potential impact of which is yet to be fully understood.

Outside the UK UAVs under development, and in service, have ranges that vary from metres to thousands of kilometres and ceilings that range from a few metres to well into the stratosphere. Generally speaking the size of the UAV relates to its ceiling, range, payload and endurance. A UAV that has an extended range and that can reach significant heights is likely to be of significant size, a short range UAV could be only a matter of feet in size, whilst at the lowest end a micro UAV could go down to the size of an insect. Up until now UAVs, especially the larger ones, have been considered to be sophisticated air platforms that require the platform controller to have a knowledge of avionics and the theory of flight. However the increasing sophistication of the software, and the greater use of automation within UAV systems, is rapidly reducing

the skills required of any pilot/operator. Developing systems are already at the stage where the operator needs minimal skills to be able to fly the air vehicle as the software carries most of that burden.

There are three potential systems architecture options for UAVs. These are:

- **Satellite Relay.** A UAV that is controlled via a satellite relay has great flexibility as to where, and how far away, the GS elements could be located. It has considerable potential range and is not inhibited by terrain.
- **Airborne Relay.** A UAV that is controlled via an airborne relay, often another UAV of the same type, is much more restricted. GS elements need to be in relatively close proximity to the relay platform but the UAV on mission could be a considerable distance from the relay UAV.
- **Line of Sight.** A UAV that has no relay can only operate within Line Of Sight (LOS) of the GS; this will restrict the reach of the system.

All systems require GS in sufficient numbers to enable the efficient working of the UAV system. GS can be either '*dumb*' ie they can only receive data from the Air Vehicle or active when they control the Air Vehicle and become known as Ground Control Station (GCS). Such stations are likely to be geographically located where they can receive data from, or communicate with, the Air Vehicles. The UAV system architecture must allow the free flow of information from the tasker to the controller to the analyst and the end user. We should expect that

ISTAR UAV systems will be resourced with a GCS/GS architecture that allows the product to be disseminated to whoever requires it.

Airspace Management and Co-ordination is vital for air operations and all UAV activity must be co-ordinated as part of the larger air situation. Generally the higher and further the air vehicle flies the greater the complexity of co-ordination, although very high flying UAVs may require less co-ordination as they will fly above the height envelope of most other air vehicles.⁶ Air Traffic Control (ATC), especially in peacetime or on operations conducted within a civilian airspace management environment, is crucially important to the effective use of UAVs. Procedures must be put into place to ensure that the operational use of UAVs is not unnecessarily restricted. The procedural complexity of ATC will require properly trained personnel.

The amount of logistics support required by a system will vary. A small, expendable UAV will have a relatively small logistics requirement, whereas a large, long range UAV will have a logistics requirement more akin to an aircraft. The amount of logistics support required by a system is likely to have a bearing on whether it has true tactical capability or requires the type of infrastructure associated with a fixed site, such as an airfield.

Future UAVs could be used for many different tasks but there are likely to be three primary ones: carrying sensors, acting as a communications relay and carrying a payload that achieves an effect, this could range from physical destruction ie a bomb to

information broadcast such as a PsyOps message. Information gathering UAVs are used primarily to support planning, operations (manoeuvre) and targeting. The key requirement for tasking is that the person who needs to task a UAV must be able to do so rapidly, be assured that the task will be undertaken, and that the information gathered will be passed back rapidly. The further removed the requester is from the UAV task co-ordination function/cell the less responsive the system. When speed of response to information received must be in seconds and minutes any delay can be detrimental to effectiveness.

There is always a requirement for the timely dissemination of information or intelligence. This is particularly important at the lower levels of tactical command where the immediacy of response to a detected threat can be critical to the battle outcome. In the short to medium term C4 capability will constrain the dynamic use of UAVs and require them to be controlled close to the level of command at which they are to be tasked, otherwise the immediacy of the imagery from the 3rd dimension will be prejudiced. However it is important to recognise that the products of all UAVs should be distributed to all who need them, of whatever component or level of command. The C4I architecture, and in particular the distribution of GS must ensure that this can be achieved. In principle, the key is having authority to task a system in the knowledge that it is responsive enough to provide the required information in the timeframe in which it is needed and to be able to hold the system on task,

providing a continual flow of imagery to support engagement and manoeuvre.

Implications

The introduction of these systems will provide ISTAR to underpin planning, manoeuvre and targeting for the Land Component from corps level down to battlegroup. Combined with information from other systems, this will provide commanders at these levels with an unprecedented understanding of their own battlespace. Planning, manoeuvre and the application of firepower will be much improved. In particular, the immediacy and sustained flow of the information provided by UAVs that can respond dynamically as circumstances change, has the potential to revolutionise the way commanders think about and use ground and consequently has implications for weapons, organisation and tactics.

NOTES

- 1 Adm B Owens USN, *Lifting the Fog of War*, Farrar Straus and Giroux, New York, 2000, p 14. Adm Owens is a former Vice Chairman of the US Joint Chiefs of Staff.
- 2 See David Fraser, *Knight's Cross*, Harper Collins, London, 1993.
- 3 For a historical perspective, see Martin van Creveld, *Command in War*, Harvard University Press, Cambridge MA, 1985.
- 4 Tethered air balloons with observers had already been in use for many years.
- 5 The GR4a will continue to fly the Tornado Infra Red Recce System (TIRRS).
- 6 High flying UAVs will still need to transit through multiple levels of airspace to reach or descend from their operating altitude.

CHAPTER 13

THE CASE FOR MANNED RECONNAISSANCE

By Graham Le Fevre and John Thornton

'I trust that none of my officers considers that the aircraft can be used for anything other than observation and dropping hand held bombs. The responsibility for reconnaissance remains where it has always been with the cavalry!'

Field Marshal Haig

The UK military's plans for ISTAR equipment acquisition are based, to a large degree, on the acquisition of increasingly complex technical systems which provide a remote view of the battlespace. These systems will provide the capability to undertake wide area and focused surveillance. Yet they remain remote from their target and, even when systems, such as unattended ground sensors, can be placed on the ground they only provide a partial picture.

Paradoxically, therefore, in an era in which space-based, aerial and remote sensor systems proliferate, there is an enduring, even increasing requirement, for manned reconnaissance. However, the term manned reconnaissance can be misleading as it

implies, perhaps, that there is manned and unmanned reconnaissance. This is too simplistic – all forms of ISR have a *'man in the loop'* somewhere. ASTOR, for instance, is a remote stand off system, but it is manned by aircrew and analysts. The idea *'manned reconnaissance'* does not therefore concern all forms of information gathering that require a *'man in the loop'*. The distinction is twofold: the activity is reconnaissance, which implies infiltration and penetration of the enemy's battlespace; and *'the man'* is so placed that he is at some risk in carrying out this activity. Equally, manned reconnaissance is not the prerogative of ground forces. Manned aerial reconnaissance in fast aircraft, for example, viewed by the RAF as a continuing and essential part its capability, is an element of the manned reconnaissance equation.



Armoured Reconnaissance in the Gulf War

From a ground force perspective, a key advantage of ground-based manned reconnaissance is that its presence on a piece of ground can alter its status to being in one's own hands. The overflight of the same by manned or unmanned assets, merely

provides information. For example on 8 June 1940 Rommel expressly ordered his Reconnaissance Battalion Commander (Von Luck) to *“push through to the west for about 30 kilometres... take the hill and establish yourself there until I arrive with the tanks. Do not look left or right, only forward all the time”*.¹ Von Luck succeeded in his mission after some difficulty and by 9 June had captured the little port of Fécamp. Other similar examples include, of course, the capture of the Remagen Bridge on 7 March 1945 by Lieutenant Timmermann. A more contemporary example, perhaps, is Baghram airbase, where a company of Marines went in, ostensibly for reconnaissance purposes. The impact of their being there had strategic significance in a way that aerial reconnaissance of the same would not. Granted, their position appeared precarious – but that is precisely the risk/gain equation of manned reconnaissance.

Manned reconnaissance will continue to contribute decisively to Joint ISTAR and to targeting for Joint strike assets. It will cue combined arms Air and Ground Manoeuvre and should make an effective contribution to all the components of capability: manoeuvre, firepower, information, command and control, deployment, protection, sustainability and domination of the electromagnetic spectrum. It can act both as a sensor and as a discriminating ‘*decider*’ within the ‘*sensor to shooter*’ system. It may enable freedom of movement through flank and economy of force tasks making use of organic mobility, firepower, protection and surveillance. Using indirect fire, manned reconnaissance should

be capable of area denial, security of Lines of Communication and of key points.

It is also inherently flexible and can conduct other tasks such as regulating movement or switching rapidly to a liaison role, by virtue of having good communications and high quality people at all levels of command. For example, Von Luck, again, in the fall of France in 1940, was able to switch rapidly to a liaison role and thereby facilitated Pétain's surrender at Bordeaux.²

In Other Operations, covert manned reconnaissance will have a key role to play – tasks could include gathering evidence and cueing other agencies to, for example, effect an arrest or to carry out some other form of action. The more sensitive the surveillance mission, the more specialised the unit carrying it out will need to be.

Uniquely, and particularly in Other Operations when there will be a premium at all levels on being able to acquire information from third parties, manned reconnaissance can interact with the populace and other parties in the battlespace. This implies a need to dismount from a vehicle or to operate on foot for sustained periods. The mix of platforms and team-level structures may have to be adjusted between warfighting and Other Operations and from one scenario or environment to another. This will require a range of manned reconnaissance capabilities and argues for an increasing light infantry, or dismounted formation level patrol element.

In conflict prevention, the strategic mobility of manned reconnaissance will contribute to rapid



Reconnaissance Patrol in Sierra Leone

effect. The ability to achieve, quickly, both presence and coverage of a wide area is a task for a military force in which manned reconnaissance has a key role to play. As ground forces they can build the confidence that enables both civil-military co-operation and HUMINT operations. Manned reconnaissance forces may appear benign but retain the ability to escalate with organic weapons and access to Joint fire support. Equally, overt manned reconnaissance can monitor and negotiate to ensure compliance or to reduce tensions.

The flexibility of manned reconnaissance allows it to switch roles and functions rapidly from Warfighting to Peace Enforcement to Peacekeeping and back again. It can be used in both an overt and covert manner, switching between modes as the situation demands. Ground-based systems with the tactical mobility to reach then loiter in outlying areas can monitor a situation and provide a visible presence. Stand-off and remote systems might not have sufficient discrimination³ and will certainly not be capable of interaction to defuse, arbitrate or enforce. Manned systems will be most suited to obtaining evidence of infringements by former

belligerents, reconnaissance in support of the restoration of civil infrastructure, the enduring and local provision of security and, if required, support to humanitarian operations.

Manned reconnaissance will apply mission command including the ability to self re-task to seize and retain the initiative. Though range may be reduced it will have an all-weather, 24 hour capability with endurance. It can penetrate cover, dismounted as necessary, to see inside buildings, tunnels and caves or beneath dense foliage. By being on the ground, manned reconnaissance can make assessments on routes and going in which a commander can have sufficient confidence on which to act. It can also fully identify the extent and nature of resources (dumps, stores, construction materiel, etc) and infrastructure (road, rail systems, water, power, production facilities, etc).

Crucially, manned reconnaissance can force the enemy to react and, if suitably configured, can choose to fight for information. Boldness in probing, recognition of opportunities to exploit, for example, by seizing bridges or terrain and by attacking HQs, logistic or communications sites will be enduring characteristics.

Key to ground-based manned reconnaissance is the fact that the soldier's own sensory capabilities supplement that of the technologies at his disposal. This might appear initially to be a glib statement, however technology has not managed to produce a single sensor package equivalent to the human senses integrated with an effective intelligence

direction and analysis system – the human brain. The essential quality of a human being to be able to direct his senses, cross cue between them, re-direct effort, collate and analyse the information received, and all within a few milliseconds, is still beyond technology. The overall benefit of a human linked directly to a sensor, or indeed doing the sensing, remains critical to the overall ISTAR mix.



Reconnaissance Trooper

However, the use of manned reconnaissance risks loss of life, or capture, which will have a greater media impact than the loss of unmanned systems. Manned systems operating away from the main body of the force will remain at high risk⁴ and the complications of inserting, supporting with firepower and extracting a penetrating ground-based force will endure. Sustainment will be challenging for all forms of manned reconnaissance, particularly medical support and casualty evacuation, which places further troops and assets at risk.

Communications links to small ground-based teams will also be challenging, whether mounted in a vehicle or dismounted. Challenges will include distance, terrain (especially as manned reconnaissance is most suited to complex terrain)

and security. Mobility will be constrained by speed of movement on the ground whether on foot or vehicle borne, by obstacles such as rivers, which could require organic mobility support. Moreover, all ground movement is likely to increase signatures - particularly to MTI detection. The problem of combat identification is common to all types of manned reconnaissance and in some cases, co-ordination of deployment will be constrained by a '*need to know*' culture. Insertion and extraction are particular Combat ID challenges and these can be linked to the process of re-tasking, which can be time consuming in certain circumstances where the assets must be recovered, re-briefed and re-inserted.

But the disadvantages of manned reconnaissance are far outweighed by the advantages. It will sometimes produce information of operational or strategic significance and sometimes it will produce operational or even strategic effect just by being in the right place. A key advantage is in '*micro-recce*', which provides invaluable detail to the level of command at which it is generated. However, it secures its place in the order of battle by its ability to discriminate intelligently in circumstances where strike assets must be employed within restrictive rules of engagement and in its ability to move amongst and interact with people.

NOTES

- 1 Von Luck, H, *Panzer Commander*, Praeger, New York, 1989, p 35.
- 2 *Idem*, pp 39-44.

- 3 To discriminate between former belligerents, Displaced Persons, NGOs, agitators, criminals, civil population ethnic groupings, etc, is an essential for successful post conflict activity.
- 4 Armoured Reconnaissance in particular is vulnerable when operating far ahead of the main force.

CHAPTER 14

THE DELILAH FACTOR – NEW THREATS AND VULNERABILITIES

By David Potts

‘Their wild eyes met his as the bloodshot eyes of the prairie wolves meet their leader ere he rushes on at their head in the trail of the bison, alas! only to fall into the hidden snare of the Indian.’

Herman Melville¹

The ‘electronic flank’ is an area of vulnerability that will require increasing and stinging attention. Potential adversaries can acquire sophisticated commercially available capabilities with which to attack our information systems. These attacks could have operational, or even strategic impact and for relatively little cost compared to, say, developing a long-range weapon with which to strike a distant headquarters. There is therefore a pressing need for some form of ‘Red Team’ analysis of the nascent tactical network and its vulnerabilities. Networks will need to be robust enough to remain effective in a hostile command and control warfare environment.

Networks will also need to be stable enough and robust enough to continue to operate and fight with

them in the face of system failure. There is much talk of the importance of reversionary modes, but we need to be realistic as to what these are. Once a force has become digitised, traded mass for tempo and become accustomed to information feeds from a whole variety of aerial and stand-off sensors, it will have developed a command tempo and a way of fighting that simply does not lend itself to reverting to chinagraph pencils and paper maps. Procedures will need to be developed so that the fall-back position to a digital environment is another digital environment. For example, if an application closes down, use another application, if a workstation fails move to another one, or if all of a particular command post's systems fail, revert to an alternative digitised command post. This should be easier than trying to revert to an analogue, or pre-digital mode, especially as distributed databases should mean that all of the information in a command post could be held and automatically updated at its alternate headquarters, for example. Reversionary modes will also change over time – systems being introduced now will seem reversionary compared to subsequent technology generations.

The widespread use of GPS for military purposes also brings with it new vulnerabilities. The system's global, all weather capability for precision weapon aiming, position reporting and time synchronisation underpins many of our information age capabilities. Programmes and projects such as BOWMAN, Tomahawk and Brimstone are and will continue to be ever more dependent on the system's capabilities.

It would be foolish to imagine that potential enemies will not attempt to exploit the vulnerabilities of GPS. The satellites which transmit the GPS signals are potentially vulnerable to space warfare from physical attack or the effects of an electromagnetic pulse (EMP). However, the spacing of the individual satellites within the system would mean that each satellite would have to be individually targeted. A more realistic threat is jamming or '*spoofing*'. Spoofing is the deliberate transmission of false signals with the intent to produce a false position, velocity and time output from a receiver. Spoofing is relatively easy, but can be prevented by encryption. The most significant threat is from low-cost jammers, which are now available commercially for only a few hundred dollars. Movement behind shielding terrain can counter jamming, though the tactical situation may not allow this. Technical solutions include adaptive spectral filters to counter jammers; integration of GPS with Inertial Navigation System velocity data; and the use of controlled reception pattern antennas that cancel jammers by forming areas of extremely low gain in the radiation pattern. These solutions, although feasible, are more expensive than the GPS system they would be used to protect.

Tempo drag is a possibility as allies digitize their forces in varying timescales and to varying levels of capability. In a multi-national force, formations with less advanced C4I will not be capable of operating at the same tempo or on the same battle rhythm as fully digitized formations. This gap in C4I capability will have to be managed by commanders in the same way as other capability shortfalls are now² – by

allocating appropriate missions and tasks or by allocating additional resources.³ Doctrine, techniques and procedures will need to be developed in international fora to manage potential tempo drag. The challenges inherent in this will increase over time as digitised forces become more and more adept at operating in a digitised environment and adjust their force structures and tactics accordingly.

'Information overload' is the single most cited potential drawback of Digitization. Staff in offices already live under the tyranny of email and there is a real fear in many quarters that Digitisation will extend all of the worst aspects of this phenomenon into the battlespace. It is easy to imagine busy staff officers groping their way through a blizzard of such communications from subordinates, superiors and flanking forces. This is a real issue – of course rigorous information management will help, but the situation will still arise on occasion.

Worse still is the prospect of information free-flowing into the planning process, providing constant updates and refreshes, so that a decision is never reached. Or, alternatively, planning paralysis while staff seek out every last obtainable detail of potentially available information to inform a decision that might consequently be delayed beyond the point where taking it is effective. These spectres are not valid reasons for shrinking away from the vision of the network, but they are real concerns and do underscore the importance of having clearly ingrained methodologies for the effective exploitation of information and, crucially, knowing

when enough is enough. Above all, perhaps, commanders will need to understand that in getting inside the decision cycle of the enemy, the key is to make a good enough decision quickly, rather than a perfect decision when the moment has passed.

Linked to this is the threat to our cognitive powers of decision support tools and any number of planning aids that are envisioned for the future. The risk is that the key staff and even commanders may become so overly immersed in managing these systems – providing input to them and assessing their outputs – that they simply forget to analyse the situation for themselves. The most important aspect of decision making is thinking, drawing on one's own experiences and applying judgement based on a developed understanding of the real world.

Combat occurs in the physical domain, not in the information domain. Commanders will need to have a feel for the difference between ground truth and displayed information. UAV video feeds, ASTOR moving target trails and displayed icons will tell a commander where everything is, with some imperfections, and may even show with some veracity where his own forces and those of the enemy are in relation to each other. But in vile weather, in complex terrain, or when casualties are being taken, there is no substitute in Land warfare for genuine *Fingerspitzengefühl* derived from first hand knowledge of the actualities.

At the lowest tactical level, ground needs to be read and understood. The fact that a UAV can see a target does not, for example, automatically mean

that a friendly direct fire system can actually see and engage the target, even if it appears to be in line of sight of it on a display screen. There could be tall grass, hedgerows, debris, smoke or any number of battlefield frictions and fogs that prevent the target being seen and engaged. This is perhaps just a matter of training, but one senses the potential for a good deal of friction between levels of command, especially in complex terrain.

There is also a risk of fighting '*Red Icons*' rather than the enemy. This is particularly so in circumstances where a red picture has been compiled in some all knowing superior headquarters and injected into everyone else's battlepicture. There might be a tendency to attempt to engage these icons without a real understanding of either the latency of the information, or perhaps that the icons may have been disaggregated from a centre of mass by a rule and are therefore displayed as a mathematical projection of reality, rather than actual positions. Avoiding this requires technical solutions to the way information is displayed as well as operating procedures and a grasp of the difference between displayed information and ground truth.

Despite all of this information on enemy forces, there will still be surprises, and at every level – tactical, operational and strategic. Even in relatively recent times the West has been surprised by its enemies. The crossing of the Yalu River by the Chinese and of the Suez Canal by the Egyptians are text book examples. The Tet Offensive achieved simultaneous surprise throughout the entire depth of the American deployment in Vietnam and, most recently of all, the

attacks of 11 September shocked and stunned the world, including those whose business it was to see these sorts of things coming. We will continue to be surprised, either because the other fellow conceals his whereabouts and movements, or deceives us into believing he is elsewhere, or that he is not present in the strength we imagined. For example, despite impressive aerial surveillance and bombing, the Serbian Army in Kosovo withdrew with much of its combat power intact as a direct consequence of its effective concealment techniques. We will also fail at some time in the future to draw the appropriate conclusions from the facts that are presented to us. In the information age, we will still find occasion to recoil in shock and announce that *'we never believed he would do that!'*

We will also continue to kill the wrong people, on occasion. It seems unbelievable that despite spending billions of dollars on state of the art surveillance systems and having an enormous intelligence bureaucracy, the United States still managed to partially destroy the Chinese Embassy in Belgrade. Subsequent investigations have revealed that this was an error, a classic *'cock-up'*. It is the sort of thing that could happen again and the consequences could be much more adverse. Such mishaps highlight the extent to which chance and ill judgement can be determining factors in warfare and serve to undermine the more extravagant Western, and especially US, claims for information superiority.

Effective information operations are predicated on a thorough understanding of the target set. It is doubtful if the West, and particularly the US, can

really develop a sufficiently sophisticated understanding of the impact of information operations messages on potential target audiences world-wide. This will constrain the effectiveness of such operations, which is, in any case, almost impossible to measure. Difficulties are compounded by the impossibility of compartmentalising messages and audiences – the domestic message ends up being beamed around the world. The images of the alleged terrorist prisoners being held in Cuba by the US is a case in point – photographs taken and released by the US authorities seem to have had a positive reaction in the US, but much of the world is, rightly or wrongly, horrified. Information Operations have a vital role to play in operations, but we need to be more honest with ourselves as to how perceptions can be shaped to advantage and what our own limitations are in this field. In recent conflicts our enemies (for example, Sinn Fein et al) appeared to be better at this game than we, constrained, rightly, as we are by all the trappings of liberal democracy and a free press.

Some of the concepts underpinning network centric warfare are arguably implausible. Self-synchronisation, for example, is difficult to envisage working in circumstances where resources are constrained. This may occur either because resources are intrinsically scarce, or because they are scarce relative to the scale of the target array. In such circumstances there will be a need to prioritise and sequence engagements more centrally, leading potentially to the centrist control and timetable warfare to which NCW is intended to be the antithesis.

The operational art for the information age, spawned or defined by NCW, appears to be one centred on integrating the effects of long-range air and sea launched weapons, linked to space-based and aerial sensors. This has two failings.

The first is that in many circumstances it is simply not cost effective to attack the target with such expensive systems. The second is that it is fundamentally attritional and the time will come when an enemy will simply soak this punishment, possibly even to the point of running down operational stocks to dangerously low levels.

It also requires air superiority. It must be assumed that no potential adversary would be able to survive for long in air to air combat with the US. Equally, it must be assumed that no potential adversary would try to fight the US in the air. But innovations in ground-based, theatre air defence are a different matter and it must be assumed that potential adversaries are energetically exploring this field. This networked long-range attack collapses as a form of warfare as soon as the defender develops an air defence capability to counter the threat.

'As long as airpower can defeat the anti-airpower, then this recipe for warfare will continue to flourish. But if we reach a stage in which there are numerous directed energy weapons, real-time, long range, that can track and acquire instantaneously... then the equation would be reversed'.⁴

The greatest strength of this form of warfare is also its greatest weakness. Namely, that it has conferred

upon the US, and by association, its allies, such an air of invincibility in conventional *'force on force'* warfare that it has become a powerful catalyst for other forms warfare, labelled variously as *'asymmetric'*, or *'unrestricted'* warfare. Conceivably, such forms of warfare could, in time, render the networked conventional force irrelevant. But network based capabilities will have a vital role to play in supporting intelligence gathering on secretive and diffuse enemies and in executing novel attacks against them, wherever they might be.

Information age technologies and NCW concepts have the potential to deliver a decisive advantage in all forms of combat, including asymmetric warfare. But in exploiting these technologies and concepts, the Delilah Factor must be acknowledged and properly addressed.

NOTES

- 1 In Moby Dick.
- 2 For example when a subordinate formation has little organic artillery or has an unduly slow or vulnerable Main Battle Tank.
- 3 It is not immediately clear what additional resources might mean in a C4I context, but it might include enhanced liaison teams or mechanisms to provide shared access to particular planning tools for example.
- 4 General Wesley Clarke, *Jane's Defence Weekly*, 2 Jan 02.

PART THREE – PROGNOSIS

**Tactical Combat with the New
C4ISTAR**

Whither the Close Battle

Asymmetric Warfare

Once Upon a Time in the Future

CHAPTER 15

TACTICAL COMBAT WITH THE NEW C4ISTAR

By David Potts

This chapter considers the impact of the new C4ISTAR on the way we might conduct tactical combat in the future. It firstly describes the possible impact on armoured manoeuvre forces engaged in an expanded close battle in the 2010 timeframe. It then outlines a concept for joint tactical combat and points to the essence of the operational art in the information age.

The Expanded Close Battle

Even at the lowest tactical level (brigade and battlegroup), high quality, relevant information will soon be provided by operational and strategic level assets, which, when combined with locally gathered information, will give commanders an undreamed of information advantage over their adversaries. This will enable rapid decision-making and action and the application of appropriate and timely effects – including joint firepower. This will change the way land forces fight at the tactical level – with greater emphasis on achieving decision in the deep battle

and a greater stand-off in the close battle. This will be accompanied by a shift in emphasis from direct fire, ground-based platforms to aerial and indirect fire systems. As a consequence, it is possible that the functions in combat paradigm of *'Find, Fix and Strike'* could evolve into *'Find, Track, Strike, Exploit'*. This is of crucial significance as the functions shape our understanding of the very nature of manoeuvre.

The divisional context, in which brigades sit, is itself changing considerably. Think of a UK Division in 1990 and compare that to what we know of a UK Division in 2010. Firstly, in 1990, even at the Divisional level, information from strategic and operational level assets could be characterised as too little too late. In 2010 information from operational and strategic level assets is expected to be readily available. But crucially, the Divisional level of command will itself control a range of capable ISTAR assets that contrast most starkly with the paucity of assets around 1990, when drones, EW and sound ranging, for example, were real Cinderella capabilities. This is indicated on page 263, together with other anticipated major changes in capability.

UAVs will provide real-time information and a capability for persistent dwell over targets delivering live imagery to allow tracking, engagement and Battle Damage Assessment. This is a quantum leap in capability compared to an aerial photograph by a manned aircraft or drone providing a still snapshot in time with a latency of hours or even days. Similarly, the division can expect to have its own ASTOR Ground Station permanently allocated in operations.

	1990 DIVISION	2010 DIVISION
ISTAR	Arty Drones, Arty Patrols, Armoured Recce.	ASTOR, UAVs, EW, STA Patrols, Weapon Locating Radar, HUMINT, Armoured Recce.
AVIATION	LYNX/TOW	AH64D
DIVISIONAL ARTY	M107 & M110	MLRS, GMLRS, IFPA
GROUND MANOEUVRE	CHALLENGER 1, Warrior FV 432	CHALLENGER 2, Warrior MRAV, FRES.

This contrasts sharply with the situation in 1990/91 when the UK had no such capability. Even in the US Army during the Gulf War, JSTARS was in its infancy and a terminal could not be made available to VII US Corps. The consequent difference in perception of events between General Schwarzkopf, who had such a terminal and Lieutenant General Franks, who did not, is well documented.¹

By 2010 the UK division's EW capability will have been modernised twice since 1990. COBRA and ASP will provide an effective counter-battery target acquisition system, effectively replacing and very substantially upgrading the Cymbeline Mortar Locating Radar capability, previously held in the brigades' Direct Support Artillery regiments. Armoured reconnaissance, although fewer in number, will also become more effective as CVR(T) is replaced by an ISTAR platform based on the Future Rapid Effect System (FRES). The whole will be integrated much more effectively by digital

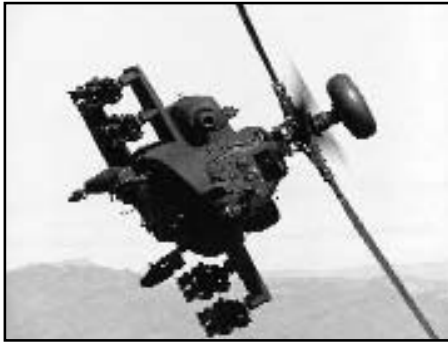
communications and processing and with new command and control, organisations and doctrine to deliver an integrated, recognisable ISTAR capability.

The combination of these factors, ISTAR, better integration with joint capabilities and a more effective digital command system will make the division a very formidable adversary, perhaps capable of dominating an area of operations as much as 200 kilometres wide and perhaps 120 Kilometres deep.²

The reach and effectiveness of the divisional artillery will have improved with the introduction of MLRS and subsequently of improved, longer-range munitions. But the indirect fire assets, whose projected ranges make them unlikely to be able to concentrate fire across the divisional frontage, will need to be allocated down to brigades. Indeed, the enemy is most unlikely to oblige us by massing his forces in future and we can therefore expect to see increased emphasis on the engagement of fewer and smaller, well-concealed or mobile targets. This too could encourage further decentralisation of artillery.

The Apache AH64D will have replaced Lynx/TOW to provide a genuine deep attack capability at corps and divisional level, as well as a remarkably capable ISTAR platform. The use of this asset at the divisional level would deliver unstoppable combat power to a UK Division.

The brigades will be focused on the close battle, but, by 2010, with increasing emphasis on longer-range indirect fire engagement and with brigade areas of operation in excess of 50 Kilometres Square.



Brigades will take on many of the attributes of a division today and will be more capable of independent action than presently. As with the division, it is anticipated that this level of command will be able to benefit from information gathered at the strategic and operational level. It will also have organic ISTAR assets when deployed on operations – the contrast with the UK brigade of 1990 could be as stark as shown below:

1990	2010
Cymbeline Mortar Locating Radar	ASTOR Ground Station UAVs Armoured Reconnaissance (including Forward Air Controllers) Dismounted Reconnaissance Patrols EW HUMINT

We are half way through this journey in terms of time, but perhaps only 20% through it in terms of capability improvement. The dramatic changes in ISTAR and command and control systems will occur from the middle of the present decade onwards.

Their impact is therefore a matter of conjecture at this stage, but we have had insights from our own exercises and experiments and from those of our allies to suggest that there will be profound changes in how we will fight at this level of command. The brigade commander will have timely, accurate and relevant information on his enemy enabling him to engage earlier, with a wider selection of weapon systems and to more precise and lethal effect. He will be able to manoeuvre with confidence and develop the situation out of contact with the enemy, preserving both his own combat power and his tactical options. He will be able to act rapidly and take a genuinely manoeuvrist approach to exploit enemy weaknesses and seize opportunities.

Over time, as experience with this kind of ISTAR capability grows, we will see changes to brigade organisation and tactics. The expanded area of operations will have implications for indirect fire assets. It may require greater emphasis on more capable mortars at battlegroup level, or the pushing down of AS90 batteries to that level. Brigade level firepower will be longer-range assets, such as MLRS, attack helicopters and airpower.

There should also be fewer surprises – there will probably always be some surprises, but, conceivably, there should be much fewer of them. This has implications for reserves – it does not imply that they are not needed, but that they could be smaller, or perhaps not held at every level of command, or constituted differently in some way. A commander should also have more notice of needing to commit his reserve and this

too should influence their composition and posture. The balance of the purpose of a reserve might also change from that of reacting to unexpectedly adverse events, to one of exploiting opportunity – this too would affect the form and posture of reserves.

Battlegroups too will be able to access relevant information from assets held at higher levels of command as well as being pushed time critical information from whatever level of command, or asset, that has generated that information. It is anticipated that as digitised command and control develop, particularly the automation of aspects of ISTAR planning and processing, battlegroups should be provided with more focussed and tailored intelligence support than at present. Planning will be better informed and they will be able to manoeuvre with much greater confidence – dominating larger areas and bringing combat power to bear more effectively. The command tempo will be improved by C4ISTAR and digitised command systems as well as by improved command doctrine, such as effects based planning – already beginning to impact now.

Despite the ISTAR capability envisaged at the Brigade level, battlegroup commanders will require their own ISTAR assets to provide that fine grain detail and immediacy so essential at this level of command. The precise mix of assets will depend on a variety of factors, including the mission, enemy, terrain and operational priorities. There will also be an interplay with the brigade level ISTAR and in circumstances where brigade assets can provide battlegroup commanders with much of the

information they need, there will be less of an imperative to expand the ISTAR mix at the battlegroup level. But in complex terrain where lower levels of command need very detailed and immediate information and the scope for the unexpected is greater, the Brigade level will be less able to meet the immediate needs of battlegroups.

There will undoubtedly be an enduring requirement for a scouting capability in light armoured vehicles. But this could be supplemented, as required, by other capabilities such as tanks, snipers, engineers or anti-tank guided weapons. The most exciting addition to the armoury will be the UAVs and their associated Ground Stations, which will provide battlegroups with their own 'eye-in-the-sky' real-time information to support planning, manoeuvre and engagement with indirect fire and joint systems.

Core Capability		Possible additional capabilities for warfighting		Possible additional capabilities for Small Scale PSO	
ISTAR Offr	FOOs/MFCs	CR2 Tp	WR/AI PI	MI	HUMINT
ISTAR Cell	UAV ground station	TACP/FAC	Snipers	Fd Sy	Armd Recce
Scout Tp/PI	Engr Recce	ATGW		MAMBA	EW

The table above is purely indicative of the range of assets that might be found in a future ISTAR grouping at the battlegroup level. As the grouping expands, sub-unit level command would be

required together with an effective architecture to ensure the assets can be commanded and coordinated effectively and their information exploited and acted upon.

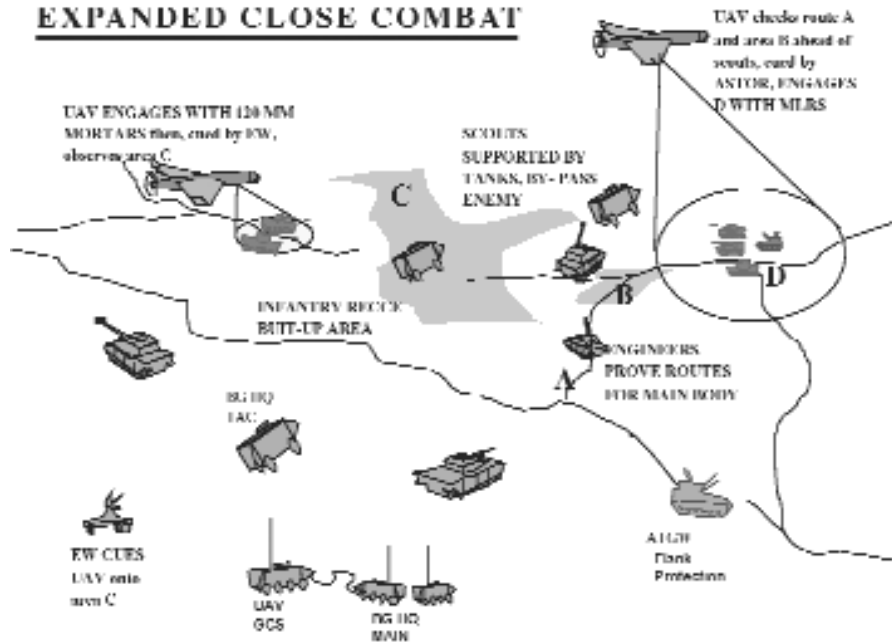
Crucially, the ISTAR grouping, whether a scout troop or a sub-unit sized grouping, must have all the appropriate linkages to apply the firepower available to the force. The integration of effects and battlespace management will, therefore, be key functions at this level of command.

Effective command and control systems and the automated support to the tasking, management and cross cueing of assets will be the sine qua non of effective ISTAR at brigade and battlegroup level. Without appropriate C4I, there is a risk that information overload, coupled to the burden of commanding assets beyond the capability of the command team, could turn '*recce pull*' into '*ISTAR drag*'.

Joint Tactical Combat

At first sight, the term joint tactical combat appears to be a contradiction in terms. Joint has come to be associated in our thinking with the operational level of command,³ which is an entirely false horizontal barrier. The Joint Force Commander and his staff are of course operating at the operational level. But individual platforms, for example, operating in '*a single integrated joint battlespace*' are operating at the tactical level. This could mean that they are working, as now, within a component framework where the Land Forces are commanded by a Land

EXPANDED CLOSE COMBAT

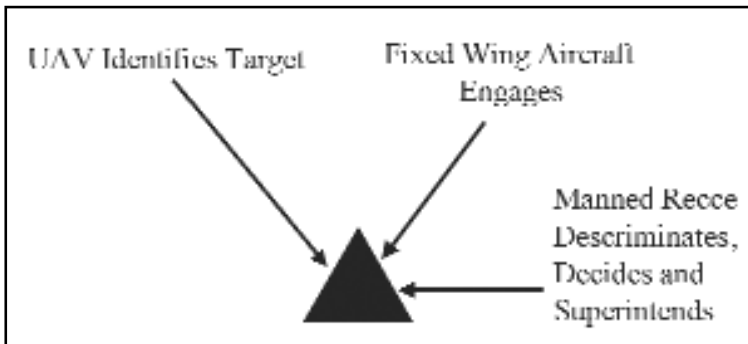


Component Commander and assets from other components are supporting him, or indeed that his assets are supporting another component, air or maritime, or special forces for example. But it might also involve closer integration of ISTAR, manoeuvre and strike assets into a joint framework with greater emphasis on joint capabilities and joint command.



Such a shift in emphasis is especially relevant to the precise application of force to achieve specific effects in a complex battlespace where, increasingly, tactical action has operational impact and strategic significance. The diagram on page 272 provides a simplistic and stark schematic of a tactical action that is inherently joint.

Any number of permutations is possible in the diagram on page 272. The UAV could be operated by the Air Component and launched from over 1,000 kilometres distant, or even from another continent; or it could be a operated by the Maritime



Component and launched from a ship, or ground forces might be operating it from only a few hundred kilometres away. Equally, the aircraft could be from an airbase or a ship and might even belong to a contingent from another nation. The ground based manned reconnaissance could be special forces, marines or an army patrol. Variations are also possible on the combinations of sensor and strike assets. For example: EW could acquire a target, a HQ perhaps, ground based or aerial reconnaissance could corroborate and discriminate and the strike asset could be a sea launched cruise missile or a combat UAV. Whatever is happening is both joint and tactical and doing this well should obviously be one of the much sought after positive outcomes of our investment in digital technology. It is also precise – it represents the application of precisely the required force to achieve a specific effect without unintended consequences. A key feature should be that the ‘*decide*’ function in executing the action is delegated within command intent (Mission Command) to the lowest practicable level, rather than micro-managed centrally.

Developing this theme further, recent experience in Afghanistan has suggested to some that:

'the purpose of manoeuvre forces is to find the enemy, to locate him, to determine the outline of the enemy force, to find those specific points on the ground that are most vulnerable to attack by fire, to observe them, to separate civilians from military, deception from real targets and then to superintend going after those targets'.⁴

This is clearly about using special forces, Ground Manoeuvre and ground based manned reconnaissance capabilities to provide a framework that enables the effective application of Joint firepower. The capacity to discriminate and superintend is clearly especially important when operating within restrictive rules of engagement – the most likely circumstance in the future operating environment. However, Afghanistan is not tomorrow's war – it is already yesterday's war, although it obviously provides powerful signposts. The circumstances might prove unrepeatable: a benign airspace environment, a benign maritime environment, a benign electromagnetic environment and an obliging surrogate ground force of about 80,000 troops.

A more likely future scenario is one where light and light mechanised ground forces create a framework of secure operating bases to enable special forces operations, manned reconnaissance and specialist HUMINT operations. This also establishes an overt presence and begins to facilitate and support humanitarian and other non-military lines of



operation, which might need to go on concurrently with the engagement of targets in the same theatre of operations (the 3-Block War). Favourable conditions are also then created for follow-on forces to enter theatre and do whatever needs to be done, whether that be manoeuvrist warfighting with overwhelming combat power enabled by new technologies, or nation building. The core enabler to all of this is an effective **network** over which the requisite information can be passed and processed with the necessary timeliness and granularity – this is the key area for development and investment. But there will be organizational implications too as the twin imperatives, of the need for first echelon forces to deploy rapidly and to operate jointly at the tactical level, drive us toward the increasing optimization of some forces for this form of joint combat.

Whilst environmental components can be given the lead for both enabling and taking action in the battlespace, we should try to envisage alternative, more dynamic models. Conceivably, if a balanced deployed joint force is enabled by a robust network, it will be possible to form joint task or effects-based

teams of sensors, manoeuvre and strike assets to achieve specific effects in the battlespace. These teams could be networked together and formed and reformed as the situation demands. The deployed components then become the basis of managing forces in or within reach of the theatre of operations, rather than the basic command construct responsible for executing tactical actions. This is not as alien as it sounds – think of Northern Ireland and the model there of framework patrolling by the Army with ‘*strikes*’ against terrorists being carried out in an integrated way by other agencies. Alternatively, a new construct might emerge based on sensing forces, strike forces and manoeuvre forces.⁵ Whatever the outcome, an agile and razor-sharp command structure will be required to exploit the potential offered by a robustly networked joint force in which command intent is understood throughout and execution can be delegated to the lowest practicable level.

But it is tempting to ask whether, fundamentally, the joint tactical combat described is really anything



new? It still requires a blend of fire and manoeuvre, otherwise it risks becoming a fantastically expensive attritional slog.⁶ Perhaps all this merely serves to highlight a debate that has been with us at least since massed archers took the field at Crecy: whether we envisage manoeuvre supported by firepower or firepower supported by manoeuvre? or, perhaps it just fuels debate on the efficacy of airpower versus ground forces? These arguments obscure the real issue, which is that information age technology and the imperatives of the operating environment are changing the form and purpose of both firepower and manoeuvre. The relationship between them is changing too and is now potentially so dynamic that the balance could be adjusted rapidly within operations as the situation develops – combining cheng (normal force) and chi (extraordinary force)⁷ in infinite combinations, across all components and contingents, to achieve specific effects in a complex battlespace. These precise effects will, in turn, often be exploited outside the military domain to create advantage in other lines of operation. This will be the essence of the operational art in the information age.

NOTES

- 1 General Norman Schwarzkopf, *It doesn't Take a Hero*, Bantam Books, 1992, pp 533-540.
- 2 Allies who have already digitised some of their forces would recognise these parameters, but what a UK Division will actually be capable of will depend very much on the precise capabilities of C4ISTAR assets and weapons yet to enter service.
- 3 A Land Force Commander could be operating at the operational level and must be versed in the 'operational art'. This is especially so in Land-centric Other Operations.

- 4 Major General Robert E Scales (USA Retd), quoted in *Jane's Defence Weekly*, 2 Jan 2002, Page 24.
- 5 See Admiral B Owens USN, *Lifting the Fog of War*, Farrar, Straus and Giroux, New York, 2000 for advocacy of a construct based on Find, Strike, Manoeuvre and Sustainment. D A MacGregor, in *Digital War*, R L Bateman, Presidio Press, Novato CA, 1999, pp 171-192 for advocacy of a model based on Deep, Close and Rear.
- 6 See J A Antal, in Bateman, *op cit*, pp 153-170, which puts the case for the continuing need for unhinge adversaries through manoeuvre in conjunction with firepower.
- 7 Cheng (normal force), Chi (extraordinary force), Sun Tzu, *The Art of War*.

CHAPTER 16

‘WHITHER THE CLOSE BATTLE ?’

By Richard Cousens

‘C’est magnifique, mais ce n’est pas la guerre’

Gen Bosquet (at Balaklava)

There is a general assumption in Western armies that the close battle is the pivotal and most significant aspect of warfare. This has certainly been the case in past history, but there are some indications that the Revolution in Military Affairs (RMA) might be indicating the eclipse of the close battle if not its demise.

This brief chapter explores our love affair with the close battle and its continued relevance for the future. The aim is to describe our vision of the 2015 battlefield together with the significance of the close battle within it, in order to identify some difficult decisions on the horizon. It explores emerging UK thinking on the framework of the future battlefield and identifies some bitter pills that may require to be swallowed. It will also suggest that we are having difficulty in identifying the true potential of digitization and that we are hampered by a cultural malaise that is emotionally wedded to the equipment programme, rather than to the concepts to which the equipment

should be subordinate. But UK conceptual thinking for the battlefield of 2015+ is mature and effervescent and that, following a fixation with peacekeeping, we are now focussing back on warfighting – the gold standard. This chapter also explores a particularly sensitive idea – the notion that the primacy of the manoeuvre elements in the prosecution of decisive operations is fading and that consequently the significance of the close battle is changing too. The chapter concludes with a signpost to possible changes in our structures over the next 15 years.

Dr Michael Evans recently published a paper entitled *Close combat- lessons from the cases of Albert Jacka and Audie Murphy*. In it he makes the definitive statement that *'close combat has been the defining feature of war in the past and is likely to remain so in the future'*. He concludes that: *'success in war usually requires first-class infantry to close with and to finish off the enemy. There is no other way of winning'*. He also refers to the *'mystical appeal of close-quarter combat'*, referring to a *'long history of eager participants'*. Finally he offers the thought that *'men at arms, not military machines give western society the mythology to nourish its mutual pride and traditions'*. Most soldiers can readily identify with all these sentiments. They stem from our history, our culture, our tradition and heritage. The walls of infantry messes all over the world are adorned with tributes to those who fought and died in bloody close combat. Below is but one example of the pivotal significance of the close battle in war:

'When dawn came, it was found that friend had bayoneted friend, foe foe, and that the .303 bullets poured so furiously inwards, had gone equally furiously outwards to the other side of the perimeter and there settled in many an Australian limb. From that time onwards the order was that the enemy was to be engaged at night only with bayonets – and we gunners, who had previously used bayonets solely for the purpose of opening condensed milk and bully beef tins, now had to view these beastly weapons in a new and more serious light which filled us with dismay.'

There is no better description of the bloody nature of the close battle at its closest than that of Russell Braddon in *The Naked Island* describing the battle for Malaya in December 1941. It reinforces all Michael Evans' remarks and most soldiers would identify strongly with them. There is certainly no denying that some close combat will indeed be an enduring feature of war, but one has to ask whether this is becoming an institutional comfort-blanket that is masking a genuine Revolution in Military Affairs? Is it an excuse for clinging to branch-specific structures that have less and less relevance in a battlefield involving the orchestration of capability rather than branches and cap-badges? It gives perhaps gives credence to Field Marshal Slim's remarks that:

'Generals have often been reproached with preparing for the last war instead of for the next – an easy gibe when their fellow-countrymen and their political leaders, too frequently, have prepared for no war at all.'

There is no need to deviate from the aim by exploring the nuances of the RMA debate. They are familiar to most thinking soldiers. Michael Evans has addressed the issues in depth in his recent paper on Australia and the RMA in which he concludes by remarking that:

'The designation of information capabilities as a separate capability grouping – with more funding than that assigned to improving current strategic strike – is perhaps the most fundamental indication of how Australia has come to view the knowledge edge as the foundation stone of its military capability in the 21st century.'

This too is the foundation of the British approach and it is best described by Dr Tim Benbow of Oxford University in a parallel paper to that of Michael Evans in which he explores the various RMA schools of thought: *'radicals, visionaries, moderates and pessimists'*. This chapter takes a radical standpoint.

It is no secret that, as we prepare to re-focus the British army for high-tempo expeditionary operations, we are equipped with major equipment types that weigh over 30 tons that are a legacy of a previous era – configured for continental warfighting. The problem is that if one evolves from today – or even yesterday, there is a danger of compounding the error. Only by making a clean conceptual break from the present can we design an army for 2015+ and we are making some strides in this direction. Making this conceptual break is a real challenge for us, we still have some officers who have a romantic fixation with the 1(BR) Corps structures in Germany

and there is often an assumption that all the capabilities deployed in Germany must be replicated in the future – ie the evolutionary approach. There is no more precise description of the need to break with the present than that offered by General Gordon Sullivan (former US Army Chief of Staff) and Michael Harper in their book entitled *Hope Is Not a Method*. In it they explore the need to look back from the future rather than evolve from the present. Strategically, this is perhaps the key point of this chapter from which all else stems.

‘Looking back from the future begins by going back to the most basic questions: what is your purpose as an organisation; what business are you in? What will your purpose tomorrow be? What will the characteristics of your strategic environment be? What will it take to win in tomorrow’s markets? Don’t ask yourself what the “next” organisation will look like. The “next” organisation is constrained by today; it must evolve from today’s organisation. By imagining the “after next” organisation, you can take off today’s blinkers and imagine your organisation in a world unconstrained by its present reality. This technique does not deny the reality of the present but rather helps you think beyond it.’

In short – if we focus on tomorrow, we are almost guaranteed to get it wrong. The key therefore is to focus on the day after tomorrow.

Warfighting will remain the benchmark against which to train and prepare. Operations in Bosnia, Kosovo, Macedonia and Sierra Leone notwithstanding, we

remain an army configured for high intensity warfighting in the belief, to put it crudely, that you can ‘*dumb down*’ to peacekeeping but you cannot ‘*dumb up*’. Secondly, asymmetric attack will become a more prominent feature of warfighting and we must be configured to conduct asymmetric attack ourselves as well as defence. In the light of the horrific attacks in Washington and New York in September 2001, this is the understatement of the century nevertheless we must not pretend that because the term is currently in vogue it is new, it is not. Thirdly – the preservation of fighting spirit and a unique ethos goes without saying. We accept that a regimental system is inextricably enmeshed with the ethos and fighting spirit of the British army and that it provides the enduring foundations of the moral component of its fighting power. These then are the constants – what about the changes? The multinational dimension of warfighting will increase; future adversaries will be more diverse and unpredictable and are unlikely to accept the moral and legal constraints that impinge upon us. Operations in 2015+ will be set within a joint campaign with the army commander drawing on joint capabilities to a far greater degree than today – facilitated by digitization. Indeed the availability and use of information will profoundly change the way the army operates. This is the most important point of all and it merits expansion.

Brigadier Jim Wallace, recently retired from the Australian Army, has written extensively on the effects of digitization and in a recent paper stated that: ‘*one of the main motivations for digitization in advanced western military establishments is the*

belief that the process will impose a new order on the inherent chaos of the battlefield'. He rightly identifies the enhancement that digitization brings to decision-making and emphasises the need for it to be balanced by firm battlefield leadership. But, in the context of 2015, digitization is much more than command and decision-making and the British army has been slow to appreciate the more holistic benefits to warfighting as a whole. As for the Americans, the debate has been fogged by the Gulf War which was perceived to be revolutionary but actually was not. In his book, *The Next World War*, James Adams suggested that:

'The 1991 Gulf War was the last hurrah of the armed forces and generals who had trained on the legacy of the Second World War. War had changed its form with the arrival of stand-off weapons and precision guided munitions.'

He noted that though the equipment had changed, the tactics had not and observed that:

'Mile after mile of tanks, armoured personnel carriers and fuel trucks; serried ranks of tents marching in perfect order over the horizon and runways shimmering in the desert heat.'

So what are those changes in tactics and structures that digitization will facilitate? In short – the doctrine?

The constants are the manoeuvrist approach and the notion that tempo is the key to success. Manoeuvre warfare theory will continue to be the doctrinal bedrock for the British approach. As for the changes we expect, they include: terminology, more

emphasis on capabilities that enhance tempo and greater interoperability through common doctrine. Herein, for example, lies considerable scope for a revitalised and more dynamic ABCA programme.

In 2015+ what is the relevance of the traditional framework of the battlefield (deep, close and rear) in battlespace that is acknowledged to be dispersed, noncontiguous and non-linear? Does it continue to have relevance when operations are progressively enemy-focused rather than terrain-focused and where holding information is arguably more significant than holding ground? How can one describe close and rear operations in such an environment?

Once again there is merit in identifying constants and changes. In deep operations the constants might be summarised as follows:

- The corps, division, brigade and battlegroup hierarchy remains valid: whereas today the lowest level at which deep operations are prosecuted is division, we believe that around 2015 it will become brigade;
- Attacking the enemy's centre of gravity;
- The need to commit ground forces in deep manoeuvre;
- The difficulty in the indirect engagement of moving targets.

But the changes are far more significant and far-reaching and perhaps point to the eclipse of close operations as we know them:

- Deep attack will be increasingly joint and integrated;
- Deep operations will be increasingly decisive;
- There will be much greater reach – long range precision artillery, air manoeuvre, EW and the contribution of both maritime and air, fixed wing and long range missiles, will deliver synchronised fire at ranges out to 300 kilometres or more; digitization is the enabler – not just the enhancement to C2 but also the sensor to shooter links;
- Air Manoeuvre will deliver greater operational impact than ground manoeuvre;
- Planning will be much more complex.

As for close operations, some form of close combat continues to be inevitable but the changes are profound:

- There are an increasing number of alternatives to striking including, perhaps, isolation and neutralisation;
- The range and volume of the close combat zone will increase rendering existing capabilities inadequate and a legacy of the analogue era. The RMA really bites here;
- Sensor and shooter will be much more difficult to conceal;
- Huge changes in the way that combat arms fight;

- More capable infantry. Fewer, digitally empowered, light – lean – lethal;
- Armoured effect less likely in decisive operations – they are unlikely to be there. Their effect will be from much more dispersed locations;
- Artillery – hugely significant and much more integrated. The demise of dedicated FOOs and increasingly joint effects;
- Much greater contribution by aviation and hence, if there is a close battle, it is likely to be a product of air manoeuvre – not ground manoeuvre with a hugely reduced logistic drag.

But what do we mean by *'fewer but more capable'* infantry? At a recent infantry trial of battle group thermal imagery installed in Warrior, a corporal remarked *'who needs close recce now?'* He had a good point. He was sitting in a Warrior AFV with better firepower, mobility, protection and surveillance equipment than his colleagues in a CVR(T)-equipped recce platoon and would not offer the unique signature of a recce unit. We are arguably wedded to the concept of manned recce but, with the technology now available, do we need dedicated recce platoons any more? The scope is huge: equip the mortar platoons with 120mm mortars and top-attack precision-guided munitions and dispense with anti-tank platoons but, above all, equip the soldier to cue and initiate effect from fire units which may not be integral to his unit. The days of the decisive close battle at less than 2000 metres surely must be numbered? The see, tell, act cycle can now include

the manoeuvre elements and suddenly the potential exists for an infantry company commander to see, to tell and act at ranges far deeper than today. The answer for us lies in the FIST programme – Future Infantry Soldier Technology. It is the UK equivalent of the US Land Warrior programme.

FIST has particular potential in urban operations too which remain an area in which concepts, tactics, techniques and procedures have changed little since 1945. The British approach is to acknowledge that close combat remains one of the most demanding tasks of all but that the trend should be to make close combat less close. Thus while developments will never completely negate the need to close with the enemy, the aim will be increasingly to locate the enemy, neutralise his capabilities and break his morale and will to fight while at a distance. We owe it to our soldiers to use technology to take them out of the loop where technology can deliver. Some current USMC modelling of urban warfare projects a casualty rate of 33%. No small army such as ours can afford to sustain such a rate from such an old-fashioned, close and attritional activity. There has to be another way.

Of course rear operations continue but those who cling to the linear divide between rear and other operations may be mistaken. The battlespace will be more seamless and the US concept of '*an expanding area of close combat*' is very attractive. The need for any commander to maintain his freedom to manoeuvre and to support and sustain operations while preserving his force will be

increasingly important. It represents a role for medium forces.

There will be a definite impact upon future structures as a result of some of the conceptual thinking that I have outlined. There was a prophetic article in *The Economist* of 6 Jan 01 entitled '*Wars of Intervention*' which sums up the strategic drivers nicely:

'As late as 1938, Britain's Neville Chamberlain could get away with calling Czechoslovakia "a far-off country of whose people we know nothing". That is a vanished past. Now, except for a few sealed-off corners of Africa and Asia, what a ruler does to his people is swiftly revealed by camera, satellite and internet to a large, interested and reasonably well-informed audience; and, if what he does is outrageous enough, the audience is likely to want something done about it.'

The UK Defence *Future Strategic Concept* paper indicates that the UK is likely to have to deploy forces more rapidly in order to deliver strategic effect. The emphasis is not just on rapid deployment but on operational impact once deployed – what we call '*rapid effect*' which requires sufficiently capable forces to be effective in theatre in order to deter, pre-empt or contain a crisis ie – a '*medium*' capability. We see that a medium capability will be based on the enhancement of existing forces; in particular the merging of light and mechanised infantry into light mechanised infantry; and improving the inherent light armoured characteristics of armoured recce, taking advantage of enhancements in firepower,

digitization and ISTAR. Significantly there is an opportunity to do this within the current equipment programme through what is known as the FRES concept to develop a group of armoured platforms that have broad utility, greater tactical and strategic deployability and greater commonality. FRES stands for Future Rapid Effect System and might blend the armoured battle group support vehicle (ABSV), multi-roled armoured vehicle (MRAV), and the future command and liaison vehicle (FCLV). This is a challenging issue but the key point is that the transition towards medium forces is well under way.

Structures are bound to change, but note that the reference is to a regimental system and not *the* regimental system. The emphasis for ground manoeuvre on balanced forces, versatility, high tempo and a growing '*medium*' capability may begin to prove that the traditional distinctions between armour, armoured infantry, mechanised and light forces become less helpful. Similarly the traditional boundary between firepower and manoeuvre could become blurred in close combat leading to a much closer integration between the two. Indeed we are likely to acknowledge the subordination of manoeuvre to firepower and an effects-based approach. Hence not only whither the close battle? But also whither the directorates on infantry and armour as separate entities?

In *The Australian Army In Profile* Captain Glenn Jones wrote an excellent piece on the 12th/16th Hunter River Rifles. His conclusion is a classic:

'The history of the regiment is proud and honourable. Its continuing success is grounded in its traditions, values and its ability to incorporate change as needs have changed over a century of continuous capability.'

He has identified the central theme. Status quo is not an option and the current generation of staff college graduates in the UK are not as wedded to the past as some of their predecessors – particularly having been educated at a joint staff college. Ownership of assets is no longer an issue – the key is the ability to cue those assets in order to produce effect as deep as possible. The close battle will indeed, as Michael Evans suggests, be an enduring feature of war but not the defining feature of war. Our love affair with close combat leads perhaps to backwards looking evolution when what is required is a lust for the deep battle and forward-looking revolution.

CHAPTER 17

ASYMMETRIC WARFARE

By John Russell

'Get ready for the future, it is murder.'

Leonard Cohen

Asymmetry is topical and the term pervades current military literature, particularly in the United States. While the existence of asymmetry is widely acknowledged, it is usually regarded as a constant, which can be met within the compass of our existing capabilities and doctrine, and that conventional force-on-force warfighting will continue to predominate. The Army has had a long tradition of operating against irregular enemies and the asymmetric threat is generally regarded as merely a 21st Century expression of these types of opponents and only an adjunct to the main business of warfighting. So has anything changed? The asymmetrists argue strongly that it has. Their argument is not that asymmetry is something new, but that in its present guise it represents a discontinuity, a fundamental change in warfare. Whereas the Gulf War is seen as the prototype for a new form of warfare, the asymmetrists argue that it was the final manifestation of manoeuvre warfare and an anachronistic throwback to World War II in

Europe but with updated weapons and systems. They assert that western nations are designing armies for yesterday's war, the war they would like to fight rather than the war they are likely to fight, and that these nations have profoundly misunderstood the nature of the asymmetric threat.

The fundamental premise of asymmetric advocates¹ is that warfare undergoes generational change due to political, social and economic factors rather than just the technological. Thus it was not the development of massed, rifled artillery, barbed wire and machine-guns that brought about the warfare of the Western Front in the Great War but rather the evolution of the entire political, economic and social structure required to wage war of this type and scale. Asymmetric proponents see such a change taking place today and that the weapons and systems based on the information revolution, although affecting the future of war, are not in themselves the future and that other stronger forces are at work.

The asymmetrists argue that society's conditions are now in place for a change to a new generation of warfare, which they term the Fourth (1st – massed manpower, 2nd – massed firepower, 3rd – manoeuvre). The title some have given to this generation is '*Netwar*' in which antagonists will fight in the political, economic, social and military arenas and communicate their messages through a combination of networks and mass media. This generation is likely to be based more on ideas rather than military technology; this is a crucial point. Warfare will not be the relatively clear-cut, high technology '*stately dance*' of conventional war but

rather extremely complex, mainly low-intensity conflicts. In these conflicts it will be hard to differentiate between war and peace, military operations and crimes, front and rear, combatants and non-combatants. Fighting will involve an amalgam of military tactics from all four generations and the concepts of '*victory*' and '*defeat*' will probably cease to exist.

Our current approach to warfare views the future as much like the present but with steady advances in technology enabling changes to our operational concepts and continued dominance over any likely warfighting opponents. However, this technological approach, summarised by some as the Revolution in Military Affairs, is likely to be ill-suited to many of the opponent types we could meet in the 21st Century. Furthermore, history² suggests that technological supremacy is at best ephemeral, that faith in a technological '*silver bullet*' is misplaced and that there are other forces stronger than technology at play.

Fundamentally warfare falls into two categories: symmetric and asymmetric. However, these categories are likely to be blurred and it is possible that a war could start symmetrically but change to asymmetric if one of the combatants considered that it best served his interests. Additionally, there is no reason why a number of the weapons and techniques of asymmetric warfare could not be used in symmetric warfare, further blurring distinctions. The French identify a third category – dissymmetric warfare – which is included below for the sake of completeness.

- **Symmetric** warfare involves combatants with broadly similar aims, strengths, assets, doctrine and moral codes. As pure symmetry will result in a stalemate, protagonists seek to break the symmetry by strengthening or developing winning capabilities, changing the conduct of operations or reducing the opponent's capabilities. This need to break symmetry means that there is always, to a greater or lesser extent, asymmetry within warfare. However, '*asymmetry within warfare*' is wholly different from '*asymmetric warfare*'.
- In **asymmetric** warfare there is a total or extremely strong difference between the opponents' aims, capabilities, courses of action and moral codes. An asymmetric threat implies that one side is incapable, either due to his own inability or the strength of the force opposing him, of confronting an opponent in a conventional manner, using similar means or weapons. Instead he will use weapons and tactics in ways that are unplanned for or unexpected to foil, off set, reduce or circumvent technological superiority. Asymmetric attacks generally exploit vulnerabilities and have a strong psychological as well as physical impact. They can also be designed to goad the adversary into an inappropriate response, thus undermining their legitimacy in the eyes of their constituencies. Asymmetric warfare can threaten the homebase far more directly and with a greater variety of methods of attack than symmetric warfare. Vulnerabilities generated by asymmetry will need to be identified. By

addressing these vulnerabilities symmetry will be restored, albeit to a new form of warfare.

- The thinking behind the French concept of **dissymmetry** is not entirely clear but it appears to be based on a major imbalance between the combatants either in the stakes or the performance of assets but not in the broad nature of the assets or the conduct of fighting. There is a strong resemblance between the opponents.³

Outlined below is a synopsis of the key types of asymmetry compiled from the extensive research already undertaken both here and in the United States. This summary is by no means definitive, but does encapsulate the key elements of the concept, as it is currently understood. The types are not mutually exclusive and it is likely that more than one could apply to any given situation.

- Asymmetry of **interest**, whether real or perceived, is considered by some to be the most basic asymmetry of all. Essentially it occurs when one antagonist, usually economically and militarily weaker, sees its survival or vital interest at stake, while an opponent is only protecting or promoting less than vital interests. In these circumstances the weaker adversary is likely to seek ways of deterring an opponent from involvement in a given situation. This can be achieved by convincing an opponent that the potential costs are too great and/or the potential benefits too small.

- Asymmetry of **will** exists when one antagonist, usually with a higher stake, is willing to accept greater risks, bear greater costs or undertake actions which a less committed opponent might eschew, possibly on moral or legal grounds. In order to exploit a perceived asymmetry of will, an adversary may seek to accentuate his own willingness to pay any price '*for the cause*' while at the same time seeking to undermine the weaker will of his opponent. In the context of the UK and our allies, some adversaries already perceive a disparity of wills which they can exploit, for example, aversion to casualties and excessive collateral damage, and our sensitivity to domestic and world opinion.
- Asymmetry of **values** occurs between adversaries with widely differing values and beliefs – both of society and individual. Such opponents are also unlikely to share our priorities, moral constraints and legal principles. They may be unwilling to conform to internationally regulated or understood standards of behaviour, and may simply not care about '*public opinion*'. Indeed, some non-state groups are probably not constrained whatsoever by any Western democratic moral or ethical convictions. They may be willing to absorb or inflict large numbers of casualties and major damage to infrastructure, or exploit capabilities that we are unwilling or unable to match. Examples of such actions could include ethnic cleansing, terrorism, human shields, child soldiers and the threat of, or use of WMD/WME. The aim would not be to defeat us

militarily but to constrain our freedom of action or even to deter us from becoming involved at all. The danger of such an approach (for the adversary) is that their action might transform a situation into one of vital national interest for us (or our allies) thereby removing certain self-imposed constraints and inviting a disproportionate response.

- Asymmetry of **strategies and tactics** will become increasingly common. The Gulf War, the ongoing campaign against Saddam Hussein, and the Bosnia and Kosovo air campaigns have shown potential adversaries that there is little to be gained from force on force confrontations with NATO. It is therefore likely that our opponents will seek to employ dissimilar strategies and tactics that are designed to avoid Alliance strengths (dominant manoeuvre, precision engagement, information superiority etc) and exploit weaknesses (eg force protection concerns, legal constraints, coalition faultlines). Asymmetric opponents may also choose to disregard the concepts of victory and defeat, both of which belong to the inter-state model of warfare.⁴ They are also likely to select ground which will give them marked advantage and reinforce the effect of other asymmetries. For instance fighting in urban areas would involve to a greater or lesser degree asymmetries of will, values, technologies/capabilities, organisation and time.
- Asymmetry in **technologies and capabilities** is not new in itself. Conflict has always been

characterised by disparities in technology. These disparities have often proved to be decisive, although clever adversaries have found ways to counter technical superiority. Historical examples can also be found of weaker adversaries seeking to gain advantage from novel technologies as a counter to a more powerful opponent's conventional superiority. The availability of leading edge technologies on the world's arms markets provides the opportunity to overmatch a western army in one or more key capabilities, for instance TI or gun-launched ATGM. The asymmetric opponent is not burdened with lengthy research and procurement cycles and the necessity to equip large, structured organisations. Indeed, buying off the shelf is in itself an asymmetric approach to developed nations' long procurement cycles. His training requirement is minimised as the use of the technology does not have to encompass the complexities of an equipment's use in warfighting. At the opposite end of the technological scale, an asymmetric opponent could decide to ignore technology and attempt to overwhelm us through massed infantry, so called human wave attacks. Against such attacks, forces which have traded manpower for expensive, and therefore limited, precision weaponry designed to combat other high technology forces will be vulnerable to being overwhelmed.

- **Organisational** asymmetry has often provided one antagonist with a significant advantage over another. That said, for some 50 years we have

been faced by adversaries who have essentially been organised along similar lines to ourselves. In the future, we are just as likely to face non-state groups organised as networks or simply not organised at all. These groups may not have any organised command structure or centralised means of co-ordinating activity. Potential adversaries may also be made up of loose federations of disparate groups with very few common beliefs or shared objectives. By design or default, such organisational asymmetry could provide an adversary with significant advantages.

- Asymmetry of **time** occurs because the West has little appetite for long and protracted engagements. All US operations, for example, must have a clear 'exit strategy' with rapid effect then early withdrawal, a goal shared by many. An asymmetry of time may occur when one antagonist enters a conflict willing to see it continue for a prolonged period, while their opponent is only able to sustain collective will for a short engagement. In this case, perception is reality, and an adversary may only need to appear willing to engage in a protracted conflict to deter Western intervention.

Asymmetric Actors

The range of actors who could employ asymmetric techniques is very broad. However, categorisation of these actors is not easy due to their variety and by compartmentalising them can obscure their complexities. For instance, the Taleban regime



Sierra Leone Revolutionary United Front

was an autocratic system of religious fanatics governing by a system of internal terrorism while fighting something approaching a conventional war against the Northern Alliance, cutting across at least three categories.

However, while many of the potential adversaries to a greater or lesser degree pose a threat to the UK they do not necessarily pose a direct threat to the Army, either as a deployed force or in the home base. It is the state employment of asymmetric techniques against deployed forces that is a greater direct concern to the military, rather than the other disparate actors whose impact will largely be political and pose a security rather than a Defence threat.

Western nations face a dilemma when wishing to confront opponents prepared to operate outside the accepted norms of warfare and the laws that govern it. This is particularly relevant to the non-state actor for whom the traditional constraints are immaterial and for whom the primary targets will be the people and civil infrastructure, as well as the military. For the

democracies this is the nightmare scenario described by Martin van Creveld,

*'Either modern states cope with low intensity conflict, or else they will disappear; the suspicion grows however, that they are damned if they do and damned if they don't.'*⁵

The Range of Asymmetric Threats

The variety, availability, lethality and effectiveness of asymmetric threats represents not only the most significant element of asymmetric warfare but also the most significant change. Whereas non-state actors in former times would have had the ability to cause damage at the tactical and maybe operational levels, they did not have the access to weapons and systems that could generate disproportionate effect at the strategic level by attacking targets in-theatre and, most significantly, in the homebase. There are two key points about asymmetric threats. First they must be significantly different from those capabilities or options available to our own forces; thus what matters are *'the differences that make a difference'*. Secondly, that regardless of type, the weapons held or used by an asymmetric opponent are themselves of lesser importance than the effect they create in the mind of the attacked.

Fundamentally, the range of asymmetric threats fall into three categories: weapons of mass destruction or effect, information operations and other tactical concepts. All three offer possibilities for causing disproportionate effect and the potential to be used at the tactical level but migrate their effects upwards

to the strategic level. Many of the threat technologies are no longer strictly military, such as information systems and biotechnology. It is not the intention in this section to describe the detailed characteristics of each threat but rather to provide a general description of their asymmetric aspects.

The most spectacular and potentially lethal effects are those connected with weapons of mass destruction or effect.

- **Nuclear.** For a state actor, possession is the key factor as use of a nuclear device remains incredible due to the risk of massive response. However, if faced with an apocalyptic situation it is possible that some state actors could consider their use. Although some non-state actors could build a crude nuclear weapon it would probably be easier to steal or buy one. Despite the considerable difficulty in infiltrating and emplacing a nuclear device, if this could be achieved it would be very difficult to establish responsibility and even harder to mount a response in kind. Devices based on scattering radioactive materials rather than a nuclear explosion are relatively easy to produce and could be used to create a 'dirty' area. However, the use of nuclear devices should remain the least likely form of WMD/WME attack as there are easier and potentially equally effective alternatives.
- **Biological.** Biological weapons based on the use of pathogens or toxins are easier and less expensive to produce than either nuclear or

chemical weapons and it is more difficult to trace an attack's sponsorship. Biological agents can cause casualties on a scale similar to that of nuclear weapons or threaten the food supply. Their relatively low cost of production is within the capabilities of basic civil bio-technologists and they must be considered attractive to some potential adversaries. Biological agents offer the greatest advantages at the strategic level where they can be delivered⁶ covertly and far more easily than nuclear devices, are more deniable and can achieve strategic effect. The cost and problems generated by the UK's foot and mouth disease outbreak will not have gone unnoticed.

- **Chemical.** Chemical weapons are generally considered to be the least potent of the WMD/WME triad as they do not have the apocalyptic leverage of the other two. However, they are the easiest to procure and there is less stigma attached to their use. Indeed, the use of chemical agents by the Iraqis and an impure Sarin attack on the Tokyo underground by the Japanese Aum Shinrikyo cult have further reduced any taboo against their use. Similar to biological weapons, their use in-theatre by a state actor would risk a massive response, which again would not be in the asymmetric actor's interest. However, the threat of use may damage an alliance and split away those nations less well-prepared to deal with chemical attack. If used as a last resort, chemical weapons could achieve disproportionate effect if used against allied units or civilian populations as this would stress host nation and military

medical facilities and therefore political unity. However, the greatest threat is strategic; chemical weapons could achieve very marked effect if threatened against or used in cities.

Information Operations (IO)

IO are actions taken in support of objectives that influence decision makers by affecting the information and/or information systems of others while protecting your own information and/or information systems. The conduct of offensive IO poses a clear asymmetric threat to the West, with its increased reliance on information and information systems as a vital component of decision making. In many cases we rely entirely on technology to deliver information to military decisionmakers. That technology is often connected through commercial networks and therefore via routes that are both publicly accessible and outside military control. Ironically, the more we digitise, the more vulnerable we become.

The West is becoming increasingly vulnerable to cyber-based IO. This is not only in the military sector but also in the civilian and commercial sectors. There is the threat that asymmetric opponents may use IO strategically to cause mass disruption to civil society. A cyber war could slow the decision making process of the governments involved. The real threat is not the amateur hacker but the highly skilled and trained products of government agencies or corporate intelligence branches that work on the open market. Cyber warfare does not however only concern damaging systems but also intelligence

gathering, counter-intelligence and disinformation. Connected with cyber warfare is the prospect of war in space. The temptation to attack Western space-based systems would be irresistible.

The Soviet Union embraced high altitude nuclear induced EMP as an integral part of its strategic warfighting concept. However, since the end of the Cold War we have tended to ignore the threat to our electronic systems and the huge expansion in the number and range of equipments with integrated circuits has left us technically and operationally vulnerable. The threat posed by EMP and HPM weapons is an adjunct to IO and arises from their ability to strike at the heart of the information, decision making process and the command and control structures that support it.

IO are not however purely technical and the use of non-technical IO against a much more capable and technologically advanced force was demonstrated more than adequately during the Kosovo campaign where, despite NATO's supposed information superiority, Belgrade would seem to have 'won' the deception, psychological and perception war.⁷

Other Tactical Concepts

Fighting in urban areas offers them opportunity to generate maximum political impact; absorb our strength; cause mass casualties; degrade our manoeuvre and Find capabilities; minimise our ability to strike at distance by use of '*hugging*' tactics; and provide civilian inhabitants for use as a weapon. The cover provided by urban areas allows the

enemy to merge with the civilian population and avoid the limitations of a defined front line. Close attacks can be mounted at times and places of his choosing and provide opportunities for the employment of novel tactics, such as suicide truck bombers. The problems we will experience will create a wide variety of IO opportunities, which can be mounted against us. Urban areas, particularly cities, provide the maximum opportunity for the exploitation of our unwillingness to engage in attritional battles, our sensitivities toward civilians and our aversion to collateral damage. Any stated unwillingness and lack of capability on our part to fighting in urban areas is likely to increase the likelihood of asymmetric enemies forcing us to confront them here.

Terrorism will appeal to many groups and weak states as an attractive option to blunt the influence of the West. It is not a new phenomenon and has generally been relatively ineffective as a means to achieve significant political change. Historically it has had its roots in ethno-cultural or ethno-religious differences between a group and a state. So what has changed? First, while such roots still exist, the techniques of terrorism are finding wider expression in single-issue fanatical groups such as animal liberationists and the nihilistic members of al-Qa'eda. Secondly, terrorist access to and employment of the range of asymmetric threats described in this section could drastically alter their relative ineffectiveness.

Terrorism seeks to collapse the enemy from within. In its *'purest'* form it will attempt to bypass the

enemy's military strength and strike directly at his homeland at civilian targets. Terrorism will use a democratic society's freedoms, openness and legal system as weapons to be used against it. Terrorism is, by its very nature, asymmetric as it aims to achieve military-like results against an opponent relatively cheaply and with little 'friendly' bloodshed. The terrorist '*battlefield*' is highly dispersed and includes the whole of the enemy's society. Successful application of terror closely mirrors most of the characteristics of manoeuvre warfare.⁸

Future terrorists will be less hierarchically organised but better networked than they are today. They are less dependent on state sponsorship and are, instead, forming loose, trans-national affiliations based on religious or ideological affinity and a common hatred of the West, particularly the US. Their diffuse nature will make them more anonymous yet their ability to co-ordinate mass effects will increase.

Technological Surprise

Potential asymmetric opponents are able to acquire on the open market a wide range of leading edge weapons and systems.⁹ The purpose of such acquisitions will be to achieve a decisive and unexpected technological advantage over an enemy at the tactical, operational and/or strategic level; otherwise known as technological surprise. Technological surprise may achieve weapon system superiority or unexpected parity, enable a change in tactics, doctrine and capability. It can prevent defeat, prolong conflict and cause heavy casualties. It has

been made more likely by rapid advances in technology, which is more affordable, and the heavy competition in the arms market where arms are provided for cash and there are few if any ethical constraints. System modernisation can be revolutionary rather than evolutionary as generations can be skipped and there is little or no requirement to run on legacy systems. Weapons can be hybridised or modernised by component; for instance T-55 can be vastly improved by the addition of a larger calibre gun, defensive aids suites and improved night fighting and fire control systems. State asymmetric players are known to exchange information regarding Western weapon systems and doctrine. Technological surprise has particular relevance to rapid reaction forces, which are vulnerable to overmatch in terms of both equipment and mass. Weapons can be acquired specifically to defeat such forces, such as sophisticated sea mines to deny SPODs and vehicle signature abatement kits to defeat precision attack weapons. Helpfully the Iranians have distilled the various measures needed to defeat a coalition force, particularly one including the US, as shown below:

Make the Americans go home by:

- Defeating early entry force
- Causing casualties
- Stripping away key elements
- Destroying 'icon' systems/units
- Trading space for time
- Fragmenting alliances

Icon systems provide tempting targets due to the psychological impact of their damage or destruction; hence the Serbian determination to shoot down a F117A and the suicide craft attack on the USS *Cole* in Aden harbour.¹⁰ Icon systems can be relative to the theatre in which they are used. Thus a Chinook might be an icon system in Sierra Leone but not elsewhere. UK icon systems could be attack helicopters and, in the future, ASTOR; their destruction would have a powerful psychological effect on both sides and it should be presumed that such targets would be afforded a high priority.

Sabotage, subversion and espionage are all fellow travellers with asymmetric warfare. Asymmetric opponents are able, should they so wish, to operate outside the norms of Western cultural acceptance. These norms are well-known and come under the umbrella of respect for human rights; examples are: avoidance of civilian casualties, non-use of children as combatants, fair treatment of prisoners as governed by the Geneva Convention, non-use of anti-personnel mines and operating within a legal framework. The asymmetrist can therefore employ '*weapons*' which directly counter these norms and have significant psychological effect.

Cynical Exploitation of Civilians

Refugees can be used deliberately. The Serbians¹¹ used terror and atrocities to trigger the flow of as many Kosovar Albanians as possible into Albania and Macedonia. This was no random ethnic cleansing but a systematic policy intended to swamp NATO logistics, complicate and distract Allied

decision making, weaken alliance resolve and gain time to consolidate control of Kosovo. The effect was intensified by the '*denationalisation*' of the refugees by the destruction of all forms of identity and proof of property ownership and their brutal impoverishment in order to make their survival entirely dependent on outside aid.

Deliberate close co-location of civilians to military or infrastructure targets, otherwise known as '*hugging*' or human shield tactics, will present a major targeting dilemma. Examples at the tactical level are Serbian civilians '*occupying*' Belgrade's bridges over the Danube and the reported use of children to surround a Somali gunman in Mogadishu while he lay on the ground in a fire position aiming through a woman's legs.

The deliberate causing of civilian casualties is likely to have greater political impact than military. Casualties among the latter are to some degree accepted due to the hazards of the profession; the same is not true for civilians. Mass civilian casualties, particularly in the homebase, will have an extremely sobering effect on political decision making.

Warlords and Warriors

Asymmetric warfare will be dominated by warlords and '*warriors*' rather than soldiers. They are being met increasingly: Arkan and his Tigers, Foday Kallay and the West Side Boys, General Aideed and the Somali Technicals, Chechen mafia/fighters, the South China Sea pirates. The warrior lifestyle is



A 'warrior'

characterised by shifting allegiances, habituation to violence and no stake in civil order. Unlike soldiers, they follow no rules other than their own and tend not to obey orders they do not like. For the Western soldier, trained to operate within tight codes of behaviour, both military and personal, the warrior provides a challenging enemy. Warriors will only stand and fight conventional forces when they know or believe that they have overwhelming advantage; instead they will snipe, ambush, bomb and create IO incidents. The increasing numbers of female soldiers in Western armies will provide rich pickings for such incidents. Rape, pillage, terror and ethnic cleansing are all also within the warrior job specification. It would, however, be very dangerous to dismiss warriors as militarily incompetent. The Somalia National Alliance's (SNA) study of US tactics allowed them, when the opportunity presented itself in October 1993, to spring an effective tactical counterstroke against US Special Forces (resulting in 18 US killed and 73 wounded), and few in our Army would dismiss the skills, however repellent, of the South Armagh PIRA.



Omagh

In summary, it is dangerous and simplistic to over-emphasise Western technological dominance and its current hegemony in conventional *'force-on-force'* symmetric conflict as a basis for success in future warfare. It is also clear from the analysis that asymmetric warfare itself has many shades and variations of shades. Asymmetry and conventional force-on-force symmetric conflict are not black and white alternatives and we need a great deal of new thinking to close with the many complex implications of asymmetry in all its guises. However, we should take comfort from our long historical legacy of fighting colonial and post-colonial operations against irregular foes. The core of our capability to do so successfully has been effective intelligence, an ability to operate amongst people and the fighting spirit of all our Services – exemplified, in this context, by our Light and Special Forces. This must now be developed and melded with state of the art C4ISTAR and weaponry to deliver commanders a decisive advantage in this, most ghastly, form of warfare.

NOTES

- 1 The majority of this section is ascribed to Lt Col Hammes, 'The Evolution of Warfare: The Fourth Generation', *USMC Gazette* Sep 94.
- 2 At the close of World War II the US military had the atomic bomb, millions of battle-hardened soldiers, unprecedented mobility, systematic training, global logistics, excellent battlefield communications and a host of other capabilities from sophisticated artillery co-ordination to medical evacuation helicopters. Yet, slightly less than five years later in Korea, that same military was fought to a standstill by a fourth rate army backed by a third rate.
- 3 *Future Engagements by Ground Forces*. CEMAT
- 4 Such disregard is neatly illustrated by a conversation between a US officer (Col Summers) and a North Vietnamese officer (Col Tu) in April 75. "You know you never defeated us in the field", said Summers. "That may be true", replied Tu, "but it is also irrelevant".
- 5 Martin van Crefeld, *On Future War*. Quote extracted from Introduction to SCSI Occasional Paper No 36, Sep 98.
- 6 It was once thought that biological weapons would not be used due to the difficulties associated with the culture of toxins and the methods of dispersal. It now appears (*New Scientist* 1 Sep 01) that the Aum Shinrikyo cult successfully cultured and then released a non-virulent strain of anthrax in Tokyo (in addition to the Sarin attack).
- 7 Timothy L Thomas, 'Kosovo and the Current Myth of Information Superiority', *Parameters*, Spring 00.
- 8 Application of strength against weakness; defeat and disrupt rather than hold ground; precise application of force at critical points and times against points of weakness; and defeat the enemy by destroying his will and desire to continue by seizing the initiative and applying constant and unacceptable pressure at the times and places that the enemy least expects.
- 9 At the Battle of Little Big Horn, many Indians were equipped with Winchester repeating rifles bought from traders; Custer's troopers fought and died using single-shot breech-loaders.
- 10 Icon systems need not be military; the World Trade Centre was very much an icon 'system'.
- 11 An alternate view is that the KLA coerced their own people to leave their homes in order to magnify the ethnic cleansing and add to Milosevic's demonisation. Either way, civilians were used as asymmetric 'weapons'.

CHAPTER 18

ONCE UPON A TIME IN THE FUTURE

By Jake Thackray

How it All Began

WWN WORLD-WIDE NEWS

“Good Evening. You’re watching Headline News at six. Another continent: another crisis. It seems now that the food shortages and civil unrest in the Generic African State threaten to undo all that that young nation has achieved in the 40 years since its independence from Britain.

“In scenes reminiscent of the worst tragedies to have befallen Africa over the past 15 years, the collapse of what was once the only prosperous country in the region seems to be a matter of weeks, if not just days away. The footage from the numerous refugee camps strung along the border is particularly harrowing. Despite the presence of aid agencies and volunteer organisations from Britain and around the world, the death toll is reported to be several hundreds every day, and rising.

“The picture is no less devastating in the teeming streets of the GAS’s capital, New Pewsey. There, gangs of youths, armed with a hodgepodge of

weaponry, openly flaunt their rejection of the rule of law. Across large swathes of this troubled city, police and GAS Defence Force units appear powerless to restore order. The worsening situation has resulted in the recall of many diplomats, expatriate workers and their families from the GAS. Nonetheless, it is estimated that many thousands remain, trying to tough it out in this ravaged landscape. Here in London, the foreign Office is instructing all UK and EU nationals not to visit the GAS for any reason, unless and until the situation improves.

“Meanwhile, on its borders, the activities of the Sub-Saharan alliance, and in particular those of the alliance’s largest and most powerful country, Goldland, continue to threaten to destabilise the entire region. It’s large and capable armed forces have conducted a number of large-scale exercises close to the border, and there have been a number of small-scale border incidents with the border patrols of the GAS. There is much speculation that it is the SSA, and in particular Goldland, who are behind the general lawlessness in the GAS, speculation categorically denied by Goldland’s leader yesterday.

“We’ll have more on this story later in this bulletin. Other news, now. Heathrow’s Terminal 5 construction site was disrupted again today by environmental and anti-capitalist protesters angry about what they see as...”

Another continent: another crisis. It was not that the international community ignored the worsening situation in Africa until it was too late – it's just that it had to take its place in a seemingly ever-lengthening queue. Public outrage and sympathy had simply run out.

Looking back, nothing that happened in the world since 2002 should have come as a surprise. What's more, things could have been much, much worse. There had been no discontinuities: none of the world's players had imploded (well, none of the ones that matter, anyhow). Amazingly, there'd been no use of nuclear weapons, anywhere. People said that there's been no organised use of bioweapons, either, but then, who could tell? Somehow, however, most of us had kept getting just a little bit richer (or at least entertained the hope that our children would be). Somehow, most of the world's surface remained able to sustain life. Somehow, hope endured.

And it was fortunate that hope enjoyed such an enduring quality, because on occasions in that first fifteen years of the 21st Century, it appeared that it might be all but extinguished. The chasm between rich and poor nations continued to widen, and the suffering endured by those on the wrong side seemed to beggar adequate description. Lack of food – despite a world-wide surplus – lack of water and lack of medical care bedevilled the marginalised regions, and nowhere more than in sub-Saharan Africa. That troubled continent also experienced the worst ravages of disease – the AIDS pandemic chief amongst them.

Environmental disaster was a frequent visitor: drought followed flood followed famine with all the seeming regularity of seasonal change. But it could so easily have been the Middle East, Indian sub-continent; Indonesia; or that arc of instability between Russia and its Southern States.

The world wasn't interested in Africa. The action was in the Pacific. In late 2014, the enmity with which the US and China faced each other across the Pacific threatened – again – to explode into something worse. Again Korea, the DMZ and the 38th parallel provided the foci for tension. The rapid US deployment to South East Asia was all that the late 1990s architects of transformation could have wished for. The trouble was, the Chinese got there quickly too, and showed no signs either of leaving or invading. Both sides settled down to the stand off: neither willing either to precipitate action nor to lose face. The world's two most capable military forces were therefore distracted and fixed.

For us here in Europe, and exactly 100 years after the Archduke's visit to Sarajevo, the Balkans problem still continued to confound everyone. The sons and daughters of those first UN troops who made their way into Bosnia in 1992 now stood guard at key points throughout the Balkans. They wore national uniform, but they operated under the control of the EU Military Council and its land, air and maritime directorates. Every year the European media agonised over the cost in lives and treasure, but in the end, the troops stayed. Meanwhile, Russia's post-Communist torpor and seemingly

never-ending border skirmishes with the nations of the Trans-Caucasus continued.

And the UK? Still awkwardly balancing the requirements of the by-now well-developed European pillar of NATO and the Atlantic Bridge. We still had the ability to project at least some power around the world: HMS *Trafalgar*, delivered in 2013 complete with its 50 Joint Strike fighters, was due to be joined by a sister launching from Belfast in 2016. Our Army could deploy a division to accompany its Air Assault formation, and the RAF's Typhoons were still as good as anything Seattle might build. What's more, the MOD had won its intense political battle to keep up the huge training effort involved in maintaining a military force made up from both Regular and Reserve elements, intrinsically bound together, which was able to fight wars, and not just police troublespots.

* * *

In Africa, the irony for the GAS was that it had found itself a victim of its own success; in a continent of despair, it remained the one, bright, shining hope. As Africa fractured, its relatively stable government, its modest trading success and well-ordered society made it stand out from its neighbours. There, in what was termed the Sub-Saharan Alliance (SSA), various despotic regimes controlled societies either by the gun, or bribery. Goldland, the dominant partner in the Alliance, maintained a large, and very powerful army, funded from the profits of the drug lords and other criminal based activities. Able to put together three divisions of armoured and

mechanised forces, they had invested in a number of advanced technologies; technologies which the more unscrupulous of the world's arms manufacturers had queued up to sell them. They maintained one of their divisions close to the border, where it presented a visible and obvious reminder to the GAS of Goldland's capabilities. The others were always kept near the capital – better to keep order amongst the population. An iron grip was maintained on the people of Goldland, and inevitably, rapid migration into the GAS followed, welcomed at first, but increasingly resented as the welfare system buckled. It was a tough journey, but it could be made, and thousands of them risked the journey every day and every night. Once inside the GAS, they disappeared into the shanty towns and villages. As the world's population steadied, and as part of Africa's actually reduced, that of GAS exploded.

The GAS government could, possibly, have maintained control. Left alone, and with some financial help from outside, they might have turned the situation around. They weren't to be left alone. They had something that their neighbours wanted, a resource more valuable than all the drug money and mineral wealth in the continent. Their neighbours wanted water.

Water was scarce throughout sub-Saharan Africa and food production remained the single greatest user of water. GAS's traditional, small-scale irrigation schemes, developed with World Bank assistance to better harness local resources, were enough – just – to meet their needs. Not so across the GAS's borders. There, a lack of irrigation water

due to poor investment was beginning to make even the most pliant farmers turn rebellious. An alternative existed: the mountain range in the east of the GAS contained – if it could be harnessed – a water resource vast enough to meet all projected needs.

Moreover, the GAS's neighbours need not invade – not yet, at least. The border was still easily infiltrated, and the migrant population easily coerced into disobedience, sabotage or tribal atrocities. Eventually, the GAS would simply disappear under the weight of its burgeoning, uncontrolled population. The rump of the country could either become a client or could be annexed militarily at leisure. As far as the UN was concerned, GAS was suffering from a crisis of its own making.

In February 2015, after months of attempting to hold the GAS together, its president formally requested military assistance from the UN, *'to restore and ensure order throughout the nation'*. The Security Council, however, although willing and able to draw up a Resolution supporting GAS's request, still did not enjoy the services of a dedicated military force. Continental Europe and the US couldn't help; Russia was too busy policing its noisy southern neighbours. The GAS was not a small country, and whoever did deploy there would need to deploy in strength, and might be there for a while. No-one was volunteering, and it looked as if no-one would.

The thump which reverberated across the GAS capital, New Pewsey, in the early hours of 4th March was gruesomely familiar. The growing danger evident in dispersed embassies had forced the UK

and other Commonwealth nations into a rough-and-ready combined diplomatic presence in the country. That presence was now a scene of carnage. Within 24 hours, it became clear that over 400 Commonwealth diplomats, financial and military advisors and their families, including some 80 children, had perished. Designed to warn nations off, the bomb, just as others in the past, had the reverse effect. The UK spun up the readiness of its Joint Reaction Force, specialists in what military organisations called '*rapid effect*'. Other European countries offered their support. Echoing events unknown for more than fifty years, the Commonwealth nations did the same. The multinational forces that formed the Coalition were thus borne out of the long-established relationships of the past; NATO, less the US in this case, Europe and the Commonwealth. Larger, heavier formations in each of these nations began their preparations, too. Selective Reserve activation took place at military bases throughout Britain. The first reconnaissance



Amphibious Ready Group

and advanced command elements supported by an Amphibious Ready Group poised offshore and an air component above, landed on New Pewsey airport's only useable runway on 12th March. The fact that this happened to be Commonwealth Day was an irony lost on no-one involved.

Some Corner of a Foreign Field

WWN WORLD-WIDE NEWS

“Good Evening, and welcome to this special edition of Headline News Insight Report. Well, here we go again, and, as the Prime Minister told the House of Commons yesterday, did we really have a choice? The massacre of so many UK, EU and Commonwealth citizens in the early hours of last Thursday morning has left most of us shocked and dazed. The Prime Minister said that it was an act that could not be ignored, and that future such attacks could not be discounted. And so, once again, and in concert with our allies both close to home and from thousands of miles away, young British men and women have set off to some corner of a foreign Amphibious Ready Group field. What will they find there? How will they operate? What can we expect them to do, and, most importantly perhaps, when can we expect them to return? This rapid deployment has raised these and many other questions. To answer them, I'm joined in the studio tonight by someone who was, until his retirement last year, one of the British Army's most senior operational commanders. Now, you were involved in many operations of this kind during your service,

right back from, as many of us will recall, some of the first deployments to Bosnia and Kosovo in the last century. Do you see much that's familiar here?"

"Well, yes I do, and, of course, that's no surprise. All military operations come down in the end, one way or another, to servicemen and women going to do a dirty job in nasty conditions that no-one else will do. This is no different. The point here is: can they do the job?"

"Well, yes, that's the 64,000 dollar question. Do you think we have the right people to do it?"

"We've certainly got the right people. The best people, frankly, in the world, bar none. But the question we should all be asking is – have we got **enough** of the right people? What we're looking at here, or so it appears to me from this nice, warm studio, is a classic peacekeeping operation in a near-enough collapsed state. Now, these sort of operations are very, very complex. They take a lot of people to get right. There's no obvious enemy, nor are there any obvious friends amongst all these armed militias that we can see on the streets of Newtown and elsewhere. We need to be everywhere, all the time, and that soaks up troops. At the same time, someone's got to get to grips with the food situation over there, to make sure the relief organisations can actually do their jobs. Again, not easy. And it's a big country, don't forget, for which we have very little current intelligence. Mark my words, we've got our work cut out."

"And what if we can't get the job done? What then?"

“Then nothing. At least, not in the current climate. As far as the UK’s concerned, there’s nothing else in the cupboard. This works – or we say goodbye to the GAS.”

“Some viewers will be asking themselves why we’re sending such an advanced and capable force to deal with what, as you’ve said, is in fact a large peacekeeping operation. Why all the tanks? Why the attack helicopters? Why the Joint Strike Fighters?”

“You need to bear in mind two things. First off – don’t forget just how much force protection these big, advanced systems, equipments and weapons offer you. They scare the hell out of anyone who might fancy having a go – and that’s a good situation for any soldier to be in. Second, since before the turn of this century, British forces have never, ever deployed to any situation without being prepared for it to get worse. If it looks like peacekeeping, it might end up as warfighting, is the theory. All the big kit? Well, think of that as an insurance policy.”

“Well, let’s hope it’s a policy we don’t have to claim on. Thank you very much indeed. This has been a Headline News Special Insight report. Goodnight.”

The retired General certainly earned his appearance fee when he pointed out that these sort of operations are complex. The British Land Component Commander faced an organisational nightmare: His three divisions – one British, one European and one Commonwealth were all structured differently, had widely differing logistic needs, offered a variety of

capabilities and a huge range of equipment types and systems. Under normal circumstances, he would have liked at least three months with them to try and get them working well together – but time was one resource he didn't have. Besides, whatever preparations he'd like to make were inconsequential – there was an overriding political imperative, driven by public opinion back home in all the capitals involved – to get on and do something. Stabilise the situation, hand out the food, restore law and order and come home – after all, that's what armies were paid to do, wasn't it? His staff looked at the force establishment figures, and the size of the problem, and shook their heads. He couldn't prepare for warfighting and maintain peace and order in the GAS at the same time. It had to be one or the other, and the decision was made for him. Reluctantly, he ordered his divisions to disperse to different geographical areas of the country, with orders to stabilise the situation and provide assistance to aid agencies within their boundaries. A powerful reserve force – that prerequisite for successful military operations throughout history was a luxury he could not afford, and yet he had to afford it. With reluctance, he allocated the reserve task to the UK's Air Assault Brigade. It was the most potent offensive weapon he had – able to strike over 300 Km across the GAS's borders if needed, and here he was – as he privately confided to his Chief of Staff – *'using it like some sort of glorified airborne fire brigade'*.

At least, thought the General, as he left his twice-daily press conference, he could depend on a command and control system which would allow him to communicate to his forces quickly and securely.



Between them, the UK's FALCON and CORMORANT CIS systems provided a high capacity, robust network from his own HQs down to all his component divisions, and up to the Combined Joint Task force HQ in New Pewsey, as well as to the air and maritime components and their forces. More important, perhaps, was that some Herculean, if largely unnoticed, efforts had allowed the protocols which governed data exchange between the contingents and components, to be unified throughout the coalition. Were it necessary, he or his staff – or any other staffs, for that matter, could seek out crucial information, wherever it existed, anywhere across the force. Nor was the General under any illusion that critical information and capabilities could be provided from elsewhere in the coalition, either. He, and the generations of younger officers who served under him, had been brought up breathing the doctrine of inter-component liaison and integration. In his own case, his first appointment as a lieutenant colonel back in 1999 had been as Directing Staff at the then new Joint

Services Command and Staff College. He'd completed two *'Joint command earning'* tours since then, as well as passing all three modules of the Joint Training and Operations Centre's Senior Command Course. He didn't just *'talk Joint'* – he literally had no experience of any other way of conducting operations. Whereas his two key advisors would in the past have been his combat engineer and firepower officers, they now wore dark and light blue uniforms respectively, and the General was well aware that a similar relationship was enjoyed with his trusted representatives at the Air and Maritime Component HQs, too. Although he regarded it as something of a poisoned chalice, he and his staff also had the capability to communicate out of theatre, to each of the national capitals, to the GAS's government agencies, and to the other departments and organisations without whom integrated operations, of which military activity was but one part, was impossible. The difficulty was, each of these players had their own national, international and corporate agendas, and trying to maintain a cohesion between them was an enormous task. Each of them had their own internal and external audience, and each of them required information to keep them unified behind their aims. Information was everywhere, immediately, and in quantities unimagined by previous generations of military chiefs.

And information was crucial, to the way they all operated. They depended on it like no other military force in history. They had all, to a greater or lesser degree, traded mass for tempo over the previous fifteen years. The theory was that their digitised

systems – BOWMAN had, despite everything, been worth the wait – and the situational awareness that came with it, made each of them so much more capable, allowing their commanders and crews to make decisions, and to translate such decisions into effective action, much more rapidly than hitherto. Information, moreover, was provided by a plethora of sources; a range of intelligence, surveillance and reconnaissance systems that appeared, on the face of it, to be staggeringly capable. ASTOR was the jewel in the crown, of course, providing him – and his fellow component commanders – with (supposedly) 24 hour coverage. Synthetic Aperture Radar, however, was merely one facet of what, by 2015, had developed into true ISTAR system of systems. Whether it was his capability to see out beyond 200 Km, using Watchkeeper and other UAVs, or ground-based manned reconnaissance, or indeed assets held by other components, such as the RAPTOR stand-off tactical air reconnaissance package, and space-based surveillance systems, he could depend on an electronic picture of his area of operations like no other commander before him. Of course, this plethora of information, sources and product had brought problems with it, too. Staffs at all levels continuously demanded highly detailed information – so better to brief their superiors – and were then overwhelmed when their browsers delivered it. The continuing development of broadband data systems enabled this huge amount of information to be pushed around, but it was only with the introduction of the first battlefield intelligent agents in 2010 that the processing issue started to resolve itself. Software, capable – for the first time – of accurately

sifting, sorting and presenting intelligence and other information, had really made a difference. Fewer decisions meant fewer staffs, and for the first time since the 1990s, HQs started to actually get smaller instead of larger. So successful had their introduction been that staff at every level had come to accept the wisdom of their simple, trafficlight go/no-go indicators as much as they accepted the 'truth' of the icons which marched across their three-dimensional topographic displays.

The General wasn't so convinced: he'd once been naïve enough to believe the absolute truth of an intelligence briefing – as a 20 year old second lieutenant waiting to attack the Argentinean positions at Goose Green 33 years before. He'd stayed alive that day, and on operations ever since, due to his discovery of an instinct for knowing what his enemy was thinking, not what the intelligence picture said he was doing. He wondered, for a moment, if his instincts would hold good this last time – he had a feeling he would need them.

Keeping the Motor Running

WWN WORLD-WIDE NEWS

"Good Evening, and welcome to this special feature from Headline News Report, continuing our look at some of the amazing technology that the British and coalition forces have at their disposal in the GAS. Now, we're all familiar with that little red light that starts blinking on the dashboard when we've left the oil change for too long. If we want the car to keep running, it means a quick detour to the nearest

garage. But imagine if, while you were having your breakfast before you set off on your journey, new oil was delivered to you, because your car had told the nearest garage it needed some? Or a replacement oil filter? or a light bulb? Well, it's just that sort of smart technology which our major vehicles and weapon systems use now, and it's changing the whole way the British Army and its allies do business.

"A major refit programme, which only ended last year, re-equipped our Challenger 2 tanks with a host of add-on features that their original designers back in the 1980s could never have envisaged. It's an optional extras package you're not likely to see down at your local showroom, that's for sure. Anti-missile detectors and deflectors were only the first elements; add that to a battlefield interrogation device which automatically tells friend from foe, and James Bond's Q would be turning green with envy.

"But it's what you can't see that's really impressive. For the first time, these tanks have the automatic capability to inform each other of ammunition usage, fuel supply – even how much wear is left in their clutch assemblies. For those that understand these things – it has massively ramped up their ' Mean Time Between Failure' Figures. For those that don't – it means they just don't break down. And that changes everything. Remember, the automotive power needed to shift one of these things is equivalent to that needed for an express train. The engine, on the other hand, has to fit in a space not much bigger than a mini. Tanks always used to break down – it was a part of military planning. Now,

by and large, they don't, and that means military planners have got the equivalent of a whole new weapon system to use – a tank they can depend on. And these improvements aren't limited just to the tanks, either: right across the vehicle fleet, digital linkages that go right down to assembly level – even how many pallets are loaded on an individual truck, mean that, instead of waiting for vital supplies for hours or days, they can usually be called up in minutes.

These days, they say the British Army regards tempo as the most important weapon in its armoury. If that's so, it's due in no small part to this sort of amazing technology. Technology which allows the routine to happen like lightning.”

The debate about the relative merits, necessity and importance of close and deep operations had raged without ceasing, ever since the 1991 Gulf War had demonstrated the awesome impact of deep strike systems. Whilst this debate continued, however, no one with an ounce of military knowledge doubted for a moment that the critical element in the framework was that of Rear Operations. It didn't matter how you sought to bring the enemy to his knees: unless you had the freedom to prepare, to move, to reinforce and re-supply throughout your own area – and along your lines of communication – then you would be defeated. They used to say that poor Generals discussed tactics and good ones logistics: by 2015 there weren't any Generals who couldn't discuss logistics, and nor were their logisticians who failed to

recognise that *'rear'* operations meant a great deal more than combat service support.

Rear operations enabled virtually every type of military activity, and never more so than in the type of deployment that was being conducted by the coalition. In this situation, the normal roles ascribed to armed forces appeared to be standing on their heads. The *'close operations'* were those activities carried out by troops in and around the sprawling refugee camps. Food distribution and medical assistance were the front line activities. *'Deep Operations'* were those being carried out to reconnect the infrastructure – the water, transport and electricity networks. And rear operations? Ironically, in this case, they were being conducted by the very troops who would normally be expected to be in the thick of the action. The fighting troops – the infanters and cavalrymen – their job was to make sure the supply routes stayed open, and the towns and cities policeable. Rear operations in the Land Component, a task which had somewhat dismissively left in the past to ill-equipped reserve formations, were now the central business for an integrated force package of identically equipped and trained regular and reserve task forces. Military thinkers back in the 1990s had seen this phenomenon coming, and had argued with some success, for the tools to do the job well. It was as simple to achieve as ensuring that surveillance systems could look backwards as well as forwards. What was the point, it was argued, of being able to see over 100 km into enemy territory, if you had a blank screen 10 km to your rear. At least one of the

ASTOR platforms was kept on permanent 'look-back' mode.

There was, furthermore, no question that rear operations had to be conducted on a Joint basis. There was little point in maintaining an increased intelligence overwatch on key vulnerabilities and critical force elements if threats against them could not be countered rapidly and effectively. And this could only be guaranteed by the integration of all components across the area. The rear operations commanders presided over a highly complex and rapidly-changing battlespace – made all the more difficult to manage due to size, and multinationality of the deployed force. The GAS's civil infrastructure, the aid agencies and international organisations and each of the coalition contributors all needed real estate, access to life support and facilities. Unless co-ordination took place, freedom of manoeuvre could not be maintained. The protection issues surrounding these disparate and often vulnerable elements were considerable, and, though there had been no attack on coalition forces, it was feared by many to be inevitable. The targets were just too inviting to ignore.

Enormous strides had been made in the fields of logistics and combat service support over the previous decade. In its way, it was at least equal to the developments that had taken place in surveillance and strike systems. As ever, though - and it showed that some things never really changed – no one really found digitised asset-tracking and automated warehouse management anything like as sexy as new missiles and guns.

It was called '*directed logistics*' and its aim was to overcome the age-old paradox of manoeuvrism. If you wanted to manoeuvre rapidly around the battlefield, you couldn't do so whilst dragging a lumbering logistic tail behind you. On the other hand, if you divested yourself of this tail, then you'd manoeuvre rapidly all right – but only until you either ran out of fuel, or spares, or both.

Directed logistics, enabled by the digitised systems valued so much by the surveillance and command communities, broke this paradox – well, that was the theory, anyhow. Because such an accurate record could be kept of both resource usage and availability, and such a complete track of assets maintained, overstocking was, largely, a phenomenon of the past. Logisticians – good ones, anyway – had always tried to keep a little something back for the rainy day. Quartermasters, whether in 2015, 1915 or 1815 all knew that '*stores was for storing*'. Now, despite the fact that the physical environment had not changed (logistic forces were still more vulnerable than fighting troops, and were still, therefore, shepherded to the rear) prediction had replaced over-caution. With full asset visibility, cross-decking of material could take place at every level of command, from sub-unit through to formation. Full vehicle systems integration allowed for '*self-demanding*': the process whereby platforms automatically requested re-supply – or anticipated repair – from the logistics organisation. This had revolutionised the turgid process of military CSS forward planning (though BMW had been doing it for thirty years). At the same time, the reduction in overall stocks in

theatre both on wheels and warehouse stored, had meant a reduction in the numbers of logistics troops required. Not only were their fewer drivers, but the universal adoption of web-based stores management had drastically reduced the numbers of store managers and distributors.

There were many who trumpeted this remarkable way of doing business as a '*Revolution in Logistic Affairs*', and it was, indeed, far more revolutionary than anything that was taking place elsewhere. The press came to see the revolution for themselves, but saw instead trains being loaded from the quayside. '*Some revolution*' they thought, and went to find better library pictures elsewhere. The loggies grinned at one another, rolled up their sleeves and went back to winning the war.

Beyond Gethsemane

WWN WORLD-WIDE NEWS

"This a Headline Newsflash. Headline News has received reports in the last few minutes that seem to indicate that a British logistics base in the GAS has been attacked by some form of poison gas. We're going straight there now, where we have a live satellite link up with the British Forces HQ in Newtown and the coalition spokesman, Major Andrew Maclean. Major Maclean, can you give us and indication of what's taken place?"

"...You'll appreciate that we don't have a full picture yet here, but I am able to confirm that the UK Reception and Staging area, some 50 Km north of

where I'm standing, came under mortar fire without warning, earlier today. It appears that the mortars each carried some form of crude chemical warhead, all of which detonated inside the perimeter of the installation. It appears that the type was some form of non-persistent agent, but—"

"Which units were involve, and can you tell us the casualty count?"

"You'll understand that we don't release unit details until we've informed the next-of-kin, and that process is not yet complete. As far as casualties are concerned, I'm afraid I have to report that, as of an hour ago, we have 277, that's two hundred seven seven fatalities on site, of which 38 are UK personnel—"

"Who were these others, major, and how is that so many of them died? You said this was a British installation."

"The other victims were locally-employed labourers, none of whom were in possession of chemical protection equipment...er...we have another 67 UK personnel suffering from chemical injuries, but none are critical, right now."

"How did this happen? Why weren't we better prepared for this?"

"It's far too early to say for certain, of course, but we will be reviewing our chemical defence capabilities throughout the operational area, and—"

"A little late for that, some will say, Major. Who are the families of those killed to blame for this failure in

our procedures, if that is, indeed, what has happened?”

“Everyone here has nothing but sympathy for the families who have lost loved ones here today, but I need to remind you, and those watching tonight, that this is a military operation, and military operations always entail risk. Sometimes, we will take casualties. We’ll take more before this difficult campaign is over, I can virtually promise you. No-one’s to blame – blame doesn’t enter into it.”

“Major, I imagine you and the rest of the British HQ there have much work to do. We’ll let you get on with it. Thank you for joining us here tonight, and good luck.”

Well, it just goes to show that tactical level issues can have strategic level impact. Major Maclean thought that blame didn’t enter into it. Not from his perspective, it didn’t, but it certainly did back in London. This was an operation of choice, not necessity, and there were those who would have chosen differently. The UK forces had gone into theatre with, supposedly, the best force protection package on offer. So, how had this happened? For a while, and until the end of a particularly emotional and bad-tempered emergency Commons debate, it appeared that the UK might actually withdraw. The video conference between the Prime Minister and the UK contingent commander later that day left the latter in no doubt as to how precarious both their positions were.

The public was also shocked to discover that, of the 38 British dead, 20 weren’t even service personnel.

The logistics base was only partially run by the British Army. It was, in fact, the collection and distribution point for the Army's operational pool of vehicles. Here, hundreds of tanks, armoured command cells, land rovers, trucks and other vehicles were married up with soldiers familiar with these same equipments in the training fleet. This business had been almost entirely contracted out – it was by far simpler and cheaper to do so – and the terms of the contract extended to the delivery of the fleet into the theatre distribution point. Contractors were almost everywhere in the area of operations: they provided additional strategic comms links; they delivered on-site support to the specialist IT systems; they managed vehicle fleets and more besides. In the aftermath of the attack, it was expected that these contractors would quit the operation – getting killed, after all, wasn't part of the contract, but surprisingly few did. They had been trained and equipped by the British Army for just such an eventuality. Many of them also expressed a kinship with the men and women in uniform alongside whom they served (so many of them were ex-servicemen, anyhow); those that didn't ruefully admitted that the money was just too good to ignore.

That apart, there was little to cheer the UK HQ that night. They'd been hit, badly (and, privately, the staff knew that they were at fault, that their procedures had been found wanting: although the initial attack forced everyone under cover, no one donned their NBC respirators quickly enough – at least not till the smell and the cloud were on top of them. The fact is that the threat had not been recognised. No one had expected a chemical attack. Well, they would from

now on). But how could they strike back? No one was claiming responsibility and the perpetrators had vanished, presumably for good. What was galling was that strategic SIGINT resources, deployed into theatre under the strictest secrecy, gave the commander a good steer that the attack had been co-ordinated by the SSA. Telephone and data traffic in and out of the capital showed it as clearly as a signed confession. It was evidence, but not the sort that could be used in the court of world opinion. Like Enigma and the Bletchley code-breakers, the British had a capability they couldn't admit to for fear of losing its effectiveness.

Instead, the entire Coalition reviewed its force protection posture, tightened procedures, and trained hard in chemical defence. Their ability to support the aid agencies dropped, but, for the moment at least, soldiers throughout the force decided that they needed to do a little more looking after themselves, or they wouldn't be around to help anyone else.

It was an irony, then, that the next hammer blow to strike the GAS was one that the coalition forces could do absolutely nothing about – and nor could they be blamed. Just as contractorisation had seen more civilians based in the Area of Operations, so new technology – and in particular high bandwidth strategic comms links – had seen more and more military staffs being based at home. They called this '*reachback*' and the idea was that the '*footprint*' in-theatre could be much reduced, and personnel could contribute a range of analysis and decision support from the UK Intelligence staffs, mission planners and

logistic specialists – all of whom would have been deployed in previous expeditions – now assisted their colleagues 5,000 miles away. They did so from a grandly-titled – but visually unimpressive – Mission Support Facility, a couple of dozen portakabins co-located with the SKYNET 5 downlink hub at Corsham in Wiltshire. ‘Reachback’ was a good theory, but it only worked in practice if the home base was a more secure and safer place to operate than the Area of Operations.

The incendiary device which almost razed the Corsham facility to the ground 48 hours after the gas attack lent the lie to that notion. Thankfully, casualties on this occasion were light, though they included the suicide bomber who had driven her fuel tanker through the Corsham perimeter fence. But it was the loss in capability that was important. The hub went down – admittedly only for a few hours before commercial standby links were re-engineered – but the support facility could not be so easily replaced. For an uncomfortably long period, the reachback planning and analysis capability that each of the components depended upon wasn’t there. Reversionary modes existed – the architects of the reachback capability had insisted upon it throughout development, but they couldn’t be as capable as the primary systems. Again, there was much head-scratching on the MOD Main Building’s mezzanine floor. How to defend against this? The sombre mood wasn’t helped, first, by an admission from the head of Special Branch that his people had not been able to penetrate subversive groups thought to be sympathetic to the SSA and second, from the Director General Information that internet

attacks on UK Defence and Government Information Systems were increasing every day. If this continued it would rapidly lead to the loss of some systems unless he took radical quarantine action. Of course none of these attacks affected the MOD's stand-alone high-security links – they were protected by some of the highest-rated cryptographic techniques in the world, after all. Neither were these *'attacks'* particularly complex and highly-skilled feats of computer engineering (most of them were merely simple viruses with automatic re-broadcast attachments), but their impact on low-security, supposedly firewall-protected targets was rapidly becoming a real problem. Shutting these down for quarantine would not only reduce capability yet further; it would also announce to anyone who wished to take notice that the UK was suffering from *'cyber attack'* and could only deal with the problem by hitting the off button. Around the UK, alert states at MOD and associated contractor sites ramped up – in some cases regional military units were assigned guard of key installations. It appeared, to those whose job it was to think of such things – that *'mission-creep'* was now something that happened at home, too.

Nothing Changes for the Infantry...

WWN WORLD-WIDE NEWS

“Good Evening, and welcome to this special edition of Headline News Insight Report. With me tonight, coming live from the UK deployment to the GAS, is Corporal James Chilman, who's been with the UK

force in that country for – well, how long now, Corporal?”

“I’ve been here about six weeks or so now.”

“And what’s your role in all this?”

“Well, I’m a Section Commander in the 1st Royal Green Jackets Battlegroup. I command seven other blokes, and we operate either inside or, more usually, outside a Section Warrior vehicle. Our job is...well... same as the infantry’s job’s always been, really – we get stuck in and kill as many of the enemy as we can, as quick as possible, before they kill us.”

“Well, they say nothing changes for infantrymen like you, and the job you have to do. How true is that? Is it exactly the same as operations we’ve known in the past?”

“The basics are the same, no question – but all this new kit makes a hell of a difference when we actually go into combat.”

“Perhaps you could take us through some of it – it looks to me pretty much like what soldiers have worn or carried for years. What’s so different?”

“It might not look much different, but everything you can see here gives me and my men more chance of killing the enemy and, hopefully, staying alive whilst we do it. If you look at this rifle, first—“

“That’s one of those old SA80s isn’t it?”

“With about a thousand modifications – yeah. With this sight, I’ve got a combined TI, II and night vision

view of the battlefield And what's more, it links up from this sight into this head-up display in my helmet. I can see round corners, and shoot round them too. It's also linked to this grenade launcher, too. With this I can lob a 40mm grenade out to 250m and I'll know exactly where it will land. It's brilliant. And everything's linked up into this computer in my pocket – it tells me if I'm running out of ammo, where my muckers are, if there's a system fault, whatever. But, if you were to ask me, the best thing of all is this sensor-to-shooter business. Because I know where everything is, and everyone else knows where I am, I can call down fire instead of having to fire myself. I've called up attack helicopters, strike fighters, artillery, the lot. Remember, my main job when I get out there is hiding. If I don't have to shoot, well, it makes hiding a whole lot easier.”

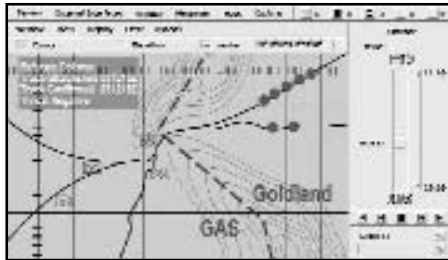
“It certainly sounds impressive. Why don't they go the whole hog and automate everything? Why do we still need to send you out to do the killing? There's a lot of talk about robotics and unmanned vehicles.”

“Well, er, that's a bloody good question actually. You'd have to ask someone in charge, I suppose. But I'll tell you this – I think all this Gucci kit is well impressive – but I've never, in ten years in the Army, ever been issued with anything that didn't break down at least once when I got my hands on it, so I suppose we're there to make sure it happens if stuff goes wrong.”

“Corporal Chilman, I know you're busy, and I'd like to say thanks for coming on the programme tonight.

I know that your wife Tina and your children are watching tonight. Do you have any messages for them?"

"Just to say Ryan, Taylor, be good for your mum, keep your feet off the sofa, and I'll be back home soon."



As invasions go, this one hardly looked like BARBAROSSA. As the hotchpotch of pick-up trucks, four wheel drive utility vehicles and minibuses lurched across the border from Goldland and into the GAS, it looked – as the ASTOR operator said to the analyst sitting next to him – more like a refugee column than anything else. Again, hindsight allows us to reasonably ask the question: what were the SSA thinking of? From our perspective, the invasion was the strategic blunder – no matter how much (unexpected) success it appeared to enjoy at the time. Everything was going their way, or so it seemed: their asymmetric attacks had hurt the coalition, where it felt the pain most – it had killed people. Furthermore, their policy on covert funding and arming of militia groups had continued to leave them relatively blameless in the eyes of the media and therefore the world. Why change that? Again, their action was meant to be pre-emptive, and it was

meant to hurt the coalition so badly that withdrawal would be the only option – after all, went their logic – look how the Coalition resolve wobbled when they lost a few dozen casualties. What would they do if they suffered hundreds? Or thousands? As irrational as the SSA's decision to launch an invasion might have been, their assessment of the coalition's centre of gravity – its count of friendly casualties – and their tactical methodology of getting to it, were right on the money. It was an invasion with no objective to capture, and with no territory to dominate. They came across the border with the sole aim of killing people until their enemies' leaders decided the killing wasn't worth it.

Because at first it didn't look like an invasion, it wasn't given the reception normally afforded one. It was seen coming. As well as the ASTOR feed (whose product was being relayed to HQ 1st Armoured Division) a Watchkeeper UAV was able to give a vehicle count – getting on for 50, whilst the reconnaissance vehicles strung out on piquet duty along the border maintained a silent watch. As we know, an enormous investment had been made into '*finding*' technology. It paid off, too: the enemy was well and truly found. So, why weren't they fixed, or struck? Well, no combat indicators were identified by the surveillance assets to suggest a threat. No armour, no tracked vehicles, no heavy weaponry, no support from the air. No electronic signature whatsoever – no radios, cell phones, nothing. At least six vehicles in the convoy were clearly buses full of refugees, amongst them a significant number of women and children. The outcome was that this particular refugee convoy (admittedly larger than any

seen before) would be treated like any other. The nearest battlegroup – in this case, the Royal Highland Fusiliers about 10 km up the road – could intercept it, search it and then escort it to the nearest aid centre.

The first direct action of the war was to be as violent as it was brief. As the convoy approached the hastily set-up checkpoint, the first few vehicles slowed and stopped. The refugees began approaching the checkpoint on foot. As they did so, without warning the Defensive Aid Suites on the three Warriors facing them barked out their alarms. The threat appeared to come from the refugee vehicles, but how? Almost before the gunners could slew their turrets in their direction, beam-riding AT missiles, guided by unseen marksmen in the buses, unmasked from the pick up trucks behind the distant ridgeline, launched, dipped, struck and detonated. The platoon's Warriors were instantly destroyed: the troops inside them wiped out.

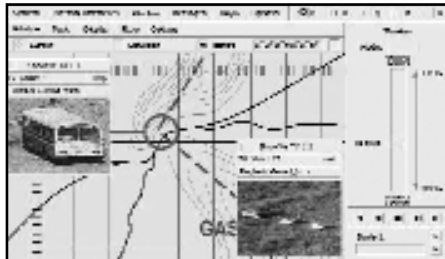
We all know now what happened next. Again, hindsight allows us to realise that the outcome of the close operation on the ground was never really in doubt, despite the enemy's initial success. We can see now that the quality of our Ground Manoeuvre forces, backed up with substantial artillery and joint firepower allowed us to quickly regain the initiative, irrespective of the surprise achieved by Goldland and the SSA. Their ruse of using fake refugee columns worked (at first) just as it was intended to do: it drew in our forces on the border, and gave them the opportunity to launch the main body of their attack elsewhere. But it was never going to work. It

played to our strengths, for the first time in the campaign. That's not to say the enemy capitulated without the hardest of fights, though: the 1st Armoured Division, attacked by Goldland was forced into a defensive battle whilst the coalition's air forces struggled to close the door behind the invasion force. Once again, the Goldland forces proved themselves expert in forcing elements of the coalition to operate on their terms – not ours. They couldn't defend against very high-level aerial attack, so they forced us to low levels by never placing themselves where they could be attacked without the risk of significant collateral damage. Low level attack risked losses from light, shoulder-launched anti-aircraft missiles. Most missed, or were decoyed – the defensive counter measures on the coalition aircraft were state of the art – but they made the successful prosecution of air attacks extremely difficult and hazardous. Despite the best efforts of the Coalition Forces Air Component Command, and some well-documented heroism on the part of both its land and sea-based pilots, the air forces could not quite stop the SSA's invasion force in its tracks, nor entirely slam the door behind it. This didn't stop them trying, though. On the ground, too, the SSA showed themselves unexpectedly skilled in placing themselves where we could only manoeuvre against them with difficulty. More than anything, they knew how to negate our technological advantage by the use of complex terrain, which the towns and villages provided. These became their vital ground, and we had to go and get them. Vicious, small unit close combat – that most demanding of all human activities – was still needed.



Although close combat presented the same unique and enduring challenges to soldiers on both sides of this battlefield, one thing had changed. These close operations were no longer as close as they were before: direct battlefield engagement distances had moved inexorably outward: from 1, 2 or 3 kilometres increasingly to 4, 5, even 10 kilometres. The increased capability of sensor systems, improved battlefield awareness and a range of direct, near line of sight and beyond line of sight systems could be rapidly deployed to attack the enemy in an increasing volume of the Close Operations area. GPS enabled combat troops to work individually, while knowing the location of others and with access to a range of direct and indirect fire systems. From then on, things started to work the coalition's way. *'The integration of Joint effects'* is a dry and doctrinal term: for the Goldland division, what it meant was that destruction came from all sides, and without warning. Our investment in technology had paid off. ISTAR assets could link right down to the artillery battery, the armoured vehicle, or the FIST-equipped soldier. High tempo, enabled by digital communications and C2 systems, allowed chances

to be seized as they presented themselves, not hours later. Infanteers fought, where necessary, either from their platforms or on their feet. Either way, they were devastatingly effective, either by calling down fire themselves, or by applying it, with unheard of accuracy. Tanks, guns and sappers all played their part: the traditional relationships between each strengthened, not weakened – by the information-age technologies common to all. As ever, good workable procedures evolved out of operational necessity. Ultimately, though, this engagement – the largest for the British Army since WW2 – would have been lost, irrespective of the technology used, were it not for the fighting qualities which allowed the coalition to withstand the early, significant reverses.



After a week of little sleep, caused by the constant demands of the operation, particularly dealing with multi-national and host-nation concerns, and the ever-present media, the land Component Commander was able, finally, to report to the JTF HQ that the Goldland attack had been repulsed. The coalition had, however, lost over 300 dead, and both he and his superior knew that statistic reflected victory for the SSA. The news he received was both good and bad. The good was that the coalition's

political support was holding up, despite the casualties. There would be no withdrawal. The bad news was that this support would not hold for ever, and certainly not if the casualty level increased much further. The bottom line was – there could be no large-scale, ground-based invasion of SSA territory – the projected losses were simply untenable. So, however this war was to end, it wouldn't do so with a set piece invasion across the ground like Kuwait. Someone was going to have to come up with something more clever. Fortunately for the coalition, the Deep Operations Group in its HQ had something just so clever in mind.

A Revolution in Military Affairs

WWN WORLD-WIDE NEWS

“Good Evening, and welcome to this special edition WWN Insight Report. As regular viewers will know, we've spent some time over the last few weeks, and since the coalition operations began in the GAS, focussing on some of the key equipments and weapons in use with the British forces in theatre, and on some of the men and women who operate these systems in combat. Tonight, via our satellite feed, we're able to enjoy a live link-up with Captain David Amlot, in command of 669 Squadron of the Army Air Corps. Captain Amlot, can you hear me?”

“Yes, loud and clear.”

“Captain, I don't need to remind you of the operations that have been carried out over the past days by coalition forces. You pilot one of the key

weapons in the British armoury, that's for sure. How come we haven't seen Apache involved in any combat? Isn't that what we bought it for?"

"Well, that's true, but you need to remember that the fighting that's taken place up to now has been very much focussed on the shanty towns and cities of the GAS. It's very difficult for us to carry out offensive missions in this kind of terrain without running the risk of causing civilian casualties, and as the British Command HQ has pointed out, we're not here to do that. I can assure you, however, that we haven't been wasting our time – we've been training hard, and we're more than ready for action when the time comes—"

"If the time comes, some might say, Captain. And if it does, how many of these Apaches have we got over there, and what sort of capability do they bring to the fight? After all, they cost £21 million apiece, don't they?"

"It would clearly be wrong of me to talk about how many assets we have or don't have with us, Glen, but I will say that the Apache gives us the ability to deliver an overwhelming amount of precision firepower, almost wherever we like. I've been flying these things for over ten years now, and I can tell you, eight Hellfire missiles, a pod of rockets and a thousand rounds of 30 mm cannon is enough to spoil your whole night's sleep."

"You sound confident –but we've taken losses – substantial ones. How do you know we won't do so again?"

“There’s risk for all of us on operations, and I’m not going to pretend we all don’t think of that every time we go up. But I can tell you that I’ve never been more confident in anything I’ve ever flown in than this airframe. And it’s not just this, of course: you’ve got to remember that, since they developed the Air Manoeuvre command system, I can sit in my cockpit and call up a picture from just about any sensor on the battlefield. I can call in fire from other Apaches, fast jets, artillery, even ships. I can report in to whatever HQ is planning or controlling the Op, and I can do it right away. That’s also good for the rest of the Air Assault Brigade, too. All the infantry commanders on the ground, or even when they’re airborne in the Chinooks. They all know exactly what’s going on – they’re never blind. We know where the enemy are, and believe you me, if they try to run, they’re just going to die tired.”

“Captain, when and if that takes place, good luck from all of us here. This has been a WWN Special Insight report. Goodnight.”

By and large wars aren’t won (or lost) at the tactical level. They’re won or lost at the strategic or political level. Campaign planning allows you to undertake maritime, air, and land operations, sequenced or simultaneous, aimed at – eventually – attacking the enemy’s centre of gravity. Do this well, and stop him doing it, and you win the war. What the coalition was planning now was something so ambitious that it could – might – break this paradigm. They wanted to win the war with a single engagement. Actually, it wasn’t that revolutionary an idea; for years, the huge

investment on deep strike systems – and particularly Air Manoeuvre – had been made on the basis that it could have decisive operational or even strategic impact, as well as tactical value.

If you desire, as a soldier, to project an effect 200 to 300 km beyond your own troops, you need to stop thinking like a soldier. The battlespace out there was as much ‘owned’ by the Air and Maritime forces as it was by the Army. Much effort had been carried out in the previous decade on how this battlespace could best be exploited, and this effort was about to pay off. Joint planning teams were already based in each HQ, now able to work in virtual collocation. Mission rehearsals and refinement took place within a single, unified synthetic environment. An outline concept already existed, but such was the cumulative value of the assets involved, and the impact if failure resulted, that every detail needed to be worked out. The final go/no-go decision would only be made by the CJTFC, and the criteria for a go decision would be 90% forecast of success. Like most military operations, timing was key. Unlike most operations, however, these timings could not be allowed to change.

For the first time, special forces and strategic human intelligence assets (they used to be called spies) had been able to work out in advance the movements of Goldland’s leader. In 48 hours time, he would address a rally in the capital’s central football stadium. In this case, for the first time in the war we had the chance to attack their Centre of Gravity. Absolute power rested with this man, and with the Army and militias he either funded or controlled.

Neutralising him, however, was only part of the task. Somehow, the Presidential Guard Goldland division – kept, until now, out of the fighting as a strategic reserve – had to be destroyed, too. Whilst that force existed, the possibility of one dictator being replaced instantly by another, equally as powerful, existed as well. Finally, even if all this were achieved, it would not be, of itself, enough. Somehow, the people in the capital, and in the rest of the SSA, needed to be persuaded that the void that they left behind could be filled. The mission, then, depended on a complex information operation: at the instant that the military strike took place, a network of electronic and psychological warfare assets had to ensure that our information, and only ours dominated the battlespace. Management of the Electro-Magnetic Spectrum between the myriad of systems emitting signals throughout the battlespace, was, fortunately, now an active process. It was made possible by an automated capability which de-conflicted users' requirements and provided close to 'frequencies on demand'. When the Commander finally sat down for his decision brief, his planning team on the other end of the video link had, they hoped, put it all together. Their synchronization matrix needed to be divided between four screens because of its complexity, but it did make sense. They had identified the enemy's main weakness, and this was the only way to exploit it. The Commander listened patiently until the end. He had no questions. He had, after all, been personally involved at every stage of the planning process. He gave the order.

We all know the rest, of course. Some say it was just a lucky move – others have described it as a feat of

arms as successful and significant as the Inchon landings in Korea. The official report downplayed all that, of course, merely attributing success to the successful imposition of superior doctrine on an unfamiliar situation, but, undeniably, it did work, just as it had been planned.

The General commanding 1st (UK) Armoured Division hadn't been enamoured with the idea of using his formation to psychologically fix the enemy, particularly as he'd enjoyed no time for reconstitution, but there was little choice. It was risky – the Division was hardly more than 60% combat effective – but it worked. Its noisy approach to the border forced Goldland into a counter-move with the Presidential Guard Division. This was enough: ISTAR systems were able to plot sufficient enemy movement and concentration areas for the next phase of the operation to begin. 1st Armoured Division, its job done, halted.

The air forces, unconstrained for the first time by the rules of engagement, which had largely held it back thus far, punched a series of corridors through the airspace – corridors punctuated by precision strikes not only from the air, but from long range precision artillery and, for the first time, TLAMS launched from offshore for the first time in this operation. The integration of these effects and the deep operation by 16 Air Assault Brigade was impressive enough: more so was the tempo that was achieved. Active, positive airspace procedures allowed each component's systems to work at their fastest. The Information Operations mission was unfolding with similar speed. The cell phones, mobile laptops and



radios operated by the SSA were disabled in swathes in Phase 1: in Phase 2 each of them – supplemented by additional self-rebroadcast radios – began displaying and replaying the Coalition’s message to stay calm, to stay put and to stay alive. The effort that had gone into airborne TV and civil radio broadcast, in particular, paid off in spades. A series of pre-recorded messages were beamed down across the UHF and VHF range. The audacious ‘*capture*’ of the SSA’s websites, and subsequent link to webcams broadcasting events in the capital, provided an instant world-wide audience for the Coalition’s activities.

This deep manoeuvre was not without its reverses, of course, since it remained impossible to remove all risks. A well camouflaged anti-aircraft gun – 40 years older than the soldier manning it – opened up at close range on a hovering Apache. All the defensive aids suites in the world couldn’t deflect the stream of lead which struck throughout the

airframe. Saved from fatal splinter injuries by their body armour, the crew managed to guide their crippled aircraft to a thumped landing – whilst their wingman, having destroyed the anti-aircraft gun, activated the emergency link to the orbiting Combat Recovery controller.

Incidents like this apart, the mission was a success, by any yardstick. The shock and destructive power of the AH Regiments had their intended effect. The first strikes took out the key command vehicles, cutting off the head of the force.

Thereafter, the Goldland Division, deprived of direction, simply stopped moving coherently. There was no organised response. The air assault infantry, inserted at key locations in the division's area, was able to direct more withering and murderously effective indirect fire. Selective close combat operations quickly whittled the remaining Goldland Division's combat power down to nothing in a few hours. The appearance of coalition forces, simultaneously, at the rally was enough to paralyse Goldland's leader and his bodyguards: by the time they'd started to think about escape, Special Forces Teams had disabled them – temporarily, using Non Lethal techniques - an act designed not to cause panic. The opening of a Chinook tailgate to reveal Goldland's last elected ruler – long since exiled but still revered – was both an inspired piece of theatre and a huge risk. He was surrounded not by armed troops, but by international aid agency staff; he spoke the language of rebuilding and the crowds listened. In the space of 30 minutes, just as planned, a successful tactical engagement in support of

information operations had operational impact, which altered the strategic circumstances, irrevocably. The Coalition, as a whole, took a deep breath, and prepared to move into the SSA: not to fight a war, but to cement a fragile peace.



Afterword

Glossary of Acronyms

About the Authors

AFTERWORD: THE IMPERATIVE FOR NEW THINKING

By David Potts

'Murder your darlings.'

Sir Arthur Quiller-Couch

Deploying massed force, employed to achieve a decision against other such forces in a defined battlespace, is giving way to deploying forces to create the conditions in which a decision might be achieved outside the military domain.¹ The military line of operation in a campaign is therefore not just one of a number of lines of operation, it is subordinate to and constrained by others: diplomatic, political and economic and increasingly by Information Operations, directed from the highest political level, and legal considerations. War aims, or even the desired endstate, will often be unclear at the outset of operations when there may be an imperative to act to alter the adverse dynamics of a situation and to begin to create the conditions that might allow possible endstates to be discerned. In coalition operations there will be compromises about ends, ways and means and there may even be a need for constructive ambiguity as to ends in order to maintain coalition cohesion.

The form of warfare that seeks to achieve a decision in a defined timescale is intensely Western, forming during 2,000 years or more of conflict between various European powers and exported to the Americas and elsewhere. It achieves results through face to face struggle, by those who believe they can and must prevail in such a struggle, in a defined battlefield and within a narrow timeframe. An alternative form of warfare is not European at all and seeks results neither through decisive engagement nor in a defined timescale.² The capacity to confront adversaries with such a perception of timescale requires endurance. This includes preparing and deploying successive follow-on forces, remaining committed, adapting over time as circumstance changes and shaping perceptions over a long haul. Confronting those who seek to avoid decisive engagement involves applying force precisely at carefully chosen moments to create opportunities that can be exploited by other lines of operation. It is a fundamental shift away from the notion that a massed force can be committed for a one shot decisive action.

The setting of warfare is also changing – operations will occur amongst people. Massed force and concentration of force become redundant concepts. Instead, there is a need for a specific effect at a precise time and place. Therefore, while we might still need hierarchical component constructs to deploy forces into a theatre of operations, or to within striking distance of a theatre of operations, and to manage them there, the execution of tactical action must be finessed and Joint.

Old forms of warfare have taken a new and lethal twist. The emergence of '*New Terror War*'³ has reminded us of just how thin the crust of civilization can be.

Fuller argued that the history of warfare was one of conflict between the city dwellers and the nomads,⁴ civilization and barbarism – into which category falls the 20th century wars between democracy and totalitarianism. Huntington⁵ has updated and expanded this idea. War between civilizations (Christendom, Islam, China, India et al), he argues is now too awful to contemplate. For Huntington, the solution to a decent future for all of humanity lies in civilizations standing together against barbarism, otherwise they risk hanging separately. This is exactly the battle-line that has been drawn, superficially at least, in the war against terrorism and it indicates that bloc-on-bloc and state-on-state warfare are receding as the basic strategic construct in which wars occur. We must now increasingly anticipate coalition operations with ever more unusual bedfellows – Russia and China, for example – with all that that implies for our pre-conceptions of future conflict.

Added to all of this, information technology is helping to shape the age we live in. It is shrinking the global village yet further and has unleashed an area of highly competitive economic activity that impacts on almost every aspect of our daily lives and is altering the pattern of wealth creation on a global scale. It also underpins a distinctly American form of warfare and an apparent American hegemony in conventional force on force combat. How can we in

the UK exploit this technology to military advantage? What kinds of forces will be required if we are to succeed in the strategic circumstances described and what will be the essence, for us, of the operational art in the information age?

This Occasional has attempted to answer such questions, but it is impossible to do so with certainty. All that one can be certain about is that this is a time for new thinking. There is no cow so sacred that our thinking should be constrained by the assumption that its importance now implies it has a part to play in our military future. Take for example the Principles of War – inviolate, perhaps – but if they are to be useful as a guide to thought and action they need to be relevant. New Principles of War for the information age⁶ are therefore proposed:

Principles of War (Current UK Doctrine)	Principles of War For the Information Age
Selection and Maintenance of the Aim Maintenance of Morale Offensive Action Concentration of Force Economy of Effort Co-operation Security Flexibility Surprise Sustainability	Develop the End State Cohesion Exploit Opportunity Integration of Precise Effects Application of Precise Force Unity of Effort Protection Agility Decision Superiority Endurance

A minor essay could clearly be offered in explanation and justification of each principle, including why it was a principle of war rather than an operational imperative. But that would miss the point – the new principles are not offered because they are in any

way intrinsically valid. They are offered purely to make the point that we must *'murder our darlings'*. No assumption, no principle of doctrinal certitude, no precious equipment programme, or existing force element should be allowed to constrain or skew our thinking about what the military future might hold and how best to prepare ourselves for it.

The most costly failings we could allow ourselves now would be narrowness of vision and poverty of aspiration. We must not allow ourselves to reduce the possibilities before us to fit our pre-conceptions – we must instead let go of preconception and open our minds, nationally and internationally, to a number of hypothetical futures that can be explored and refined through experimentation. If we do that, we could seize opportunities we have yet to imagine.

NOTES

- 1 Sir Rupert Smith, *Wars in Our Time*, World Defence Systems, Volume 3, Issue 2, 2001.
- 2 John Keegan, *The Penguin Book of War*, introductory remarks, 1999.
- 3 Chinese Peoples Liberation Army terminology for the synthesis of maniacal terrorism and weapons of mass destruction (see Chapter II).
- 4 J F C Fuller, *Decisive Battles of the Western World*, Grenada Publishing, London, 1970 (first published 1954).
- 5 Samuel Huntington, *The Clash of Civilizations*, New York, Simon and Schuster, 1996.
- 6 See R R Leonard, *The Principles of War for the Information Age*, Presidio Press, Novato CA, 1998, for an in depth analysis of this issue. Leonard examines the US principles (different in emphasis from the UK principles above and including, for example, 'Unity of Command', although derived from J F C Fuller's list in 1921). He argues that they are not principles of war at all, but principles of battle in industrial age, symmetrical, land warfare. He does not propose new principles, but

“eschews any attempt to formulate aphorisms for a future conflict that we can scarcely envision, let alone control”.

GLOSSARY OF ACRONYMS

ABCA	America, Britain, Canada and Australia
ABSV	Armoured Battle Group Support Vehicle
ACTORD	Activation Order
AFV	Armoured Fighting Vehicle
AH	Attack Helicopter
AI	Artificial Intelligence
AP	Air Platform
ARRC	Allied Command Europe Rapid Reaction Corps
ASP	Advanced Sound Ranging Post
ASTOR	Airborne Stand Off Radar
AT	Anti Tank
ATC	Air Traffic Control
ATGM	Anti Tank Guided Missile
ATGW	Anti Tank Guided Weapon BAOR British Army of the Rhine
BDA	Battle Damage Assessment
BEF	British Expeditionary Force
C2	Command and Control

C4I	Command Control Communications Computers and Intelligence
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
C4ISTAR	Command, Control, Communications, Computers, Intelligence, Surveillance, Target Acquisition, and Reconnaissance
CASEVAC	Casualty Evacuation
CDS	Chief of the Defence Staff
CENTCOM	Central Command
CinC	Commander in Chief
CIS	Communications and Information System
COA	Course of Action
COBRA	Counter Battery Radar
COMARRC	Commander Allied Command Europe Rapid Reaction Corps
Combat ID	Combat Identification
COMBRITFOR	Commander British Force
COMKFOR	Commander Kosovo Force
COP	Common Operational Picture
CR2	Challenger 2
CSS	Combat Service Support
CT	Counter Terrorist

DBS	Direct Broadcasting by Satellite
DHSS	Department of Health and Social Security
DIF	Difficulty, Importance and Frequency
DLGS	Data Link Ground Station
DMRS	Dual Mode Radar System
DMZ	Demilitarised Zone
DVLC	Driver and Vehicle Licensing Centre
EMP	Electromagnetic Pulse
EO/IR	Electro Optic/Infra Red
EU	European Union
EW	Electronic Warfare
FAC	Forward Air Controller
FCLV	Future Command and Liaison vehicle
FIST	Future Infantry Soldier Technology
FOO	Forward Observation Officer
FP	Force Protection
FRES	Future Rapid Effect System
FYROM	Former Yugoslav Republic of Macedonia
GOC	General Officer Commanding
GMLRS	Guided Multiple Launch Rocket System
GPS	Global Positioning System

GS	Ground Station
HPM	High Powered Microwave
HQ	Headquarters
IBCT	Interim Brigade Combat Team
IFPA	Indirect Fire Precision Attack
IM	Information Management
IMINT	Imagery Intelligence
IO	Information Operations
ISR	Intelligence Surveillance and Reconnaissance
ISTAR	Intelligence Surveillance Target Acquisition and Reconnaissance
IT	Information Technology
JFHQ	Joint Force Headquarters
JFLCC	Joint Force Land Component Commander
JOP	Joint Operational Picture
JSTARS	Joint Surveillance and Target Attack Radar System
JTFHQ	Joint Task Force Headquarters KFOR Kosovo Force
KLA	Kosovo Liberation Army
KP	Key Point
LC	Land Component

LCC	Land Component Commander Line of Communication
LOS	Line of Sight
MACP	Military Aid to the Civil Power
MASINT	Measurement and Signature Intelligence
MFC	Mortar Fire Controller
MI	Military Intelligence
MLRS	Multiple Launch Rocket System Main Operating Base
MRAV	Multi Role Armoured Vehicle Moving Target Indicator
NATO	North Atlantic Treaty Organisation
NBC	Nuclear Biological and Chemical
NCC	National Contingent Commander
NCW	Network Centric Warfare
NDM	Naturalistic Decision Making
NHS	National Health Service
NORTHAG	Northern Army Group
NRT	Near Real Time
OGD	Other Government Departments
OODA	Observe, Orientate, Decide, Act
OSCE	Organisation for Security and Cooperation in Europe

P5	Nation Permanent Member of the UN Security Council
PCP	Pedestrian Check Point
PIRA	Provisional Irish Republican Army
PSO	Peace Support Operations
PsyOps	Psychological Operations
RAPTOR	Reconnaissance Pod for Tornado
RCS	Rational Choice Strategies
RFI	Request for Information
RMA	Revolution in Military Affairs
ROE	Rules of Engagement
SA	Situational Awareness
SACEUR	Supreme Allied Commander Europe
SAR	Synthetic Aperture Radar
SDR	Strategic Defence Review
SIGINT	Signals Intelligence
SIS	Secret Intelligence Service
SNA	Somalia National Alliance
SPOD	Sea Port of Disembarkation
STA	Surveillance and Target Acquisition
TACP	Tactical Air Control Party
TEWT	Tactical Exercise Without Troops
TI	Thermal Imaging

TIRRS	Tornado Infra Red Reconnaissance System
TLAMS	Tomahawk Land Attack Missile
TOC	Tactical Operations Centre
UAV	Unmanned Aerial Vehicle
UN	United Nations
UNPROFOR	United Nations Protection Force
USMC	United States Marine Corps
VCP	Vehicle Check Point
VP	Vital Point
WFE	Warfighting Experiments
WMD	Weapons of Mass Destruction
WME	Weapons of Mass Effect
WR	Warrior

ABOUT THE AUTHORS

The authors work in the British Army's conceptual '*think tank*', the directorate General of Development and Doctrine, located at Upavon on Salisbury Plain. Most, but not all, are members of Command Development Branch (comdsp.bas@gtnet.gov.uk). This is a small team of six personnel whose focus is the conceptual and doctrinal development of the Army's Command, Intelligence, Surveillance, Target Acquisition and Reconnaissance capabilities in a joint and multi-national context, with particular emphasis on the exploitation of information age technologies. All of the serving authors attended the Army's Command and Staff Course. The views they have expressed are entirely their own.

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Colonel David Potts has an artillery background and commanded a regular regiment in the depth fire and target acquisition roles. He has served at unit

level in the UK, Germany, Northern Ireland, Belize and with the UN. He served on the staff in the UK MOD Joint Operations Centre during the Gulf War and the humanitarian relief operation in Northern Iraq and was Military Assistant to two successive Army Board members. For the past two years he has been responsible for the development of the British Army's Command and ISTAR capabilities. He holds a bachelor's degree in American Studies from Nottingham University and Carroll College, Wisconsin, and won the Commandant's Prize on the Army Command and Staff Course in 1989. He was appointed a MBE in 1991.

Lieutenant Colonel Tim Blad is an Engineer officer who has served in the UK, Germany and Northern Ireland. He has extensive experience on the Staff and has been active in international command and control interoperability for the past three years, particularly in the fields of information exchange requirements, messaging and symbology. He chairs and attends a very wide range of international panels and working groups in NATO, ABCA and other fora. He recently moved within Upavon to become the co-ordinating focus for all of the Directorate's international activity. He holds a master's degree from Cambridge in engineering and law.

Lieutenant Colonel Graham Le Fevre has a background in ISTAR at the Strategic, Operational and Tactical levels. He has served in ISTAR related posts in the UK, Northern Ireland and Germany. He has been an instructor at Sandhurst and an exchange officer with the US Army working within

their digitization programme. He was the senior J2 officer within the British Joint Task Force Headquarters on Operation Palliser in Sierra Leone. His responsibilities within Command Development Branch were the authorship and coordination of pan-Army ISTAR concepts and doctrine. He holds a bachelor's degree in Mediaeval and Modern History and a master's in Military Studies. He recently left Command Development Branch to command a Military Intelligence battalion.

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Lieutenant Colonel Jake Thackray is a Signals officer and has served in regimental appointments in England, Northern Ireland and Germany. He studied at the Royal Military College of Science at Shrivenham for his bachelor and masters degrees, both of which were related to the development of Information Age military technologies. He was Deputy Chief of Staff for logistics, personnel and administration with the British Army's 7th Armoured Brigade and later commanded a brigade signals squadron. He recently left Command Development Branch and now commands a Signals Regiment providing support to NATO's Allied Command Europe Rapid Reaction Corps (ARRC).

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Paul Lefever, in '*a former existence*', carried out regimental duties in Northern Ireland and Germany, attended the National Defence College and was a staff officer in NATO Headquarters. He also filled Attaché and Adviser posts behind the Iron Curtain

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