Postmodern Tactical Air Intelligence

Byron Reynolds

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Flight Lieutenant Byron Reynolds graduated from the Australian Defence Force Academy in 1997 with a Bachelor of Arts in Politics. The following year he was an unsuccessful candidate on No 178 Pilots Course, but on transfer to the Intelligence Officer category he was lucky enough to be posted to No 81 Wing Intelligence Section, RAAF Williamtown in 1999. From 1999–2000 he completed Fighter Intelligence Qualified (FIQ) program as part of the F/A-18 Hornet Operational Conversion (OPCON) Course and provided Intelligence support to each of the operational F/A-18 squadrons. In 2001 he was posted to No 75 Squadron, RAAF Tindal, and in 2002 deployed with the squadron on Operation *Guardian II*—the ADF operation to protect the Commonwealth Heads of Government Meeting—providing tactical air Intelligence support to the first live air defence operation over Australian soil since World War II.

In early 2003, Flight Lieutenant Reynolds developed and implemented the Intelligence training syllabus for F/A-18 aircrew deployment to the Middle East for operations against Iraq. He deployed with the squadron as part of a comprehensive mission support team including Imagery Analysts (IAs), Ground Liaison Officers (GLOs) from the Australian Army, and several other Intelligence Officers (INTELOs). He acknowledges that any lessons he has to offer have been from mistakes he has already made …

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ABSTRACT

Tactical Air Intelligence will face a crisis of relevance in conflicts of the future. In these postmodern battlespaces, warfighters will receive an abundance of information from the network of sensors around them, negating the trickle of descriptive Intelligence provided by their Intelligence staff. This future is not without its challenges.

This thesis examines the challenges facing a particular group of warfighters of the future—the pilots of multi-role fighter aircraft, such as the F/A-18 Hornet and the Joint Strike Fighter (JSF)—and how Intelligence may best be delivered to them to aid in their use of the material and to minimise its interference with other information. A large part of this work concerns itself with the nature of the challenges facing the fighter pilot. The argument is that changes in the strategic environment combined with the evolution of military technology are giving rise to a number of new operating doctrines intended to deal with uncertainty, such as Effects-Based Operations (EBO), Network Centric Warfare (NCW) and Australia's Multidimensional Manoeuvre. These operating doctrines in turn generate further imperatives for the use of air power and commensurate demands on the fighter pilot. The rest of the work develops the argument that in order to deal with the volatile, uncertain, complex and ambiguous battlespace of the future, intelligence processes will need to be used by everybody in the battlespace and will require an improved degree of knowledge. At the same time, RAAF Intelligence at the tactical level risks losing relevance due to the availability of near real-time Intelligence directly into the cockpit.

The solution provided to these parallel challenges is that tactical air Intelligence will focus more on building knowledge than simply providing information. In this way aircrew will be better equipped to deal with the emerging battlespace.

CONTENTS

ABBREVIATIONS AND ACRONYMS

3ID	Third Infantry Division
ABCCC	Airborne Battlefield Command Control Center
ACC	Air Component Commander
ACO	Airspace Coordination Order
ADDP	Australian Defence Doctrine Publication
ADF	Australian Defence Force
AEW&C	Airborne Early Warning and Control
AHR	Attack Helicopter Regiment
AO	Area of Operations
AOC	Air Operations Centre
ARM	Anti-Radiation Missile
ATO	Air Tasking Order
AWACS	Airborne Warning and Control System
BDA	Battle Damage Assessment
BFM	Basic Fighter Manoeuvres
C2	Command and Control
C4ISR	Command, Control, Communications, Intelligence, Sureveillance and Reconnaissance
CAS	Close Air Support
CBRN	Chemical, Biological, Radiological or Nuclear
CLOS	Command to Line of Sight
CO	Commanding Officer
COMINT	Communications Intelligence
CONSCAN	Conical Scan
CSAR	Combat Search and Rescue
CSIS	Center for Strategic and International Studies
DER	Defence Efficiency Review
DIGO	Defence Imagery and Geospatial Organisation
DIRLAUTH	Direct Liaison Authority
DRP	Defence Reform Program
DSD	Defence Signals Directorate

EA	Electronic Attack
EBO	Effects-Based Operations
ELINT	Electronic Intelligence
EP	Electronic Protection
EW	Electronic Warfare
FAC	Forward Air Control
FCC	Fighter Combat Controller
FCI	Fighter Combat Instructor
FII	Fighter Intelligence Instructor
FIQ	Fighter Intelligence Qualified
FWC	Future Warfighting Concept
GDP	Gross Domestic Product
GLO	Ground Liaison Officer
HMMVW	'Humvee' Multipurpose Vehicle
HOTAS	Hands on Throttle and Stick
HUMINT	Human Intelligence
IA	Imagery Analyst
IMINT	Imagery Intelligence
INTELO	Intelligence Officer
ISR	Intelligence, Surveillance and Reconnaissance
JDAM	Joint Direct Attack Munition
JEWOSU	Joint Electronic Warfare Operational Support Unit
JFC	Joint Force Commander
JSF	Joint Strike Fighter
JSTARS	Joint Surveillance and Target Attack Radar System
KM	Knowledge Management
LOAC	Laws of Armed Conflict
LOC	Lines of Communication
LPI	Low Probability of Intercept

MANPADS	Man Portable Air Defence Systems
MISREP	Mission Report
MPA	Maritime Patrol Aircraft
MRCA	Multi-Role Combat Aircraft
NCW	Network Centric Warfare
NEBA	National Effects-Based Approach
NGOs	Non-Government Organisations
NTISR	Non-Traditional Intelligence, Surveillance and Reconnaissance
OIF	Operation *Iraqi Freedom*
ONA	Operational Net Assessment
OODA Loop	Observation-Orientation-Decision-Action Loop
OPCON	Operational Conversion
OSINT	Open Source Intelligence
PFC	Private First Class
PRC	People's Republic of China
PRONAV	Proportional Navigation
RAAF	Royal Australian Air Force
RAF	Royal Air Force
RG	Republican Guard
RMA	Revolution in Military Affairs
RoC	Republic of China
ROE	Rules of Engagement
RPG	Rocket Propelled Grenade
SA	Situational Awareness
SAM	Surface-to-Air Missile
SAN	School of Air Navigation
SASR	Special Air Service Regiment
SEAD	Suppression of Enemy Air Defences
SIGINT	Signals Intelligence
SPINS	Special Instructions

STOVL	Short Take Off Vertical Landing
Stratfor	Strategic Forecasting Inc
TCT	Time Critical Targeting
TD	Targeting Directive
TST	Time Sensitive Targeting
UAV	Uninhabited Aerial Vehicle
UCAV	Uninhabited Combat Aerial Vehicle
UK MoD	United Kingdom Ministry of Defence
UNSC	United Nations Security Council
US	United States
US DoD	United States Department of Defense
USAF	United States Air Force
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USN	United States Navy
USSR	Union of Soviet Socialist Republics
WEC	Weapons Employment Course
WIKID	Wisdom-Intelligence-Knowledge-Information-Data
WMD	Weapons of Mass Destruction

INTRODUCTION

> *By 'intelligence' we mean every sort of information about the enemy and his country—the basis, in short, of our own plans and operations. If we consider the actual basis of this information, how unreliable and transient it is, we soon realize that war is a flimsy structure that can easily collapse and bury us in its ruins. The textbooks agree, of course, that we should only believe reliable intelligence, and should never cease to be suspicious, but what is the use of such feeble maxims? They belong to that wisdom which for want of anything better scribblers of systems and compendia resort to when they run out of ideas.*
>
> Carl von Clausewitz[1]

In recent years intelligence communities around the world have been under comprehensive scrutiny following a series of successive 'intelligence failures'. Committee after committee have pored over evidence into the activities of intelligence and law enforcement agencies prior to the attacks on 11 September 2001 in an effort to identify how the system failed to predict a scenario of hijacked aircraft used as weapons of mass destruction (WMD) inside the continental United States. Coalition operations against Saddam Hussein's Ba'athist regime in Iraq had been sold to the respective populations largely on claims that Iraq had a significant WMD program combined with a history of non-compliance with weapons inspections and international modalities. Those assertions have been brought into disrepute by the coalition's failure to locate any substantial Chemical, Biological, Radiological or Nuclear (CBRN) weapons stocks or development programs. Inquiries into the quality of intelligence advice given to governments and those governments' use of that material have been conducted in the US, UK and Australia.

In the final report of the National Commission on Terrorist Attacks Upon the United States—the official US inquiry into September 11—several systemic problems were identified, but most interesting was the accusation of a 'failure of imagination'.[2] How imagination—a notion of creative flair—relates to what should be an activity based on facts and evidence might be puzzling at first. Those unfamiliar with the nature of intelligence and what it can and cannot provide might believe that intelligence should be consistent, correct and certain. Intelligence should provide solutions to an otherwise ambiguous environment, should it not?

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1 Carl von Clausewitz, *On War*, translation by Michael Howard and Peter Paret, Princeton University Press, Princeton, 1976, p. 117.

2 National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report*, US Government Printing Office, Washington DC, 22 July 2004, p. 339. This report is available from http://www.9-11commission.gov.

WHAT IS INTELLIGENCE?

Within the intelligence fraternity, a common adage is that intelligence is the second oldest profession[3] with fewer scruples than the first. As long as humans have desired to gain an advantage over their neighbours, they have sought to know the strengths and weaknesses of their opponents. Spies and espionage are evident in the Old Testament of the Bible[4] and in ancient stories of most civilisations. These activities took on a particularly romantic notion during the Cold War with images of enigmatic men and women lurking in the shadows, drinking martinis and using hi-tech gadgets to save the world. This attractive mystique distorted modern culture's perception of intelligence activity not only by giving it a far more glamorous facade but also by shifting the focus away from the more mundane aspects of collection, analysis and distribution and towards the 'excitement' of covert operations.

In reality, intelligence is very much about those mundane aspects—the collection, analysis and distribution of information. In the end if one were to find an Australian Defence Force (ADF) analogy for the James Bond paradigm, it would more likely be a member of the Special Air Service Regiment (SASR) rather than a Royal Australian Air Force (RAAF) Intelligence Officer (INTELO).

This thesis uses the term intelligence in two different contexts. The first is a target-based definition. Intelligence (henceforth distinguished by the capitalisation of the 'I') is distinguishable as a profession and the products of that profession. This profession is discernible from others in that its focus is principally on an adversary, whether this is in business, sport, politics or—in the case of this thesis—the military. Military Intelligence seeks first to identify potential enemies (hopefully aided by strategic guidance from the national–political level), and then provide detailed information and assessments on a given enemy's likely courses of action, doctrine, tactics, weapons, infrastructure and personnel. Occasionally Intelligence must be conducted in 'grey areas' not related directly to the enemy. Friendly or neutral nations may be targeted to gain information that they wish to remain secret, such as negotiating positions or their own course of action. The civilian populace should be targeted—although this usually requires a less clandestine approach—to provide essential cultural, infrastructure and demographic information. This information should be used to help protect the population, allow better freedom of action through the battlespace for ground forces, facilitate development of relationships for Human Intelligence (HUMINT) gathering, and generally aid in the conduct of operations in a way that is culturally sensitive to the very people that are most affected by conflict.

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3 Paul Reynolds, 'The World's Second Oldest Profession', *BBC News*, 26 February 2004, http://news.bbc.co.uk/1/hi/world/americas/3490120.stm, accessed 28 September 2004.

4 ibid.

The second context of 'intelligence' is a process-based definition. Intelligence (henceforth distinguished by the use of a lower case 'i') is recognised in knowledge management literature as a process of adding value to information, usually through analysing it and making inferences or assessments.[5] Military Intelligence uses the intelligence process as a cornerstone of its capability,[6] because its focus is purely on the ambiguous and uncertain domain of other people's thoughts and activities. In this environment even perfectly correct information may have a negative impact.[7] By its very nature, Intelligence must use analysis and inference to 'fill in the gaps' between incomplete and often contradictory evidence.[8] Clausewitz recognised this when he wrote, 'Many intelligence reports in war are contradictory; even more are false, and most are uncertain.'[9]

Despite Clausewitz's apparently sceptical view of the nature of Intelligence, his work shows incredible insight into the challenges faced by the commander using Intelligence on the battlefield. Although very short—it stands at a little over 600 words in the Howard–Paret translation—the chapter of *On War* dedicated to Intelligence recognises each of the challenges identified by this thesis. If one were to distil the chapter into ten axioms of Intelligence they would look something like the following:

1. Intelligence concerns itself with the enemy.
2. Intelligence drives operations.
3. Intelligence is of no value if it cannot be used by the commander.
4. Intelligence is often 'unreliable and transient'.
5. Inaccuracies in Intelligence can be as cumulative as the accuracies.
6. A commander must apply judgements to Intelligence in order to assimilate it and use it.
7. These judgements are based on experience and knowledge.

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5 Chris Westwood, *The Future Is Not What It Used To Be*, Air Power Studies Centre, Canberra, 1997, p. 27.

6 John E. McLaughlin, 'New Challenges and Priorities for Analysis', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 18.

7 Yigal Gerchak and Frank Safayeni, 'Perfect Information with Potentially Negative Value: An Intriguing War Story and Possible Explanation', *Journal of the Operational Research Society*, Vol. 47, 1996, pp. 710–14.

8 Rob Johnston, 'Developing a Taxonomy of Intelligence Analysis Variables', *Studies in Intelligence*, Vol. 47, No. 3, 2003; James A. Marks and Steve Peterson, 'Lessons Learned: Six Things Every "2" Must Do – Fundamental Lessons From OIF', *Military Intelligence Professional Bulletin*, Vol. 29, No. 4, 2003, p. 5.

9 Clausewitz, *On War*, p. 117. The original German text and an obsolete English translation by J.J. Graham from 1873 are available from http://www.clausewitz.com/CWZHOME/On_War/ONWARTOC.html.

8. These judgements can be clouded by prejudices and the fog of war.

9. Applying these judgements is 'infinitely harder' on the battlefield due to urgency and the stream of information.

10. Intelligence and its application by the commander is 'one of the greatest chasms between planning and execution'.

From this discussion we see that Intelligence is so much more than information. Intelligence brings with it a distinctly human dimension, not only with respect to its creation but also its use. Indeed, there is no mention of the source of Intelligence in the chapter, only its use by the commander.

An article that circulated internally through Washington in 2001 provided a near heretical view of the approach analysts have taken in providing Intelligence. The author, Carmen Medina, highlighted that several assumptions forming the basis for the Intelligence 'tradecraft model' had been nullified by the changing world. The abundance of information directly available to policymakers (either through open sources such as the Internet or through classified networks) meant that policymakers were essentially able to become their own analysts and provided an enhanced requirement for analysts to add value. The article recognised that policymakers, being experts in the nature of political affairs, are well equipped to perform this analysis. Medina put forward a new model that recognised this new environment, based on a customer-focused approach that abandons the notion that all Intelligence must be 'finished' product. She encourages analysts to be imaginative, creative and assertive.[10]

There is no doubt that we are living in an information age. Most of us in our day to day lives are bombarded with information from many different sources.[11] At times, this flood of information can be overwhelming. It can distract us by drawing our attention away from our responsibilities and towards tasks that should be delegated or ignored altogether.[12] It can inundate us with so much information that we are unable to discern valuable information from worthless information. We can become addicted to information, holding off on decisions as we wait for that elusive golden nugget of

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[10] Carmen A. Medina, 'The Coming Revolution in Intelligence Analysis: What to do When Traditional Models Fail', *Studies in Intelligence*, Vol. 46, No. 3, 2002.

[11] Eva Jonas and Dieter Frey, 'Information Search and Presentation in Advisor–Client Interactions', *Organizational Behavior and Human Decision Processes*, Vol. 91, 2003, p. 154.

[12] Jim Wallace, 'The Ghost of Jomini: the Effects of Digitisation on Commanders and the Workings of Headquarters', in Michael Evans and Alan Ryan (eds.), *The Human Face of Warfare: Killing, Fear and Chaos in Battles*, Allen & Unwin, St Leonards, 2000, p. 125; Australian Defence Doctrine Publication D.3.1 (ADDP-D.3.1), *Enabling Future Warfighting: Network Centric Warfare*, Australian Defence Force, 2004, s3.11.

truth.[13] Information can simply paralyse us with its abundance.[14] These are all notions of 'information overload'.

Modern warfare is bringing this phenomenon to the battlespace. High-speed communications, precision weapons and information technology promise to give us an ever-improving picture of the battlespace and the ability to apply lethal force with near-surgical precision.[15] And yet even in the 19th century, Clausewitz identified the burden of too much information, especially where information was imperfect.[16] Now we will ask our warfighters to use a complex picture of the battlespace to inform their decision-making. The risk of warfighters suffering from information overload should not be overlooked.

STRUCTURE

This thesis examines the challenges facing a particular group of warfighters of the future—the pilots of multi-role fighter aircraft, such as the F/A-18 Hornet and the Joint Strike Fighter (JSF)—and how Intelligence may best be delivered to them to aid in their use of the material and to minimise its interference with other information. A large part of this work concerns itself with the nature of the challenges facing the fighter pilot. The argument is that changes in the strategic environment combined with the evolution of military technology is giving rise to a number of new operating doctrines intended to deal with uncertainty. These operating doctrines in turn generate further imperatives for the use of air power and commensurate demands on the fighter pilot. The rest of the work develops the argument that in order to deal with the volatile, uncertain, complex and ambiguous battlespace of the future, intelligence processes will need to be used by everybody in the battlespace and this will require an improved degree of knowledge. At the same time, RAAF Intelligence at the tactical level risks losing relevance due to the availability of near real-time Intelligence directly into the cockpit.

The solution provided to these parallel challenges is that tactical air Intelligence will focus more on building knowledge than simply providing information. In this way aircrew will be better equipped to deal with the emerging battlespace.

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13 Wallace, 'The Ghost of Jomini', p. 130.

14 ADDP-D.3.1 – *Enabling Future Warfighting: Network Centric Warfare*, s3.11; Major General Gerald F. Perryman Jr USAF (Ret), 'ISR Imperatives', *ISR Journal*, March/April 2003; Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War*, Information Age Transformation Series, DoD (US) Command and Control Research Program (CCRP), Washington DC, 2002, p. 174.

15 David Vergun, 'An Incredible Level of Situational Awareness', *Sea Power*, Vol. 44, No. 10, October 2001, pp. 54–57.

16 Clausewitz, *On War*, p. 117.

So What Has Changed?

Chapter 1 – The strategic challenges encountered in the 21st century will increase the complexity of military activities.

A number of strategic challenges are apparent for the opening decades of the 21st century. Chapter 1 examines these changes by first looking at the two critical points of discontinuity in geopolitics—the end of the Cold War and the terrorist attacks of September 11—and the effect these had on the security environment. Also discussed is the nature of the so-called Revolution in Military Affairs (RMA) and some of the ramifications that it has on the warfighter, both in terms of the tools it can provide and the additional burdens it evokes due to global media and the 'CNN Effect'. Resources available to militaries have been dwindling, not only in Australia but apparently throughout the West. At the same time the cost of keeping up with technological developments is becoming more and more unrealistic. Militaries must find new ways of fighting leaner and more efficiently. Nevertheless, war remains an intrinsically human endeavour and that means people are the essential element in making all of these changes work.

Chapter 2 – The responses to those strategic challenges include Effects-Based Operations (EBO), Network Centric Warfare (NCW) and Multidimensional Manoeuvre and their implementation may place even more burden on the warfighter.

In response to these challenges and opportunities, a number of militaries around the world are developing new approaches to conflict. These are largely spearheaded by the US military 'Transformation' programs, but other countries following suit include Australia and the UK. Among these future concepts are approaches such as Effects-Based Operations (EBO), Network Centric Warfare (NCW) and Australia's own Multidimensional Manoeuvre. Chapter 2 provides an introduction to these concepts and argues that NCW and Multidimensional Manoeuvre in particular place increased demands on the warfighter by making every warfighter a commander and expecting that they be able to simultaneously apply tactical, operational and strategic art in an ambiguous environment, independent of traditional command and control (C2) hierarchies. An important element introduced in this chapter is Boyd's Observation-Orientation-Decision-Action (OODA) Loop, which is parallelled with the Wisdom-Intelligence-Knowledge-Information-Data (WIKID) hierarchy to identify Orientation/Knowledge as the most critical elements for a warfighter in high tempo operations.

Chapter 3 – All aircraft need to be multi-role and this demands even more of our aircrew.

Chapter 3 looks at the challenges that differentiate aircrew of multi-role fighter aircraft from other warfighters. It opens by examining the shift in the nature of responsibility from pilot to commander allowed by the automation of systems and evolution of cockpit ergonomics. The chapter then looks at the 'multi-role imperative' and how most, if not all, airborne platforms will need to be able to conduct several different roles, often on the same mission. The key point is that not only must aircrew be able to perform the tasks identified above (independently apply multiple levels of military art in ambiguous circumstances), the aircrew of multi-role fighter aircraft will have to do so across more area, against more targets, and against more threats than any other warfighter in the battlespace.

Finally to Intelligence

Chapter 4 – The increased demand on the customer means that there are many challenges for the Intelligence provider.

Tactical air Intelligence is introduced in Chapter 4, firstly by looking at the role it currently performs and the subsequent threat to its relevance. The chapter goes on to discuss the various challenges that face tactical air Intelligence, whether those be directly from the changed strategic and operational environment, or as a follow-on from the challenges faced by its principal customers: aircrew.

Recommendations

Chapter 5 – All individuals in the network must analyse and use information making them all 'INTELOs'—therefore, the greatest role for tactical Intelligence is to inform orientation, not provide observation.

Chapter 5 provides a number of practical methods for Intelligence to meet the challenges indicated in the preceding chapters. It looks at the nature of advice-giving and applies this to the different capacities in which the Squadron INTELOs will be expected to perform, whether that be as subject matter experts, information brokers or 'diversifiers'. It also examines factors that can aid the acceptance of Intelligence, including the customer's existing beliefs, the adviser's expertise, reputation for accuracy and trustworthiness, and the overall quality of the advice. Chapter 5 continues by discussing how INTELOs can deal with a lack of strategic guidance through helping inculcate a culture supportive of Intelligence, teaching aircrew how to assimilate Intelligence material, devolving

authority to liaise with other Intelligence organisations, and developing adaptable and scalable products.

This thesis recommends that:

1. a professional journal for joint operational and tactical Intelligence providers should be established to facilitate a sense of a shared intellectual community and to promote understanding across function, service and level;
2. knowledge management principles should be embraced by the Intelligence community and that the community should seek to set a benchmark for best practice in their implementation;
3. tools for near real-time and ongoing collaboration to enable the knowledge management policy should be aggressively sought out;
4. RAAF INTELOs at the most junior levels should be provided with training and education opportunities that enhance their instructional techniques and capacity to educate others; and
5. posting and promotion policies should reflect the importance of having thoroughly trained INTELOs at the squadron level.

CHAPTER 1 – STRATEGIC CHALLENGES OF THE 21ST CENTURY

The mission space and the environment in which we operate have changed significantly. No longer are the missions we are called upon to participate in purely or even predominantly military.

David S. Alberts[1]

In 2020, the nation will face a wide range of interests, opportunities, and challenges and will require a military that can both win wars and contribute to peace.

Joint Vision 2020[2]

We know that we are living in very uncertain times, and we are currently experiencing a hectic operational tempo as a result. We know that our Defence Organisation, and our Defence Force in particular, will need to be agile enough to adjust to the ever-increasing and diverse demands of the future.

General P.J. Cosgrove, AC, MC[3]

Key points:

1. The current body of literature on military strategy acknowledges uncertainty as the greatest challenge facing military planners and operators in the 21st century.
2. Uncertainty has come about from the end of the Cold War, the rise of franchise macro-terrorism embodied by September 11, and the emergence of a 'new security agenda'.
3. Militaries are expected to conduct a wider range of more complex operations across greater areas with fewer resources.
4. The Revolution in Military Affairs (RMA) has rapidly increased the speed, volume and reach of communications, not only for Western militaries but also for their adversaries and the media.
5. Despite these developments the nature of war remains largely unchanged—it is a human endeavour, constantly affected by fog and friction.

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1 David S. Alberts in 'Preface' to Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War*, Information Age Transformation Series, DoD (US) Command and Control Research Program (CCRP), Washington DC, 2002, p. x.

2 Joint Chiefs of Staff, *Joint Vision 2020*, Department of Defense, Washington DC, 2000, p. 1.

3 General P.J. Cosgrove in 'Foreword' to Australian Defence Doctrine Publication D.3 (ADDP-D.3), *Future Warfighting Concept*, Australian Defence Force, Canberra, 2003.

Underlying each of the different emerging concepts for future force employment—particularly those related to the Network Centric paradigm—is the notion that the nature of conflict has changed dramatically. This change forms a fundamental premise to which the concepts represent a response, and deserves some investigation in order to determine what it is that our future warfighters are actually being asked to do, and why. This discussion can then be used to identify challenges facing the aircrew of multi-role combat aircraft (MRCA) in the future. There are three discernible and closely related drivers for this perceived change—geopolitics, technology and resources.

This chapter begins by looking at the strategic imperatives brought about by changed geopolitics. It then examines the rise of the Information Age and its impacts on military affairs through doctrinal requirements and the media, before discussing the impact of resources. Despite all of these changes the nature of war itself remains largely unaffected and this will be discussed in the closing paragraphs of this chapter.

GEOPOLITICS

Most analyses identify two points of discontinuity in the global order: the end of the Cold War and September 11. The post-Cold War period was characterised by the rise of unipolarity[4] and accompanied by an increased occurrence of humanitarian interventions.[5] For the most part, the Western world was left without the clear threat that had been embodied by the USSR during the Cold War.[6]

Having no clear threat is a problem when, according to most accepted military theory, the adversary should be at the very heart of force planning and employment. Sun Tzu's legendary work, *The Art of War*,[7] lists five estimates that must be conducted for oneself and for the adversary. Although geographic factors are there, three of the five are directly related to human aspects: the will of the people, the nature of the commander

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4 Paul Dibb, 'A Trivial Strategic Age?', *Quadrant*, July–August 2000, p. 11; Charles Krauthammer, 'The Unipolar Moment Revisited', *The National Interest*, No. 70, Winter 2002/2003, p. 5.

5 Oliver P. Richmond, 'Introduction: NGOs, Peace and Human Security', *International Peacekeeping*, Vol. 10, No. 1, Spring 2003, p. 1; Adam Garfinkle, 'Strategy and Preventive Diplomacy', *Orbis*, Vol. 45, No. 4, Autumn 2001, pp. 505–06; John E. McLaughlin, 'New Challenges and Priorities for Analysis', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 11.

6 Carl Conetta and Charles Knight, 'Inventing Threats', *Bulletin of the Atomic Scientists*, Vol. 54, No. 2, March/April 1998, p. 32; William M. Nolte, '"Information Control is Dead: What's Next?" – The Knowledge Management Challenge for the Intelligence Community in the 21st Century', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 6.

7 Many translations and variations of this work exist, but the reference used by this author is Sun Tzu, *The Art of War*, translation by Yuan Shibing, Wordsworth Reference, Ware, 1993. For further analysis on Sun Tzu's place in the history of military thought see Martin van Creveld, *The Art of War*, Cassell History of Warfare Series, Cassell, London, 2000.

and the doctrine to be employed.[8] Although this example relates specifically to operational aspects of military strategy—that is, army on army—similar advice holds true for national strategy formulation. When a threat is not apparent, these estimates are extremely difficult to undertake. Without an adversary with which to compare one's self, it is nearly impossible to judge what is required.

The issue of no threat further complicates force development due to the innate difficulties associated with turning national strategy into military strategy—difficulties largely to do with timeframes, but also experience and understanding.[9] While force structure and doctrine in an ideal world would be based on strategic assessments of what is to be required, more often than not the cultures of the force, the existing structure and the materiel in place all impact the formulation of military strategy.[10] These factors take long timeframes to change, particularly materiel with its associated acquisition costs.[11]

This is not the first time Australia has been faced with the challenge of force planning in the absence of a threat.[12] After the withdrawal of both the UK and US from South-East Asia in the 1960s,[13] Australian defence policy foundered for more than two decades due to lack of clarity in its strategic focus.[14] South-East Asian states were focused on their own internal stability and economic development and provided little or no threat to Australia's national interest. As early as the 1970s Australian defence planning documents acknowledged a far greater role for peacekeeping in the region,[15] and 'constructive engagement' with neighbouring countries was proffered as a way of protecting the approaches to Australia. Nevertheless, Cheeseman points out that while policy regularly changed during the period, 'operational documents'—those internal Defence and Foreign Affairs documents guiding actual behaviour of the departments—did not change to reflect that policy.[16]

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8 Sun Tzu, *The Art of War*, pp. 100–02. Technology is not explicitly referred to because the comparative technological differences between armies during that period were minimal and the focus of the work is on the 'art' of warfare rather than the 'science' of it.

9 Richard K. Betts, 'The Trouble with Strategy: Bridging Policy and Operations', *Joint Forces Quarterly*, Autumn/Winter 2001–02, pp. 24–26.

10 Dibb, 'A Trivial Strategic Age?', p. 15.

11 ibid., p. 15.

12 Joint Standing Committee on Foreign Affairs, Defence and Trade, *Australia's Maritime Strategy*, Parliament of the Commonwealth of Australia, June 2004, p. 42.

13 Graeme Cheeseman, 'From Forward Defence to Self-Reliance: Changes and Continuities in Australian Defence Policy 1965–90', *Australian Journal of Political Science*, Vol. 26, No. 3, 1991, p. 430; Stewart Woodman, 'Towards an Independent Outlook: Australia's Regional Security Policies, 1945–1991' in Richard Baker (ed.), *The ANZUS States and Their Region*, Praeger, Westport, Connecticut, 1994, p. 12.

14 ibid., pp. 13–15.

15 Cheeseman, 'From Forward Defence to Self-Reliance', pp. 434–35.

16 ibid., pp. 429–30.

With the stable modalities of the Cold War gone, the unipolar world with rising regional powers means that governments require a degree of agility in their diplomatic relations.[17] Democratic governments in the West have displayed their ability to be agile in such ways—some would say too 'agile'[18]—but this is not a trait shared by their militaries. Politicians, particularly those in democracies, need to keep their options open, holding off decisions to the last moment.[19] At the other end of the spectrum are military planners who prefer clarity of purpose and long lead times for planning.[20] This difference can generate friction between the component parts of strategy, policy and tactics. A risk of this process is that by holding off too much on making decisions, politicians can deny themselves the option of military action, or have a deleterious impact on the proper and efficient conduct of operations.

Australia's approach to military planning for participation in possible military operations in Iraq during late 2002 and early 2003 reflects this problem well. While the approach generated some frustration among some commanders and tactical operators, it can be seen as a near ideal compromise between government and Defence based on the personalities in place, and a growing degree of trust in the ADF developed since the success of East Timor in 1999. To ensure that the media or population did not misinterpret planning activity as a firm commitment to operations, the Australian Government protected its options by mandating strict limits on the number of people involved in the planning. Vital Australian involvement in coalition planning began in July of 2002,[21] and ADF officers participated—though only in an 'observer' status—in a critical command and control rehearsal called Exercise *Internal Look 02*.[22] Firm commitment to the operation was not given until 18 March 2003[23]—just one day prior to commencement of hostilities—but pre-deployment of earmarked forces had occurred under Operation *Bastille* in January and February.[24] Had these steps not been taken, Australian commitment to the coalition operation would have been largely denied.

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17 Dibb, 'A Trivial Strategic Age?', p. 11; Betts, 'The Trouble with Strategy', pp. 24–26.

18 One of the most common examples for this type of behaviour was the ever-evolving relationship between the United States and Saddam Hussein's Ba'ath regime in Iraq. During the 1980s Saddam Hussein enjoyed US military and diplomatic support because of the war with Iran. The 1990 invasion of Kuwait by Iraqi forces followed a discussion between the US ambassador and senior Iraqi officials in which the ambassador stated that the US would not interfere in Iraq's dispute with Kuwait, implying that the US would not intervene if the dispute turned to outright conflict. Obviously the relationship soured significantly after the invasion, eventually leading to the intense demonisation of Saddam Hussein's regime throughout the 1990s.

19 Colin S. Gray, 'Why Strategy is Difficult', *Joint Forces Quarterly*, Summer 1999, p. 11.

20 Betts, 'The Trouble with Strategy', pp. 24–26.

21 Department of Defence, *The War in Iraq: ADF Operations in the Middle East in 2003*, Defence Publishing Service, Canberra, 2003, p. 8.

22 'Australian Military to Join US Exercise in Qatar', *SBS World News*, 7 December 2002, http://www9.sbs.com.au/theworldnews/region.php?id=48613&region=7, accessed 27 February 2004.

23 John Howard (Prime Minister), transcript of press conference, Parliament House, Canberra, 18 March 2003.

24 Department of Defence, *The War in Iraq*, p. 11.

The types of conflict that are occurring are also changing, most notably with the rise of humanitarian intervention but also with the newly emerging notion of intervening in 'failed states' for ostensibly more realist concerns.[25] During the Cold War humanitarian intervention was rare for three reasons.

Firstly, the membership of the United Nations Security Council (UNSC) meant that the use of veto was likely.[26] Though not an intervention for humanitarian reasons, the UNSC Resolution that paved the way for intervention in Korea was only passed because the USSR was boycotting the UNSC at the time. Ironically, it was doing so because the Republic of China (RoC) and not the People's Republic of China (PRC) was the 'China' represented at the UNSC.

Secondly, and perhaps more importantly, concerns that even minor conflicts could drag the two super powers into a global conflict meant that strategists were cautious to enter humanitarian interventions.[27] Finally, the doctrine for the employment of US military forces as espoused by Casper Weinberger and Colin Powell[28] specifically stated that any conflict to which they were committed had to be directly related to their national interests.[29] This doctrine was developed not from a humanitarian intervention gone wrong, but from the US experience in Vietnam.[30] If the threat of global communism—real or otherwise—was not a viable cause for going to war, then liberalist notions of humanitarian intervention were certainly not going to be either. This all changed in the post-Cold War period, but most noticeably under the Clinton administration.[31]

Humanitarian intervention is an important concept because it covers a broader part of the spectrum of conflict. Furthermore it can be argued that the types of activity conducted during humanitarian interventions are intrinsically more complicated than those conducted during open war.[32]

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25 Jeffrey Record, 'Collapsed Countries, Casualty Dread, and the New American Way of War', *Parameters*, Vol. 32, No. 2, Summer 2002, pp. 5–10.

26 Gary Wilson, 'UN Authorized Enforcement: Regional Organizations Versus "Coalitions of the Willing"', *International Peacekeeping*, Vol. 10, No. 2, Summer 2003, p. 89.

27 Garfinkle, 'Strategy and Preventive Diplomacy', p. 505.

28 Commonly referred to as the Weinberger or Weinberger–Powell doctrine.

29 Kenneth J. Campbell, 'Once Burned, Twice Cautious: Explaining the Weinberger–Powell Doctrine', *Armed Forces and Society*, Vol. 24, No. 3, Spring 1998, p. 365.

30 ibid., p. 358.

31 Henry F. Carey, 'US Domestic Politics and the Emerging Humanitarian Intervention Policy: Haiti, Bosnia and Kosovo', *World Affairs*, Vol. 164, No. 2, Fall 2001.

32 Naomi Weinberger, 'Civil–Military Coordination in Peacebuilding: The Challenge in Afghanistan', *Journal of International Affairs*, Vol. 55, No. 2, Spring 2002, p. 246; Nick Spence, 'Civil–Military Cooperation in Complex Emergencies: More than a Field Application', *International Peacekeeping*, Vol. 9, No. 1, 2002, p. 165; United Nations, 'Challenges Faced by Complex Peacekeeping Operations', http://www.un.org/Depts/dpko/dpko/pub/year_review03/Challenges_faced.htm, accessed 28 April 2004.

The actions of mass murderers on 11 September 2001 changed the world—or at least changed the West's perception of the world. Clearly, terrorism was not new.[33] Not even terrorism on US soil was a new event. al Qa'eda was not an organisation born overnight, conducting its first operation.[34] But if one were to believe the hysteria, these are conclusions that could have been drawn. What September 11 did was dramatically shift the American public's perception of what constitutes 'security'. Rightly or wrongly, September 11 has set the agenda for security for the foreseeable future and has expanded further the types of operations that are expected from militaries around the world.

Terrorism is just one small part of what has been called the 'new security agenda'.[35] This new agenda differs dramatically to the traditional concepts of security in that states are no longer the only relevant parties, and threats exist across borders and jurisdictions. The new security agenda includes things like 'human security', which expands the notion of security to encompass economics, health, environment, culture and society. In this way the new security agenda not only represents a change in the nature of the threat (terrorism, transnational crime, disease, environment etc) but also a shift in focus of what is to be protected (civil liberties, health, welfare of the individual etc).

Due to the particular challenges presented by these threats, responses to them are best conducted by specialist agencies with the following traits:

1. both domestic and international purview;
2. authority to apply means of compulsion;
3. cross-departmental liaison and inter-agency cooperation; and
4. relevant skill sets, training and experience.

For terrorism and transnational crime these prerequisites can be problematic for a number of reasons. Firstly, jurisdictions are normally legislated to prevent inappropriate use of agencies. For example, in the Australian context the Defence Signals Directorate

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33 A brief historical perspective on terrorism as far back as 66 AD can be found in Stephen S. Beitler, 'Counterintelligence and Combatting Terrorism' in Gerald W. Hopple and Bruce W. Watson (eds.), *The Military Intelligence Community*, Westview Special Studies in Military Affairs, Westview, Boulder, 1986, pp. 184–85.

34 An excellent discussion of the rise of al Qa'eda, including the first terrorist attack on the World Trade Center in 1993, is found in: National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report*, US Government Printing Office, Washington DC, 22 July 2004, p. 339.

35 Stewart Woodman, 'Beyond Armageddon? The Shape of Conflict in the Twenty-First Century' in Denny Roy (ed.), *The New Security Agenda in the Asia-Pacific*, St Martins Press, New York, 1997, p. 77.

is legislated to collect Signals Intelligence for the national interest,[36] but is restricted to foreign parties—Australians can only be collected against in very specific circumstances and such activities must be reviewed by the Inspector-General of Intelligence and Security.[37] Secondly, the authority to apply means of compulsion, such as custodial powers or lethal force, rely on either very specific agreements between countries or an acceptance of risk by politicians that the actions are likely to harm international relations.

Since organisations with these prerequisites were rare prior to September 11, the institutions with the most applicable capabilities to wage 'war' against terrorism were militaries,[38] and the role was largely left to them. The greatest problem that military planners face in this changed geopolitical environment, then, is uncertainty. Not only are they being asked to prepare forces for a wider variety of types of conflicts, they must also prepare for many different opponents, operating in many different geographical regions and using asymmetric tactics.[39]

TECHNOLOGY AND THE REVOLUTION IN MILITARY AFFAIRS

Another key driving force in the change of conflict has been the Revolution in Military Affairs (RMA) widely touted in the late 1990s, but of apparently declining favour in the current parlance.[40] This would seem to be driven by the United States' own shift in terminology towards 'Transformation'. This shift recognises that it is not so much a revolution as an evolution[41]—technology is being used to do old tasks faster and more efficiently, rather than enabling a distinctly new approach to warfare.[42] Nevertheless,

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36 Defence Signals Directorate, 'Relevant Legislation', http://www.dsd.gov.au/about_dsd/legislation.html, accessed 3 June 2004.

37 Defence Signals Directorate, 'Privacy Safeguards', http://www.dsd.gov.au/about_dsd/privacy_safeguards.html, accessed 3 June 2004.

38 The CIA is perhaps the only example of a non-military organisation that has the necessary resources to not only gain intelligence on terrorism or transnational crime, but also to act upon that intelligence either through the use of custodial powers or the application of force.

39 General P.J. Cosgrove in 'Foreword' to Australian Defence Doctrine Publication D.3.1 (ADDP-D.3.1), *Enabling Future Warfighting: Network Centric Warfare*, Australian Defence Force, 2004, p. iii and s1.2.

40 Frederick W. Kagan, 'The Art of War', *The New Criterion*, November 2003, http://www.newcriterion.com/archive/22/nov03/kagan.htm, accessed 27 February 2004; William A. Owens, 'Intelligence in the 21st Century', *Defense Intelligence Journal*, Vol. 7, No. 1, 1998, p. 25.

41 Anthony H. Cordesman, *Lessons of Post Cold War Conflict: Middle Eastern Lessons and Perspectives*, Center for Strategic and International Studies (CSIS), Washington DC, 2004, p. ii; Owens, 'Intelligence in the 21st Century', p. 25.

42 Kagan, *The Art of War*; Steven Metz, 'The Next Twist of the RMA', *Parameters*, Vol. 30, No. 3, Autumn 2000, p. 41; Frederick Teo Li-Wei, 'Revolution in Military Affairs and Information-Age Warfare: Why Technology Alone Cannot Win Wars', *Pointer*, Journal of the Singapore Armed Forces, Vol. 25, No. 2, April–June 1999.

RMA remains a useful theme of analysis as it represents the technological basis that enables the new concepts.

There have been a number of Revolutions in Military Affairs in history. Soviet military scientists first coined the phrase itself, but there remains some debate as to the heritage of the term. Some suggest that it was used to describe the break in military strategy brought on by the advent of nuclear weapons,[43] while others state that it was a term developed to describe the technological advantages enjoyed by the US military in the late 1970s and early 1980s.[44] RMAs can be based on dramatic changes in doctrine, but are most often viewed as technological advances that revolutionise the very nature of combat.[45] The longbow, train, nuclear weapons—these have all been described as RMAs,[46] but it was not merely the technology that was important, rather the way that it allowed friendly forces to change their activity and forced commensurate changes in adversary behaviour.[47] The currently anticipated RMA is based on high-speed, global communications,[48] fused sensors[49] and precision weapons.[50]

The RMA is seen by many commentators, both proponents and opponents, as an attempt by the West to use technology to make the battlespace 'transparent' and remove the human dimension from warfare.[51] According to its proponents, this technology will reduce the fog and friction of war, if not negate them altogether. To its opponents, the RMA represents a dangerous shift towards the science of war, at the cost of its art.[52] The risk here is that the West will become so dependent on technology that it will no longer have the skills to wage lower sophistication but equally lethal warfare, nor the manpower to conduct high demand operations such as reconstruction efforts.

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43 Kagan, *The Art of War*; You Ji, 'The Revolution in Military Affairs and the Evolution of China's Strategic Thinking', *Contemporary Southeast Asia*, Vol. 21, No. 3, December 1999, p. 345.

44 Norman Davis, 'An Information-Based Revolution in Military Affairs' in John Arquilla and David Ronfeldt (eds.), *In Athena's Camp: Preparing for Conflict in the Information Age*, RAND, Santa Monica, 1997.

45 François Very, 'Military Futures of Developing Countries: Images of Alternative Futures for the South African Military', *Strategic Review for South Africa*, Vol. 23, No. 2, 2001; Davis 'An Information-Based Revolution in Military Affairs', p. 80.

46 Kagan, *The Art of War*.

47 Jyri Raitasalo and Joonas Sipila, 'Reconstructing War after the Cold War', *Comparative Strategy*, Vol. 23, No. 3, 2004, p. 249.

48 Metz, 'The Next Twist of the RMA', p. 41.

49 Davis, 'An Information-Based Revolution in Military Affairs', p. 86.

50 ibid., p. 85.

51 Metz, 'The Next Twist of the RMA', p. 50; Thomas K. Adams, 'Future Warfare and the Decline of Human Decisionmaking', *Parameters*, Vol. 31, No. 4, Winter 2001/2002, pp. 57–58; Alfred Kaufman, *Curbing Innovation: How Command Technology Limits Network Centric Warfare*, Argos Press, Canberra, 2004.

62 *The Perfect War*, television documentary, New York Times Television and ZDF, aired on SBS Television 8 June 2004 and 15 June 2004; Kaufman, *Curbing Innovation*.

The CNN Effect

A flow-on effect of globalisation and the technology developed in the RMA has been the so-called 'CNN effect',[53] where the media now has access to similar communications technology and therefore also has global reach.[54] Indeed, the media's willingness to compromise accuracy and comprehensiveness for speed means that they are capable of communicating fragments of events occurring in a war zone faster than the military is able to report the corresponding complete picture to the government.[55] Cost to civilian life, fratricide and casualties are all part of the normal pattern of war, but now they are broadcast directly into our homes, influencing public opinion with graphic portrayals of the horrors of war.[56] This sort of reporting can distort democratic states' approach to warfare, making their populace and by extension their governments averse to casualties and fearful of collateral damage.[57] But rather than limiting the number of conflicts, the CNN effect has merely placed a new emphasis on the way in which they are prosecuted. It is no longer merely enough to win a war—it must be won with a certain degree of compassion and efficiency.

As well as influencing one's own population, media reporting on a war has effects on coalition members, neutral parties and even the enemy. Therefore, the laws of armed conflict are no longer institutions limiting the conduct of war through threat of legal prosecution—they have become operational imperatives. The end result is an extension of the ability to influence the strategic level to encompass the entire military.[58] The RMA has introduced the notion of the strategic corporal; the CNN effect introduces the 'strategic private'.[59]

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[53] The Brookings Institution, *'The CNN Effect': How 24-Hour News Coverage Affects Government Decisions and Public Opinion*, a Brookings/Harvard Forum, 23 January 2002, http://www.brookings.edu/comm/transcripts/20020123.htm, accessed 29 July 2004; Margaret H. Belknap, 'The CNN Effect: Strategic Enabler or Operational Risk?', *Parameters*, Autumn 2002, p. 100; Bernd Horn, 'Complexity Squared: Operating in the Future Battlespace', *Canadian Military Journal*, Vol. 4, No. 3, 2003, p. 10; Sarah Miskin, Laura Rayner and Maria Lalic, *Media Under Fire: Reporting Conflict in Iraq*, Department of the Parliamentary Library, Canberra, 2003, p. 15.

[54] Miskin, Rayner and Lalic, *Media Under Fire: Reporting Conflict in Iraq*, p. 108; Center for Defense Information, *The 'CNN Effect': TV and Foreign Policy*, transcript from 7 May 1995, http://www.cdi.org/adm/834/transcript.html, accessed 29 July 2004.

[55] Center for Defense Information, *The 'CNN Effect': TV and Foreign Policy*, television program, 7 May 1995; Belknap, 'The CNN Effect', p. 108.

[56] The Brookings Institution, *'The CNN Effect'*; Center for Defense Information, *The 'CNN Effect'*.

[57] Jeffrey Record, 'Collapsed Countries, Casualty Dread and the New American Way of War', *Parameters*, Vol. 32, No. 2, Summer 2002, pp. 10–14.

[58] Horn, 'Complexity Squared', p. 10.

[59] The notion of the 'strategic private' has been taken from two speeches made by the Chief of the Army Lieutenant General Peter Leahy during 2003: Peter Leahy, 'Chief of Army's Opening Address', *Chief of Army Conference 2003*, http://www.defence.gov.au/army/PUBS/CAspeeches/20031001.pdf, p. 4, accessed 3 August 2004; Peter Leahy, *Address by Chief of Army Lieutenant General P.F. Leahy to Army Class Australian Command and Staff College Weston Creek*, 28 July 2003, http://www.defence.gov.au/army/PUBS/CAspeeches/20030728.pdf, p. 14, accessed 3 August 2004.

Arguably, Private First Class (PFC) Lynndie England became the first strategic private when she was featured prominently in photographs of prisoner abuse at the notorious Abu Ghraib prison in Baghdad. This event not only deeply affected the American public, but also brought the US military's procedures for interrogations and the entire hierarchy of the Defense Department into question.[60] It also had the potential to galvanise anti-American sentiment throughout the Arab and Islamic worlds.[61] Whether or not PFC England was ordered to participate in this abhorrent activity, the circumstances highlighted the fact that the American military remains reliant on poorly paid[62] troops with limited education and inadequate training,[63] and that these personnel can make significant impacts at the strategic level—intentionally or otherwise.

IMPLICATIONS OF RESOURCES

Modern militaries take large amounts of money to raise, train and sustain. In an international system where the importance of human security and transnational threats are in ascendancy, and where many feel that interconnectedness through free markets and trade liberalisation has made conventional conflict seem more and more remote, the demand on Western militaries to do 'more with less' is becoming universal.[64] In

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60 Julian Coman, 'Rumsfeld 'approved' Abu Ghraib tactics', *The Age*, 5 July 2004, http://theage.com.au/articles/2004/07/04/1088879370478.html, accessed 5 July 2004; Seymour M. Hersh, 'The Gray Zone: How a Secret Pentagon Program Came to Abu Ghraib', *The New Yorker*, Vol. 80, Issue 13, 24 May 2004, p. 38.

61 'Abu Ghraib "a win" for terrorists', *BBC News*, 28 June 2004, http://news.bbc.co.uk/1/hi/uk_politics/3848521.stm, accessed 28 June 2004.

62 Senator John McCain, 'They Defend America on Food Stamps', 29 September 1999, http://mccain.senate.gov/index.cfm?fuseaction=Newscenter.ViewOpEd&Content_id=758, accessed 29 March 2004. For assumed relationship between well paid military forces and respect for human rights: United States Congress, *Senate Rpt. 107–156 – Making Supplemental Appropriations for Further Recovery from and Response to Terrorist Attacks on the United States for the Fiscal Year Ending September 30, 2002, and for Other Purposes*, http://www.congress.gov/cgi-bin/cpquery/?&dbname=cp107&&r_n=sr156.107&sel=TOC_199528&, accessed 29 March 2004.

63 While the US military enjoys far higher standards of personnel training than many of the world's militaries, the reservist Military Police involved in the Abu Ghraib scandal have consistently stated that they were not trained in the application of the Geneva Convention. Poor training of military police and interrogators were just some of the systemic problems identified in one of the US Army inquiries into the matter: Eric Schmitt, 'Systemic problems led to Abu Ghraib abuses, US Army report finds', *International Herald Tribune*, 2 July 2004, http://iht.com/articles/527661.html, accessed 5 July 2004. Full US Army reports by Major General George R. Fay and Lieutenant General Anthony R. Jones were accessed at http://www.defenselink.mil/news/Aug2004/d20040825fay.pdf. For further comment on US troops ability to conduct 'hearts and minds' campaign see: Jim Wallace, 'US troops unsuited to win hearts and minds', *The Age*, 20 July 2003, http://www.theage.com.au/articles/2003/07/19/1058545627430.html, accessed 3 June 2004.

64 A discussion of trends in UK Defence spending can be found in Michael Asteris, 'British Defence Spending: Making Choices', *Teaching Business & Economics*, Vol. 8, No. 2, 2004, pp. 5–10; with respect to USAF manning decreases see: Mona Ferrell, 'Jumper Speaks on Decreased Manning', *Air Force Print News Today*, 31 August 2004, http://www.af.mil/news/story_print.asp?storyID=123008536, accessed 3 September 2004.

the end, this is a simple question of economics—limited resources to meet unlimited wants. It would appear that even the world's biggest economy and most noted military industrialist—the United States of America—is not immune.

The Australian experience of this type of downsizing was most acute during the late 1980s and early 1990s with a decline in real-terms of Defence spending to less than two per cent of GDP, and successive reviews of the ADF's structure and capabilities. The most significant of these reviews was the Defence Efficiency Review (DER) which led to the Defence Reform Program (DRP) in the mid 1990s. Faced with issues of dealing with civilian contracts, costs of updating materiel, ageing aircraft and escalating separation rates, the RAAF hierarchy instigated a strategy they called 'soft landing, re-balance and re-shape'.[65] The key issue regarding resource implications is that attempting to operate across the entire spectrum of conflict may be impractical.[66] The downsizing of Western militaries through the 1990s[67] in response to the reduced threat of conventional attack has left many of them unable to deal with the complexity of issues facing them.

THE IMMUTABILITY OF WAR

Despite these observed changes to the nature of conflict, warfare retains many of the characteristics that have been the fodder of strategists since the dawn of time. War remains an intrinsically human endeavour,[68] luck is still a feature of the battlefield, combatants will continue to attempt to avoid the enemy's strengths while taking advantage of their weaknesses, and for every measure there is a countermeasure. These elements are usually distilled into the concepts of 'fog' and 'friction'. To the outside observer these terms might seem innocuous, but their true and often devastating meaning sends a chill down the spine of conventional force commanders. The more a force relies on the absence of fog and friction, the more vulnerable that force is to uncertainty.

In the early hours of 24 March 2003, thirty-two[69] AH-64 Apache gunship helicopters from the 11th Attack Helicopter Regiment (AHR)—an aviation element attached to 5th Corps, US Army for Operation *Iraqi Freedom*—launched for an assault on tanks and artillery emplacements of the Medina Division of the Republican Guard (RG) near Karbalah. What occurred that morning has been used as a touchstone for opponents of

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65 Air Marshall Angus Houston, 'Towards a networked force', presentation to *Defence Watch Seminar*, National Press Club, Canberra, 14 May 2004.

66 Horn, 'Complexity Squared', p. 7; Woodman, 'Beyond Armageddon? The Shape of Conflict in the Twenty-First Century', p. 77.

67 Wallace, 'US troops unsuited to win hearts and minds'; Asteris, 'British Defence Spending: Making Choices', p. 5.

68 Adams, 'Future Warfare and the Decline of Human Decisionmaking', p. 69; Wallace, 'The Ghost of Jomini', p. 125.

69 Numbers differ vastly between sources and even the official US Army lessons learned publication is inconsistent stating both 30 and 32 at different points in the work.

attack helicopters to justify heavy criticism, and eventually for the cancellation of the RAH-66 Comanche armed reconnaissance helicopter program intended to replace the Apache.[70] Every single helicopter that launched on that assault received damage from an assortment of ground fire, mostly consisting of small arms but also rocket propelled grenades (RPGs). One Apache was lost over enemy-held territory, and reports vary as to the possible crash of another helicopter upon its return to base. This degree of damage left the 11th AHR out of action for the rest of major combat operations. Overall the attack was ineffectual with minimal destruction inflicted on the enemy.

Many different theories have been postulated about how this mission came to be such a dismal failure, from tainted fuel through to the coalition's efforts to avoid targeting the electricity grid. Even Intelligence has been blamed for failing to predict the amount of small arms and air defence artillery fire the regiment should have expected, despite the fact that their Intelligence Officer had outlined at length the nature of Iraqi air defence tactics and capabilities in the urban environment. Perhaps the most damning accusation was that the decision to press ahead with the attack in the face of severe complicating factors was based on the fact that 'Many in the regiment felt that if the attack didn't occur on the 23rd, the 11th AHR might not get into the war in a meaningful way'.[71]

What this event displayed was not a failure of attack helicopters in general or the AH-64 specifically. Just days later, Apaches organic to the 101st Aviation Brigade successfully conducted a deep strike against the Medina Division, aided by the inclusion of deep fire artillery, Close Air Support (CAS) and the 'lessons learned' from the 11th AHRs attack. What the 11th AHR's experience can provide is that even with formidable aircraft and sophisticated Intelligence, Surveillance and Reconnaissance (ISR) technologies, troops with small arms concealed by the urban environment are able to render a deep strike worthless.

Another element of the immutability of war that needs to be considered is that of conventional military force.[72] This remains an important element of any operation—including humanitarian, reconstruction or diplomatic efforts—that occurs in a potentially hostile environment. In some cases it is a prerequisite to the operation, such as shaping

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[70] John J. Lumpkin, 'Army Changing Chopper Corps After Setbacks', *Seattle Post-Intelligencer*, 1 August 2004, http://seattlepi.nwsource.com/printer/ap.asp?category=1152&slug=Army%20Helicopters, accessed 8 August 2004.

[71] The most comprehensive analysis of the events of that night are available in Chapter 4 of the US Army's lessons learned publication: US Army, *On Point: The United States Army During Operation Iraqi Freedom*, http://onpoint.leavenworth.army.mil/, accessed 17 August 2004. See also: Lumpkin, 'Army Changing Chopper Corps After Setbacks'; Robert Hewson, 'Apache Operations over Karbala', *Jane's Intelligence Review*, July 2003; Kim Burger and Michael Sirak, 'US Army Reviews the Way it Operates the Apache', *Jane's Defence Weekly*, 21 May 2003.

[72] Kober Avi, 'Military Decision in War: A Framework for Research', *Armed Forces and Society*, Vol. 22, No. 1, Fall 1995, p. 65.

operations to establish peace before peacekeeping can begin; in others it will occur concurrently such as force protection for aid workers. These types of operations are less visible now and sometimes taken for granted because of US dominance. Indeed, continued US dominance in these areas is what drives its adversaries to non-conventional means of operation.[73] This is a negative, unintentional effect of US operations to date that have included a demonstrated inability to deal with guerrilla and terrorist actors.

A key to overcoming this negative effect is to always remain aware of how actions might influence the behaviour of the enemy. If friendly forces cannot immediately effect the desired change in behaviour of the enemy, then keeping him predictable until they can is important. The ideal situation would be to encourage the adversary to think that they have a military advantage in a particular area of combat—one that is readily dealt with by friendly capabilities. The key here is that conventional capabilities remain relevant. Freedom of action over the battlespace is only available where conventional forces have achieved superiority.

CONCLUSION

When discussing the current strategic environment, words like volatile, uncertain, complex and ambiguous are adjectives regularly used. These descriptions are based on the fact that most of the trends that policy makers and defence planners once relied upon to predict the future are now gone. The post-Cold War and post-September 11 periods have presented a number of challenges from a lack of conventional threat against which to plan through to the expansion of activities that the world's militaries are expected to conduct.

This uncertainty and complexity has been magnified by the advent of the information age. This new era of high-speed, global communications has pushed military technology development through the so-called RMA. It has also presented new challenges to policy makers and the military by allowing the world's media to have similar access to global communications. In many respects the 'CNN Effect' has imposed its own imperatives on the conduct of war.

At the same time, resources available to conventional militaries have been dwindling as cuts in defence spending have been felt universally. These forces have had to pursue development across the spectrum of conflict with fewer resources, and have been unable to ignore the continuing importance of conventional force. Furthermore, although technology has promised so much, the fog and friction of war remains, and war is still a human activity, and that means quantity still has quality of its own.

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[73] Australian Defence Force, *Complex Warfighting: Draft Developing Concept*, ADF Future Land Warfare Branch, 7 April 2004, p. 3; Davis, 'An Information-Based Revolution in Military Affairs', p. 88.

Clearly something had to give. In order to face these mounting challenges militaries around the world have developed new approaches to their development and their conduct of operations. The next chapter deals primarily with the Australian approach taken, although many of the concepts are universally applicable and can be found in transformational doctrine for the US and UK.

CHAPTER 2 – DOCTRINAL RESPONSES TO UNCERTAINTY AND COMPLEXITY

More was involved than the ability to use airpower as a killing mechanism. The coalition could use precision-guided weapons…advanced US command and control and targeting assets…[and]…new intelligence assets and targeting planning to severely limit the number of targets it had to strike and then carefully match weapon accuracy and reliability, and the size and effect of the weapon, to the right aim point necessary to destroy the function of a target…. This, in turn, allowed the [coalition] to seek to paralyze and destroy a regime, not bomb a country.

Anthony H. Cordesman[1]

Key Points:

1. At the heart of Australia's future warfighting concept is Multidimensional Manoeuvre, which applies the manoeuvrist approach in five dimensions: breadth, depth, height, time and cognition.
2. Manoeuvre focuses on generating dilemmas for the enemy faster than he can deal with them by operating inside his 'observation-orientation-decision-action loop'.
3. Orientation (a counterpoint to 'knowledge') is central to the OODA Loop because it acts as a lens through which we see the world, shaping the decisions we make and the way we act on those decisions.
4. Effects-Based Operations may be too complex to apply as science, but it is useful as a guiding philosophy for employment of strategic tools from diplomacy through to firepower.
5. Network Centric Warfare will use mission command, informed by situational awareness and enabled by professional mastery, to allow devolution of decision-making down to the lowest levels.

Faced with the dual challenges of expanding demands and dwindling resources, modern militaries have been forced to develop responses aimed at dramatically increasing their efficiency. For the United States, this has been embodied by the concept of Transformation championed by the Bush administration and most notably Secretary of

[1] Anthony H. Cordesman, *The Iraq War: Strategy, Tactics and Military Lessons*, Significant Issues Series, Center for Strategic and International Studies (CSIS), Washington DC, 2003, pp. 28–29.

Defense Donald Rumsfeld. For Australia, a series of documents have formed the 'future warfighting concept' (FWC). In 2002, the *Force 2020* and *The Australian Approach to Warfare* publications set the contextual basis for the final document *Future Warfighting Concept*, released in 2003. In turn these publications—referred to as 'capstone' doctrine—are strategic level guidance designed to inform further doctrine, concept and force development down the chain. At the heart of these new concepts, mirrored by many other militaries throughout the world, are the paradigms of Effects-Based Operations (EBO) and Network Centric Warfare (NCW).

On closer examination of these paradigms, it becomes clear there is nothing particularly 'new' or 'revolutionary' about them. The philosophy behind them is not new; however, they are attempts to focus the application of the art of war in order to leverage capabilities offered by the information age and avoid the traps of past operational failures. It could be argued that both EBO and NCW have existed since the dawn of warfare, or at the very least have been aspired to.[2] Now the West has not only the technology to realise these elusive objectives, but also the requisite impetus.

It is necessary first to examine Australia's FWC and its central tenet of 'Multidimensional Manoeuvre', before discussing EBO and NCW both in generic terms and specifically as they relate to FWC. The key discussion for this chapter is the challenges that these approaches may provide to people at the tactical level of war.

MULTIDIMENSIONAL MANOEUVRE

At the heart of FWC is this notion of 'Multidimensional Manoeuvre'. Although manoeuvre has been central to the art of war since Sun Tzu and used with considerable effect by Napoleon,[3] it was the German *blitzkrieg* in World War II[4] that turned manoeuvre warfare into a coalescent, devastating tactic on the battlefield. The *blitzkrieg* saw its birth on the Western Front of World War I, when combined arms teams were used to punch through weak points along the adversary's trenches. By breaking the static nature of trench warfare, the force was able to generate artificial flanks and also attack

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2 In the case of EBO see Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War*, Information Age Transformation Series, DoD (US) Command and Control Research Program (CCRP), Washington DC, 2002, p. xiv, xxiii (although it should be noted that Dr Smith argues that NCW is a new phenomenon born from the RMA).

3 Manoeuvre warfare is often attributed to Antoine Henri Jomini whose earliest work was first published in 1804–1805 and submitted to Napoleon at around the same time as Napoleon's Ulm campaign in September 1805. The campaign included a classic multi-corps manoeuvre around the adversary Austrian forces to target their lines of communication (LOCs) and cut them off from re-supply. An excellent and concise account of Jomini's work can be found in Martin van Creveld, *The Art of War*, Cassell History of Warfare Series, Cassell, London, 2000, pp. 96–105.

4 Richard J. Pech and Geoffrey Durden, 'Manoeuvre Warfare: A New Military Paradigm for Business Decision Making', *Management Decision*, Vol. 41, No. 1/2, 2003.

rear echelon elements. These tactics induced 'shock' and 'surprise' on the adversary, effectively reducing their ability as a fighting force. These types of actions were enabled by the emergence of three types of forces—tanks, specialist assault infantry and air power.[5]

Manoeuvre, as its name suggests, relies on movement and can be distilled down to 'hitting the enemy at the right time and place'. Manoeuvre has not often been associated with air power in the past because the underlying principles of manoeuvre are inherent within it. Indeed the current RAAF doctrine publication *Fundamentals of Australian Aerospace Power* mentions the term 'manoeuvre warfare' just once and then only in the context of how surface forces operate.[6] While air power has a greater freedom of action to strike at the right place and time, ground forces lack the speed, responsiveness, penetration and ubiquity of air power and must apply manoeuvre as an operational art so as to avoid the trap of conducting attrition-based warfare.[7]

That is not to suggest that air forces are immune from acting in an attritionist manner. Even during Operation *Iraqi Freedom* (OIF) in 2003, coalition air power was at times engaged in attrition warfare, most notably in high-tempo operations against the Medina Division of the Republican Guard (RG) south of Baghdad and the Adnan Division of the RG moving from the north to reinforce them.[8] While land forces use operating doctrine (such as manoeuvre) to avoid attrition warfare, air forces tend to use targeting doctrine (such as EBO).

Attrition warfare can be considered as occurring on a linear or one-dimensional battlespace. Manoeuvre warfare can be envisaged as occurring on a non-linear or two-dimensional battlespace. Theoretically speaking, multidimensional manoeuvre only adds the dimension of information, as it should have always included air power. However, the fact that manoeuvre has been explicitly a doctrine of the army, multidimensional manoeuvre combined with the notion of the 'seamless force'[9] realistically adds both the fifth dimension—cognitive space, and third dimension—vertical space.[10]

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5 Chad G. Clark, 'Trampled Underfoot: The Story of Attack Aviation in the German Spring Offensives of 1918', *Air Power History*, Summer 1998, pp. 18–19; Robert Leonhard, *The Art of Maneuver: Maneuver-Warfare Theory and Airland Battle*, Presidio Press, Novato, 1991, pp. 48–52.

6 Australian Air Publication 1000 (AAP1000), *Fundamentals of Australian Aerospace Power*, Fourth Edition, Aerospace Centre, Canberra, 2002, p. 131.

7 Pech and Durden, 'Manoeuvre Warfare'; Kober Avi, 'Military Decision in War: A Framework for Research', *Armed Forces and Society*, Vol. 22, No. 1, Fall 1995, p. 2.

8 Cordesman, *The Iraq War,* p. 77.

9 Australian Defence Dcotrine Publication D.1 (ADDP-D.1), *Force 2020*, Australian Defence Force, Canberra, 2002, p. 17.

10 The fourth dimension is, of course, time. This is always a feature of war, so is not absent in either attrition or manoeuvre warfare.

In order to understand fully the nature of manoeuvre warfare it is necessary to understand first what is trying to be achieved. Martin van Creveld outlines the following six principles of manoeuvre in his work *Air Power and Maneuver Warfare*:[11]

1. **Tempo.** This is more than just operating quickly, although that certainly is an element of it. Tempo is the ability to generate dilemmas for the enemy at a rate faster than his ability to deal with them. The most commonly used model for describing this is John Boyd's OODA Loop. The OODA Loop consists of Observation, Orientation, Decision and Action (see below). The goal of manoeuvre warfare is to operate 'inside' the enemy's OODA Loop; that is, be able to observe challenges and opportunities in the battlespace and act upon those quicker than the enemy.[12]

2. ***Schwerpunkt.*** This is the ability to apply 'focal effort at the [enemy's] centre of gravity'[13] and according to van Creveld requires a considerable degree of talent on the part of the commander to identify that centre of gravity.[14] *Schwerpunkt* should not be confused with striking at the weakest point of the adversary, rather it is the ability to find weakness around a point critical to the adversary or generate that weakness through the application of the other tenets of manoeuvre.

3. **Surprise.** Deception and ambiguity hold an important place in manoeuvre warfare,[15] particularly to enable the first two tenets of tempo and *schwerpunkt*. Surprise can generate dilemmas for the adversary purely by virtue of presenting him with something unexpected and shortening the timeframe with which he has to deal with it. Deception can force the adversary to behave in a way that leaves his centre of gravity vulnerable to attack.

4. **Combined arms.** Combined arms is an operating philosophy that uses the comparative advantages of each type of weapon system to their greatest effect. A useful analogy is that of 'rock-paper-scissors'—rock defeats scissors, but is vulnerable to paper; scissors beats paper, but is vulnerable to rock.[16] Likewise, the complementary use of infantry, artillery and tanks on the battlefield can dramatically increase the likelihood of victory. Air power has not traditionally been considered as part of combined arms, in

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11 Martin van Creveld, Kenneth S. Brower and Steven L. Canby, *Air Power and Maneuver Warfare*, Air University Press, Maxwell Air Force Base, 1994, pp. 3–7.

12 Australian Defence Doctrine Publication D.3 (ADDP-D.3), *Future Warfighting Concept*, Australian Defence Force, Canberra, 2003, pp. 25–27.

13 van Creveld et al, *Air Power and Maneuver Warfare*, p. 3.

14 Indeed the centre of gravity is not necessarily military in nature and may therefore be more difficult for the military commander to identify.

15 Pech and Geoffrey, 'Manoeuvre Warfare'; ADDP-D.3, *Future Warfighting Concept*, p. 26.

16 van Creveld et al, *Air Power and Maneuver Warfare*, p. 5.

part because of tribalism between the Services leading to different doctrine but also because of the way each Service perceives air power. Land forces have typically viewed air power in two ways: mobility and force protection. Air forces on the other hand have predominantly viewed air power as a strategic weapon.

5. **Flexibility.** This is a tenet readily paid lip service to, but often not completely understood. Flexibility refers to the ability to change activities with little or no notice, with minimal impact on the organisation, and is critical for generating tempo.

6. **Decentralised command.** Manoeuvre requires geographically dispersed forces and thus lengthy lines of communication. Higher echelon commanders, being displaced from their subordinate forces, often lack the fidelity of situational awareness held by the tactical commander. Furthermore, communication methods, particularly in the past, have been cumbersome and vulnerable to attack, making them unreliable. By empowering the tactical decision-maker through decentralised command, the forces can operate with far greater agility and surety than would otherwise be attainable. The changing face of warfare and the battlespace puts this concept under scrutiny.[17]

THE OODA LOOP

An oft used but seldom understood concept with respect to manoeuvre warfare is the OODA Loop, originally developed by a USAF officer, then Captain John Boyd, to teach fighter pilots Basic Fighter Manoeuvres (BFM), or dogfighting. The basic concept was that the ability to change from one manoeuvre to another faster than the opponent was key to success in BFM. Through his time in the USAF, Boyd developed his ideas about decision-making into a concept adaptable to all levels of the military and even in the civilian world.[18] More philosopher than doctrinaire, Boyd had a unique way of presenting his argument.

Ironically, Boyd was treated like a pariah by his own Service but the OODA Loop was elevated to near gospel status by the United States Marine Corps (USMC).[19] Nowadays, the concept is evident in a variety of military strategy around the world including the

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[17] Michael K. Buckland, 'Information Handling, Organizational Structure and Power', *Journal of the American Society for Information Science*, Vol. 40, No. 5, 1989, p. 331.

[18] 'War, Chaos and Business', Kettle Creek Corporation, http://www.belisarius.com, accessed 17 October 2004; Pech and Geoffrey, 'Manoeuvre Warfare'; Chet Richards, *Certain to Win: The Strategy of John Boyd and Business*, Xlibris Corporation, 2004.

[19] Raymond J. Curts and Douglas E. Campbell, *Avoiding Information Overload through the Understanding of OODA Loops: A Cognitive Hierarchy and Object-Oriented Analysis and Design*, unpublished manuscript, 2001, http://www.oslerbooks.com/is/pdf/ooda.pdf, p. 2.

ADF's *Future Warfighting Concept*,[20] the UK MoD's *Network Enabled Capability*,[21] and the US DoD's *Effects Based Operations*.[22]

Unfortunately most publications misrepresent the OODA Loop, so it is necessary to go back to the source for some clarification. There are two critical points of contention. First, most sources underestimate the importance of the 'orientation' step largely because they fundamentally misunderstand it. The second, but related, point of contention is that when one understands the importance of orientation one sees that OODA is not a loop at all. The following quotes have been drawn together from Colonel Boyd's most important work *A Discourse on Winning and Losing*:

1. 'The process of observation-orientation-decision-action represents what takes place during the command and control process—which means that the O-O-D-A loop can be thought of as the C&C loop.'[23]

2. 'Operate inside [the] adversary's observation-orientation-decision-action loops to enmesh the adversary in a world of uncertainty, doubt, mistrust, confusion, disorder, fear, panic, chaos … and/or fold [the] adversary back inside himself so that he cannot cope with events/efforts as they unfold.'[24]

3. 'Orientation is an interactive process of many-sided implicit cross-referencing projections, empathies, correlations and rejections that is shaped by and shapes the interplay of genetic heritage, cultural tradition, previous experiences, and unfolding circumstances.'[25]

4. 'Orientation is the *schwerpunkt*. It shapes the way we interact with the environment—hence orientation shapes the way we observe, the way we decide, the way we act.'[26]

5. '[Orientation] is the most important part of the O-O-D-A loop.'[27]

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20 ADDP-D.3, *Future Warfighting Concept*, p. 27.

21 Ministry of Defence (UK), *Network Enabled Capability: An Introduction*, Ministry of Defence, London, 2004, pp. 12–13.

22 Smith, *Effects Based Operations*, p. 79.

23 John R. Boyd, 'Organic Design for Command and Control' in *A Discourse on Winning and Losing*, 1987, p. 26. Also referred to as 'the Green Book', this is a compilation of briefing slides from Boyd's lectures between 1976 and 1996 and is available from http://www.d-n-i.net/second_level/boyd_military.htm. Hardcopies are available at various libraries, but all prints sighted by the author are of poor quality and match the PDF image available from the cited web site.

24 ibid., p. 7.

25 ibid., p. 15.

26 ibid., p. 16.

27 ibid., p. 26.

From this discussion it can be seen that the Orientation step of the OODA Loop exists continually, acting as a lens through which we see the world, shaping the decisions we make and the way we act on those decisions. Ultimately, orientation is about the way in which people process information.

Knowledge and Information

An important concept that requires introduction is the distinction between information, intelligence and knowledge. Among 'knowledge management' (KM) professionals, the distinction is often illustrated by using the WIKID (Wisdom, Intelligence, Knowledge, Information, Data) ladder. Data is the basic building block of the ladder and is essentially 'symbols with no specific meaning'.[28] Information is data that has been provided with a context,[29] while knowledge is information that has been assimilated by an individual.[30] According to the WIKID model, intelligence is then the product of applying knowledge to information and wisdom is the ability to act on that intelligence and learn from the experience.[31]

The WIKID model is useful more as a guide to understanding the colloquialism of military theorists and knowledge managers than as a tool for understanding cognitive processes. Nevertheless a few important deductions can be taken from the model. First, knowledge cannot be conveyed. Information is the language that we communicate in, with data being the vocabulary. For that information to become knowledge to the receiving party it must be assimilated. Likewise, intelligence only remains intelligence while it exists in the cognitive space of the person who applied the knowledge to information they had received. Intelligence is again conveyed as information.

Information in itself is not actionable except where the individual is given a firm order, and that individual is trained to react to orders instinctively and without question. As will be discussed later, this type of individual is unlikely to be prevalent in the battlespaces of the future. To be actionable, information must be turned into intelligence or knowledge. This is where the potential for information overload comes into the equation.

This knowledge management concept is similar to the educational philosophy of constructivism, which is based on the notion that learners 'construct' knowledge through interactions with their environment, rather than through purely receiving instruction.[32]

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28 Chris Westwood, *The Future Is Not What It Used To Be*, Air Power Studies Centre, Canberra, 1997, p. 27.

29 Ross Dawson, 'Knowledge Capabilities as the Focus of Organizational Development and Strategy', *Journal of Knowledge Management*, Vol. 4, No. 4, 2000, p. 321.

30 Clinton Brooks, 'Knowledge Management and the Intelligence Community', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 16.

31 ibid., p. 27.

32 Alfred P. Rovai, 'A Constructivist Approach to Online College Learning', *Internet and Higher Education*, Vol. 7, 2004, p. 80.

Some types of information lend themselves more readily to assimilation than others, as do some styles of communication. These can be refined into notions of coherence (where the substance of the material fits with the existing cognitive pattern of the individual) and consensus (where the style of the material fits with the existing cognitive pattern of the individual).[33] These concepts will be discussed further in Chapter 5.

With respect to 'consensus', different groups have different norms of communications like colloquialism or the use of acronyms, which are effectively dialects. Even within a single Service, one group of personnel may not understand the vocabulary (including acronyms) of another.

An example of 'coherence' is the use of analogies to communicate and reinforce complex concepts. Analogies are a style of communication that can aid assimilation, and are adeptly used by educators throughout the military. The reason why analogies work so well is that they provide an explanation based on familiar already-understood concepts rather than foreign ones, especially where those foreign concepts might require background understanding that is otherwise nugatory.

From these notions of coherence and consensus it is possible to see that knowledge is not only added to by information the learner receives, but that existing knowledge actively shapes the way in which that information is received. Therefore, knowledge correlates directly to the 'orientation' step in Boyd's loop.[34] This is an important concept for considering how Intelligence providers must interact with their customers. It is also an important step back up the chain towards Multidimensional Manoeuvre, by establishing the relationship between 'information dominance' and 'decision dominance'.

Information, Decision Dominance and Multidimensional Manoeuvre

Prescribed goals of next generation strategy appear to vacillate between 'information dominance' and 'decision dominance'. One camp—let us call them 'infophiles'—see the key to multidimensional manoeuvre as lying in the ability to collect and communicate more timely, relevant and accurate information than the adversary.[35] This is the notion of information dominance. The other camp—let us call them 'OODA-philes'—observes that the key lies in the ability to use that information to generate the tempo dilemmas of multidimensional manoeuvre. This is decision dominance. Further generalisations about these groups can be made.

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[33] Francis Heylighen, 'Epistemological Constructivism', http://pespmc1.vub.ac.be/CONSTRUC.html, accessed 21 July 2004.

[34] Curts and Campbell, *Avoiding Information Overload through the Understanding of OODA Loops*, p. 4.

[35] William A. Owens, 'Intelligence in the 21st Century', *Defense Intelligence Journal*, Vol. 7, No. 1, 1998, p. 27; Dennis M. Nagy, 'A Military Intelligence Knowledge Base and Knowledge Management: Cultural Factors', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 40.

The infophile tends to push the requirement for more collection assets using better technology and higher bandwidths. This relates back to the 'science' approach to warfare described in Chapter 1. The OODA-phile, while recognising the importance of information to the decision-making process, believes it is the 'art' of war that remains paramount and that decisions have to be made with imperfect information in confusing circumstances under severe time constraints. The addition of the cognitive dimension to manoeuvre warfare—thereby generating multidimensional manoeuvre—means information dominance is ideal but never sufficient. To dominate the cognitive dimension, one must have decision dominance. It is now necessary to examine how the next generation of strategies proposes to provide this dominance to the warfighter: Effects-Based Operations and Network Centric Warfare.

EFFECTS-BASED OPERATIONS

Effects-Based Operations (EBO) represents the pinnacle of military strategy, and when combined with other disciplines in a whole-of-government approach—culminating in a National Effects-Based Approach (NEBA)[36]—is the pinnacle of national strategy. EBO is a philosophy that galvanises the essence of strategy by focusing first and foremost on what the desired outcome of the operation actually is. It espouses all the most important elements of the finest military thinkers since the dawn of time.

As stated in Chapter 1, Sun Tzu declared five estimates that need to be conducted of both oneself and the enemy. By knowing oneself and the enemy, Sun Tzu claimed a battle was either won or lost well before taking to the battlefield, and the measure of the finest general was where victory could be achieved without joining battle at all.[37]

Some two millennia later, Clausewitz described how war was merely an extension of diplomacy[38] and its ultimate goal was to change the behaviour of the adversary.[39] EBO embraces these philosophies directly; its objective is to force the adversary to behave in the way you wish them to,[40] and it does so by using a very deep understanding of the adversary's culture, intent, doctrine and capabilities to identify points of leverage—similar to *schwerpunkt*—and guide the appropriate activities.

EBO is of greater importance in the way it has us think than in the way it has us act. This can be observed from two very specific points. Firstly, EBO consistently encourages us to assess our actions against our objectives. Rather than blindly applying lethal

36 ADDP-D.1, *Force 2020*, p. 22.

37 Sun Tzu, *The Art of War*, translation by Yuan Shibing, Wordsworth Reference, Ware, 1993, p. 25.

38 Carl von Clausewitz, *On War*, translation by Michael Howard and Peter Paret, Princeton University Press, Princeton, 1976, p. 87.

39 ibid., p. 75.

40 Smith, *Effects Based Operations*, p. 109.

military force to destroy enemy combatants, EBO encourages tailoring activities across a broad spectrum of disciplines to achieve the desired effect.[41] This reduces the chance of engaging in an attritionist style of warfare that could prove costly and inefficient.[42] Secondly, EBO forces us to at least try to think about how the enemy will react to our actions. This is probably the greatest challenge to the practical implementation of EBO.

A fundamental element of EBO as it is being developed at this point is the Operational Net Assessment (ONA). The ONA provides a formal structure for the collection and analysis of information relating to the adversary elite, the population, the environment and neutral elements including bordering countries, Non-Government Organisations (NGOs), and global media.[43] This analysis would be used to determine effects that need to be applied to achieve the desired outcome. Moreover, the ONA then bridges Intelligence with planning and operations.

The nature of the ONA makes it an incredibly complex undertaking with literally an infinite number of variables at play. Furthermore, the ONA will need perfect or near-perfect information on each of these variables if it is to be used to predict the second- or third-order effects that will be generated—those effects, intentional or otherwise that flow on from the initial effect.[44] Clearly this approach to identifying desirable effects is somewhat similar to the approach of identifying the *schwerpunkt*—it relies on an element of elan, finesse and instinct on the part of the commander. The ONA cannot in itself provide all the answers for targeting in the campaign.

ONA bridges planning and operations through continuing re-assessment and refinement. A campaign planner is not, nor should they be, expected to develop the perfect plan and then put it in place to run its course untouched. The age-old adage of 'no plan survives first contact with the enemy' aside, the ONA relies on ongoing operational assessment to identify weaknesses in the ONA and adjust it accordingly.[45] This approach relies on friendly tempo and flexibility and thus returns us to the OODA Loop.

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41 ibid.

42 Owens, 'Intelligence in the 21st Century', p. 32. Not all attritionist approaches are negative. At some point in a campaign lethal force may need to be applied; elements of enemy forces may need to be destroyed, buildings may need to be struck with heat, blast and fragmentation weapons. These are essentially attritionist approaches and are necessary in certain circumstances to achieve higher order strategic effects.

43 Joint Warfighting Center, *Doctrinal Implications of Operational Net Assessment (ONA)*, Joint Doctrine Series, Pamphlet 4, United States Joint Forces Command, 2004, pp. 8–14.

44 A first-order effect might be to destroy the adversary's power supply, with the deliberate second-order effect being to limit his command and control capability. An obvious undesired second-order effect from this action might be to harm the civilian populace. Smith, *Effects Based Operations*, pp. 311–20.

45 ibid., pp. 353–56.

NETWORK CENTRIC WARFARE[46]

> Hell, I don't know what network-centric warfare is! I know what I need to do–I need to put the cursor on the target … You have to track 'em down one at a time and take 'em out. That's what I mean by 'cursor over the target'.
>
> General John P. Jumper (USAF), Chief of Staff[47]

Finding a robust definition of Network Centric Warfare (NCW) is difficult, even among the official publications on the matter. This is in part due to the fact that NCW is a concept still largely under development, and also because different people (using their different 'orientation') perceive the benefits of NCW in different ways. As with the RMA and the information/decision dominance arguments, different views of NCW are based on the relative importance of technology, doctrine and humans.

The Technology or 'Infophile' Perspective. According to the technology perspective, NCW is about using high-speed communications to network the entire force, allowing not only huge amounts of information to be shared among sensors and shooters within the area of operations (AO), but also allowing 'reachback' to communicate with elements held outside the AO.[48] This not only limits the forces put into harm's way, it allows elements within the AO to have greater transparency of the battlespace. Enabling technology for this includes satellite communications, tactical internets, global intranets, chat rooms and remotely piloted vehicles.[49]

The Doctrine or 'OODA-phile' Perspective. NCW is about generating adaptable, flexible forces that can respond quickly to challenges and opportunities as they emerge in the battlespace. This concept is taken from organisational changes in the private sector in the 1980s and 1990s that sought to flatten hierarchical structures to make them more responsive.[50] In order to achieve this organisational agility a number of doctrinal

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46 This discussion has relied heavily on a recent DSTO report that provides an excellent first-cut of issues affecting human factors in NCW: Leonie Warne, Irena Ali, Derek Bopping, Dennis Hart and Celina Pascoe, *The Network Centric Warrior: The Human Dimension of Network Centric Warfare*, DSTO Report to Future Warfare and Concepts, Defence Science Technology Organisation, Canberra, 2004.

47 Quoted in Rod Hafemeister, 'Jumper Wants Better Tech for Troops', *Intelligence, Surveillance & Reconnaissance Journal*, 12 May 2004, http://www.isrjournal.com/story.php?F=2911812, accessed 2 June 2004.

48 Ronald F. Sams, *Testimony on Air Force Fiscal Year 2005 ISR Programs*, Senate Armed Forces Committee, 7 April 2004, United States Senate, Washington DC, p. 2.

49 Alfred Kaufman, *Curbing Innovation: How Command Technology Limits Network Centric Warfare*, Argos Press, Canberra, 2004, p. 40.

50 Francis Fukuyama and Abram N. Shulsky, 'Military Organization in the Information Age: Lessons from the World of Business' in Zalmay Khalilzad, John P. White and Andrew W. Marshall (eds.), *Strategic Appraisal: The Changing Role of Information in Warfare*, RAND, Santa Monica, 1999, pp. 330–340; Warne et al, *The Network Centric Warrior*, p. 3.

tools must be employed, and humans at the tactical level must be empowered to make decisions for the entire network. This is van Creveld's notion of 'decentralised command' for manoeuvre operations writ large, and is supported by the ADF's 2004 publication on NCW. Under this doctrinal approach to NCW, the technological enablers merely create a collaborative space in which decision-makers can generate shared 'situational awareness' and act upon that with clear knowledge of what needs to be achieved.

The reality of NCW probably lies somewhere between the two perspectives. So far the focus has been on the technical dimension,[51] largely because the technical dimension is easier—it does not specifically demand organisational or cultural change, it can just make current ways of operating faster. The doctrinal and human dimensions in turn can also exist without the technical dimension. They are, after all, purely organisational and cultural shifts. However, the greatest advantage of NCW can be made through the meeting of the two perspectives by leveraging the technology to enable the doctrine, and using the doctrine to unlock the full potential of technology.

One way the doctrine can be used to unlock the full potential of the technology is that at its very heart is the notion that humans in the system must innovate. This is a doctrine that demands innovation, demands tactical decision-making, demands thinking personnel. This doctrine is ultimately anti-dogma. In order to fully understand the doctrinal element of NCW, it is necessary to look at the doctrinal building blocks of the concept—professional mastery, situational awareness, mission command and self-synchronisation.

Professional Mastery

At its most basic, professional mastery really equates to competence in performing the functions that one is charged with. The distinction of warfighting as a profession[52] means that such competency extends beyond physical skills to encompass cognitive skills also. Professional mastery has always been an important aspect of success in the battlespace, but Australia's future warfighting concept in general, and the NCW concept in particular, elevates professional mastery to an imperative.

Professional mastery requires not only a high level of competence among all members[53] but also an understanding of other members' tasks and responsibilities, and how those fit into their own performance.[54] Professional mastery represents a degree of 'knowledge' and 'orientation' and is thus developed through a mix of training, education and

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51 Australian Defence Doctrine Publication D.3.1 (ADDP-D.3.1), *Enabling Future Warfighting: Network Centric Warfare*, Australian Defence Force, 2004, p. v.

52 Samuel P. Huntington, *The Soldier and the State*, Harvard University Press, Cambridge Massachusetts, 1957.

53 ADDP-D.3.1, *Enabling Future Warfighting: Network Centric Warfare*, s2.7.

54 ibid., s2.8.

experience.[55] The complexity of the future battlespace makes professional mastery yet another challenge to the modern warfighter.

Situational Awareness

> Shared situational awareness develops as people absorb information, collaborate to understand its implications and then acquire a shared view of the situation at hand.
>
> ADDP-D.3.1 – *Enabling Future Warfighting: Network Centric Warfare*[56]

The term 'situational awareness' (sometimes referred to as simply 'SA') is an interesting piece of military jargon. At first glance it would appear to be a very basic concept: knowing about the environment around you. However, there is no implicit depth of understanding, nor any indication of the complexity or nature of the environment to be understood.

In military parlance, particularly in the fighter world, SA is a critical commodity. Senior fighter pilots are lauded for being 'SA kings' because they can handle complicated environments and tactics more readily than junior aircrew, while a person or event that causes a distraction is said to 'suck SA' away from you. In many respects having situational awareness will directly affect your success or failure in battle.

Situational awareness is more than just knowing where friendly and enemy forces are located. If the 'system' or network can detect it through geospatial Intelligence systems such as radar or imagery, then it can be communicated to the nodes of the network. With current technology, information from multiple sensors can even be automatically fused, disseminated and displayed on cockpit data screens. This displayed picture does not directly correlate to situational awareness. As with Intelligence, the information contained in the picture must be absorbed by the operator, and then analysed by applying existing knowledge.

The challenge here is twofold. Firstly, information on displays must be delivered in a way that is easily understood by the user, or they may become overloaded when the situation becomes too complex. This is really a question of ergonomic design of the 'displays' that now include aural as well as visual signals, and the familiarity the aircrew have in using those. Secondly, it is extremely difficult to communicate intent-based Intelligence such as Communications Intelligence (COMINT) or Human Intelligence (HUMINT) through visual displays.[57]

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55 ibid., s2.7.

56 ibid., s2.21.

57 Jim Wallace, 'The Ghost of Jomini: the Effects of Digitisation on Commanders and the Workings of Headquarters' in Michael Evans and Alan Ryan (eds.), *The Human Face of Warfare: Killing, Fear and Chaos in Battles*, Allen & Unwin, St Leonards, 2000, p. 127; 'More Art Than Science', *Intelligence, Surveillance & Reconnaissance Journal*, 1 May 2004, http://www.isrjournal.com/story.php?F=2881187, accessed 2 June 2004.

For instance, the location of a vehicle may be represented on a screen by an icon overlaying a map or similar graphical representation of the battlespace. Movement can be displayed through the use of arrows and 'track histories' showing the path of the vehicle up until that point in time. If that vehicle directly threatens the aircraft, perhaps through the emission of a radar signal used to support a missile, then a directional aural warning can be used to alert the aircrew to the direction the threat is coming from. For tactical leadership, the individual targets locked by friendly radar can be displayed to prevent two aircraft engaging the same target. These events are far easier to display because they represent a largely known quantity: what has occurred in preceding minutes and what is occurring at that point in time. It is far more difficult to display 'possible' future events based on Intelligence of the enemy's intent. Furthermore, this type of information is usually delayed, as it has to be analysed and assessed, usually by a human, before being put into a format suitable for dissemination.[58] Therefore, predicting enemy activity at the tactical level remains largely the responsibility of the tactical decision-maker such as fighter aircrew.

Australia's NCW construct envisages the collaboration achieved will be used to develop shared situational awareness and consequently speed up what it calls the 'decision-action cycle'[59]—that is the OODA loop. The difficulty with this approach is that all too often people fall into the trap of equating better situational awareness with more information. The ADF's NCW concept paper largely avoids this pitfall by comprehensively covering the challenges posed by the next generation strategies.[60] Situational awareness is only useful if it enables the use of mission command and self-synchronisation.

Mission Command

> The ADF needs its people to be capable of acting in the absence of processed information from external sources, as much as it requires commanders to use information to maximum advantage and effect.
>
> ADDP-D.3.1, *Enabling Future Warfighting: Network Centric Warfare*[61]

'Mission command' is effectively delegation of responsibility for the conduct of parts of the operation and is predicated on the clear construction and communication of 'commander's intent'.[62] According to the ADF's NCW concept paper, mission command promotes flexibility by allowing for individual initiative. Individual

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58 Wallace, 'The Ghost of Jomini', p. 127.

59 ADDP-D.3.1, *Enabling Future Warfighting: Network Centric Warfare*, s1.6.

60 ibid., Chapter 3.

61 ibid., s2.9.

62 Louis E. McNamara, 'Riding the Information-Revolution Tiger', *Aerospace Power Journal*, Vol. 15, No. 3, Fall 2001.

initiative is particularly important where there are time constraints, information from the network to superior commanders is distorted by dislocation or communications are unreliable.[63] As with many of the concepts discussed so far, mission command is not new. The Australian Army in particular has used this type of command authority to achieve redundancy within fighting elements. By understanding what the commander wishes to achieve from an engagement and what the tasks of other sub-elements are, an element that achieves its own tasking can then independently assist other formations as required.

The ADF's NCW concept states that collaboration unifies actions in order to achieve the commander's intent.[64] It later states that the amount of information that is available to commanders is a challenge in itself,[65] but fails to say why. It could be assumed this challenge comes from the potential of information overload, or that an over-dependency on information might lead to inaction where the picture is incomplete.

Self-synchronisation

Synchronisation refers to the ability to focus available tools, such as combined arms, to generate effects in the battlespace at the right time and place.[66] Self-synchronisation uses mission command, informed by situational awareness and enabled by professional mastery, to allow devolution of synchronisation down to each tactical decision-maker. This empowers those decision-makers to identify challenges and opportunities in the battlespace and deal with them quickly and appropriately, not only with their own tools, but also through collaboration with other elements.

CONCLUSION

The philosophical basis for Australia's response to the complexity and ambiguity of the current strategic context is Multidimensional Manoeuvre as embodied in the *Future Warfighting Concept* publication. Much is to be done in developing the practical implementation of this concept, but some key features of it already provide an insight into the opportunities and challenges the ADF will face in the future. Multidimensional Manoeuvre applies the tenets of manoeuvre warfare, seeking to use tempo to generate dilemmas for the adversary at a rate they cannot deal with, and strongly values surprise and deception. This is warfighting's answer to 'work smarter not harder'.

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63 ADDP-D.3.1, *Enabling Future Warfighting: Network Centric Warfare*, s2.9; Buckland, 'Information Handling, Organizational Structure, and Power', p. 331.

64 ADDP-D.3.1, *Enabling Future Warfighting: Network Centric Warfare*, s1.4.

65 ibid., s2.8.

66 ibid., s2.25; Kenneth F. McKenzie Jr, 'Fighting in the Real World', *Marine Corps Gazette*, Vol. 78, No. 3, March 1994.

Multidimensional Manoeuvre extends manoeuvre warfare beyond the physical realm and applies it fundamentally to the cognitive dimension. Rather than using the traditional notions of centres of gravity, the concept uses EBO to determine the types of activity that will force a change in the adversary's behaviour. This in itself presents a challenge due to the depth of understanding that the ADF will need to have of the adversary's culture, infrastructure and government apparatus.

In order to orchestrate this ambitious plan, the ADF has chosen NCW as its fulcrum for enabling Multidimensional Warfare. The 'Network' in Network Centric Warfare should not be confused for simply a communications network, although that too will be a necessary element. The Network is a web of people, a web of human decision-makers. Platforms will physically replace the human in the battlespace, but for the foreseeable future people will retain decision-making control. At its most evolved, the people within this web will be empowered by situational awareness and commanders intent to innovate responses to the emerging battlespace, independent of centralised command and control if need be.

This approach will demand an evolved degree of professional mastery. The network will rely on a high degree of training and education from each of its members so they can form ad hoc teams and self-synchronise to identify and respond to challenges and opportunities as they arise. Boyd's OODA Loop and knowledge management's WIKID ladder have been introduced here to provide insight into what drives tempo-based operations such as Multidimensional Manoeuvre. 'Orientation', the combined wealth of our education, culture and experiences, lies at the heart of decision-making. This is also the essence of 'knowledge' in the knowledge management model. These two concepts (although they are really one in the same) are pivotal for the ability of the human in the system of systems not only to cope with the flood of information, but to thrive in it.

The next chapter looks at that flood of information and increased responsibility expected from one group of humans in the network: fighter pilots. It looks at how the current strategic outlook demands the efficiency of aircraft able to conduct several different roles, and how the future might place even more demands on them.

CHAPTER 3 – THE MULTI-ROLE IMPERATIVE AND ITS CHALLENGES FOR THE WARFIGHTER

The great thing about air fighting is that the decisive factor does not lie in trick flying but solely in the personal ability and energy of the aviator. A flying man may be able to loop and do all the stunts imaginable and yet he may not succeed in shooting down a single enemy. In my opinion the aggressive spirit is everything…

Manfred von Richthofen (The Red Baron)[1]

Key Points:

1. Technological advances have changed the focus of cockpit workload from flying to tactical decision-making.
2. Australia's strategic environment dictates that the RAAF needs to be expeditionary and this places demands on basing availability.
3. Multi-role aircraft increase the efficient use of ramp space and provide inherent flexibility to the force.
4. Dynamic re-tasking efforts such as Time Sensitive Targeting (TST) provide the force with greater agility to deal with emerging targets.
5. Aircrew of multi-role fighter aircraft must be prepared for more roles, more threats, more targets and more operating environments than any other warfighter.

Having examined the strategic and operational trends confronting the future warfighter, it is now necessary to look at the tactical ramifications of those trends and the challenges they present. This is an important discussion for determining the Intelligence requirements of fighter aircrew in this future.

As with the previous chapters, the recurring theme is one of complexity. While technological developments have fundamentally reduced the pilot's requisite physical coordination to control the aircraft, the roles they are being asked to conduct are expanding. This has come about in part due to expeditionary air forces remaining reliant on land-based aircraft, and the basing for those aircraft coming at a premium. The limited availability of 'ramp space' and the evolving nature of any conflict mean that

[1] Manfred von Richtofen, *The Red Air Fighter*, translation by T. Ellis Barker, Greenhill Books, London, 1990, p. 105.

each member of a coalition must justify their use of aircraft accommodation through being multi-role, providing 'niche' capabilities, or preferably both.

The future warfare concepts such as Network Centric Warfare (NCW), Effects-Based Operations (EBO), and Multidimensional Manoeuvre discussed in Chapter 2 demand even more of the warfighter. One process that has emerged to allow for flexible application of effects at high tempo is time critical or time sensitive targeting (TCT/TST). This requires aircraft to be re-tasked at short notice, potentially changing not only the role being conducted but also the geographic area being operated in. This has implications for the threat environment that the aircrew face, the rules of engagement and laws of armed conflict to be applied, and the force mix that is compiled including control agencies, air-to-air refuelling and other enabling capabilities. The multi-role fighter aircraft covers more territory, more tasks, more threats, more target sets, and more force mixes than any other platform. The environment faced by multi-role fighter aircrew is therefore intrinsically more complex than that of any other warfighter.

This chapter opens by looking at advances in automated systems and ergonomics that have changed cockpit workload. It then examines the imperative for multi-role aircraft in future warfare, before discussing the impact that this has on the operator. The discussion is then used to inform an analysis of the Intelligence requirements of multi-role fighter aircrew in order to mitigate the impact of complexity.

AUTOMATION AND COCKPIT WORKLOAD

The nature of cockpit workload has changed dramatically since aviation's humble beginnings at Kitty Hawk. It has seen a gradual evolution from finesse hand and feet coordination through to near-complete automation of flight controls. Today, more than ever, aircrew have become tactical battle managers rather than pilots. Developments in the automation used in cockpits have included those to make control of the aircraft easier, enhance pilot performance of cockpit and weapon management tasks, reduce fatigue and increase survivability.[2]

Efforts to simplify control of the aircraft include hydraulics replacing mechanical linkages, 'fly-by-wire' using electric cables to relay flight control inputs to the control surfaces, and flight control systems that automatically adjust control surface deflection during different regimes of flight to maximise efficiency and minimise risk of stalling or overstress. Autopilot systems have been introduced to reduce the requirement for lengthy periods of concentration thereby preventing boredom and allowing aircrew to focus on mission related tasks. Auto-land systems are now being developed and fielded to reduce the risk of accidents particularly for recovery on aircraft carriers or during

[2] Wesley A. Olson, *Identifying and Mitigating the Risks of Cockpit Automation*, Wright Flyer Paper No. 14, Air Command and Staff College, Maxwell Air Force Base, Alabama, 2001, p. 1.

extreme weather. These systems may also reduce stress loads on aircrew, enabling them to perform better in subsequent missions.

Cockpit displays have improved from simple analogue dials and monochrome cathode ray tubes to multi-function colour screens with pilot selectable content. Now cockpit information and even imagery can be displayed on helmet visors, and various types of information is delivered aurally. Hands on Throttle and Stick (HOTAS) systems improve cockpit and weapon management tasks by limiting the times a pilot has to take his hands off of the controls or look inside the cockpit. Computer-aided bombing has significantly increased the accuracy and ease of delivery of both precision and non-precision weapons.

In many cases, these systems come with an additional training burden. All of the basic methods of operating the aircraft still have to be taught to pilots and the effective use of these systems, while yielding immeasurable improvements in performance, takes considerable extra tuition. For example, because HOTAS relies on instinctive use of buttons, switches and cursors, aircrew must be intimately familiar with the function of each through practice.[3] Pilots of older or less sophisticated aircraft may need to look inside the cockpit to make certain selections, but it takes less familiarity with the aircraft because the pilot can identify the switch by its label and then activate it. However, once HOTAS is ingrained into the pilot, effectiveness is exponentially improved. A graphical representation of this is at Figure 1.

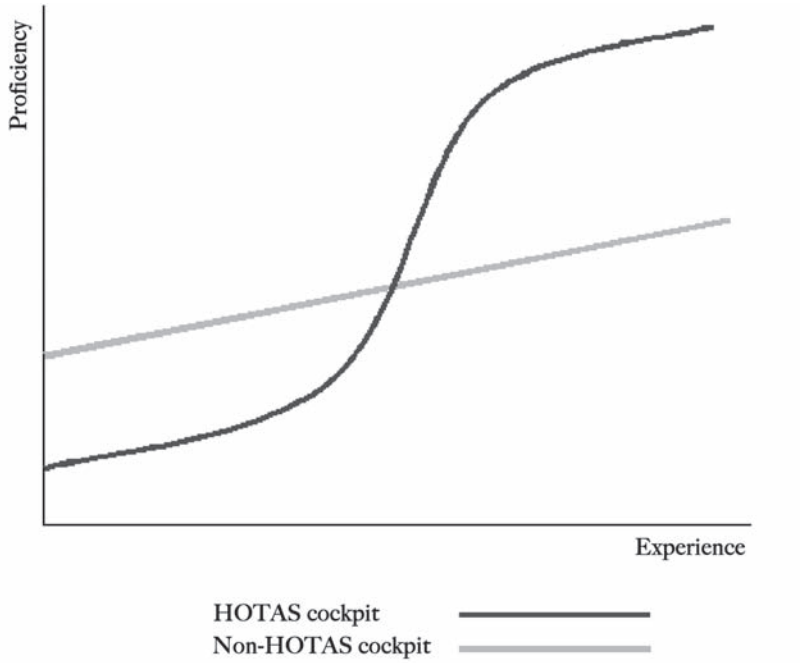

Figure 1 – Proficiency/experience comparison between HOTAS and non-HOTAS cockpits

[3] Anthony Thornborough, *Modern Fighter Aircraft Technology and Tactics*, Patrick Stephens Limited, Sparkford, 1995, pp. 72–73.

Another example of pilot aides requiring greater familiarity is the 'helmet mounted cueing system'. Original designs of these systems found in Soviet fighter aircraft such as the MiG-29 Fulcrum or Su-27 Flanker family had extremely rudimentary reticles that allowed the pilot to cue high off-boresight missiles with head movement. This enabled the pilot to lock onto an adversary and fire his missile at the full limit of the missile's seeker, rather than be limited by other cueing sensors such as radar.[4] Modern systems, however, are far more complicated and attempt to display a greater deal of information to the pilot, including flight data, weapons cueing and sensor imagery. Unfamiliarity with the particular helmet-aircraft interface and the way it displays information can lead to disorientation that at best limits pilot efficiency and at worst can lead to controlled flight into terrain.[5]

The change in cockpit workload has allowed pilots to take their improved situational awareness and apply it in decision-making. Eventually the automation of the cockpit will lead to the removal of the human from aircraft altogether, as can be observed with the emerging Uninhabited Aerial Vehicle (UAV) programs. The intent is not to remove the human dimension from warfare, rather to enhance human contribution by applying it in the most important areas. The sorts of roles we will ask aircrew—and UAV operators—to perform are inherently more complex than those of simply controlling aircraft.

THE MULTI-ROLE IMPERATIVE

Globalisation and the uncertainty of the current and foreseeable security environment have led to the requirement to project force globally and the birth of the concept of the 'Air Expeditionary Force'. Although the Air Expeditionary Force (AEF) is a United States Air Force (USAF) construct to project force,[6] the RAAF has also adopted the notion of being 'expeditionary'.[7] This has evolved from two key observations. Firstly, the close relationship between Australia and the US and the recent propensity of the Australian Government to commit to international 'coalitions of the willing' has shown that the RAAF must be able to deploy and sustain elements of the force well away from Australian bases and far beyond Australia's area of direct military interest. Secondly, Australia's geographic circumstances mean that operations in defence of Australia will occur in the remote north, where infrastructure and basing is sparse. Furthermore,

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4 Lon O. Nordeen, 'A Half-Century of Jet-Fighter Combat', *eDefense*, 1 January 2004, http://www.defenseonline.com/article.asp?print=1&idarticle=784, accessed 31 August 2004; Sanu Kainikara, 'Russian Combat Aircraft: Concept of Operations, Future Employment and Implications', *Air Warfare Conference 1999*, Air Operations Division DSTO, RAAF Williamtown.

5 James R. Vogel, Marian C. Schultz and James T. Schultz, 'The Effect of Human Factors on the Helmet-Mounted Display', *Air & Space Power Journal*, Vol. 18, No. 1, Spring 2004.

6 Also variously known as Aerospace Expeditionary Force or Air and Space Expeditionary Force. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, United States Air Force, 2003, pp. 59–60.

7 Air Marshal Angus Houston, 'Towards a Networked Force', *Defence Watch Seminar*, National Press Club, Canberra, 14 May 2004.

most of the RAAF's aircraft are based in south-eastern Australia. This means that even operations from Australian soil are likely to be 'expeditionary'.[8]

The classic form of power projection is the aircraft carrier, but there are several limitations on the use of these that mean land-based aircraft are going to remain a feature of the future battlespace. The cost of acquiring, maintaining, sustaining and defending aircraft carriers is prohibitively expensive for all but the major powers, and even then a distinction must be made between 'blue water' capabilities such as those operated solely by the United States Navy (USN), and non-blue water capabilities operated by the UK, France and Russia, and aspired to by India and China. The nature of carrier operations places strict limitations on weight and size of aircraft, while at the same time placing additional demands on aircraft design to withstand the rigours of launch, recovery and salt spray—demands that actually increase the weight of the aircraft. These weight requirements have ramifications for fuel—in both capacity and consumption—payload and avionics. It is interesting to note that Joint Strike Fighter (JSF) development was plagued by efforts to reduce weight for the carrier and short takeoff vertical landing (STOVL) variants, and solutions to those problems appear to have come largely from reduction in payloads.[9]

Fuel limitations impact range, payload and the amount of time the aircraft can remain 'on-station'. While fighter aircraft operating from carriers are a vital element of US air operations, they remain heavily reliant on air-to-air refuelling. Air-to-air refuelling capabilities organic to carriers are naturally limited by the same weight/fuel/payload limitations as the other carrier aircraft. As a result, these capabilities are only able to 'top up' aircraft just after launch or during holding patterns to ease time pressures prior to recovery. These are effectively administrative tools allowing for a greater concentration of launches and recoveries, and do not substantially increase the loiter time or range of aircraft. As evidenced by the 2003 conflict in Iraq, USN carrier-based aircraft are reliant on the larger, land-based air-to-air refuellers.

In order to project enough air power, the US has two further capabilities at its disposal—'global assets' and the AEF. The most common global assets in the US inventory are those USAF aircraft able to operate from bases well outside the area of operations or even from continental US. These aircraft include bombers like the B-1B, B-52 and B-2, and Intelligence collection assets like the RQ-4 Global Hawk UAV. As well as long ranges these aircraft have very large payloads, allowing the Global Hawk to carry multi-mission sensors and the bombers to strike dozens of targets in one mission, or even during a single bombing pass. Bombers capable of striking anywhere in the world from a home base represent a costly and politically sensitive capability, outside of the scope of most major power—and all middle power—militaries.

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8 ibid.

9 Robert Hewson, 'Joint Strike Fighter: Happily Ever After?', *Jane's Defence Weekly*, 13 October 2004.

The AEF facilitates the global deployment of other essential USAF assets to temporary bases on foreign soil. These assets include more than just land-based tactical fighter aircraft. Capabilities in high demand but low density (oft referred to as 'niche capabilities') are also deployed including command centres, search and rescue units, air-to-air refuellers and Intelligence, Surveillance and Reconnaissance (ISR) aircraft.[10] Land basing clearly allows for more space and a wider variety of aircraft than using aircraft carriers, but it comes with its own limitations.

Due to the political sensitivity of hosting foreign forces for combat operations, it can be extremely difficult to secure necessary memorandums of understanding. Compromises over basing may limit the types of assets that can be deployed, aircraft accommodation (or 'ramps') that can be used, or even hours of the day operations can be conducted. Another challenge for land basing is aircraft dispersal, revetting or hangars for force protection. These can dramatically increase the amount of space required for deployed forces.

Clearly it is not possible to acquire unlimited basing for aircraft. For any complex operation it is likely 'real estate' for the basing of aircraft will be a limiting factor. Multi-role aircraft present a means of relieving this burden by making better use of the available space, and also allowing the force to 'adapt' as the conflict progresses. An aircraft able to conduct counter air missions early in the operation when there is a possibility enemy aircraft may threaten friendly forces, and then change to conducting counter land missions when there is no longer any enemy air threat allows greater numbers of counter land missions to be conducted without rotating aircraft types.

This has led to a considerable departure from the trend of fighter development up to the 1970s where most manufacturers were producing specialised aircraft to have superiority in a single role. The F-16 was designed to be a light, agile dogfighting aircraft, whereas the F-15 with its large and powerful radar and corresponding payload of long-range missiles was designed for wider area control of the air. The A-10 was heavily armoured, slow and well armed—ideal for its intended role of ground attack. The F-111 and F-117 provided surgical strike, but did not have radars sufficient to perform more than the most rudimentary air-to-air combat.[11] Similar developments could be observed among USN aircraft, European aircraft developers and the Soviet Union.[12]

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[10] Christopher J. Bowie, *The Anti-Access Threat and Theater Air Bases*, Center for Strategic and Budgetary Assessments, Washington DC, 2002, pp. 15–18.

[11] Indeed, the F-117 was never fitted with radar. This is in keeping with its very specialised role as a low observable or 'stealth' strike platform—emissions from radar could easily alert enemy air defences to its location. Moreover, the design requirements for its stealth characteristics make it unsuited for manoeuvre associated with air combat.

[12] Kainikara, 'Russian Combat Aircraft'; Michael Fiszer and Jerzy Gruszczynski, 'Eyes of the Eastern Eagles: Fire-Control Systems for Russian Tactical Strike Aircraft', *eDefense*, 1 February 2003, http://www.edefenseonline.com/article.asp?print=1&idarticle=1090, accessed 31 August 2004.

Improved technology and an acknowledgement of the benefits of self-escorting strike aircraft[13] led to the development of two multi-role fighters: the F-15E Strike Eagle—a development of the F-15 air superiority fighter—for the USAF; and the F/A-18 Hornet for the USN. Other aircraft followed suit, with the F-16 first being retro-fitted for radar-guided missiles, and then later with variants including vastly improved radars, and was able to cover a comprehensive range of roles including strike, air control and even Suppression of Enemy Air Defences (SEAD). The USN's F-14 Tomcat, originally designed for fleet air defence, was modified to conduct reconnaissance and carry precision-guided munitions. In Operation *Enduring Freedom* over Afghanistan in 2001, F-14s operated for the first time in the Forward Air Control (FAC) role.[14]

Russian aircraft manufacturers also attempted to expand the roles to be conducted by their aircraft, particularly as a means of making them more attractive for their customers around the world. Some limited air-to-ground capability had been included in most Soviet built fighters during the Cold War, but these capabilities were strictly limited to non-precision weapons ('dumb' bombs) and were difficult to employ. Subsequent attempts to make the MiG-29 air superiority fighter into a multi-role aircraft[15] largely failed due to the outdated nature of the avionics and the extremely short range of the aircraft. However, the advent of the Flanker family of fighters from Sukhoi represent the beginnings of the first truly multi-role Russian fighter aircraft.[16]

During Operation *Iraqi Freedom* in 2003, the multi-role imperative was driven home to force planners of the coalition. A potential threat from Iraq's Air Force could not be ruled out, particularly against high value assets such as air-to-air refuellers and ISR aircraft, so air defence fighters were tasked to protect those aircraft around the clock. This tasking was predominately shared between Royal Air Force (RAF) F-3 Tornados, USAF F-15C Eagles and RAAF F/A-18 Hornets in the opening days of the war. Of these three types, only the Australian F/A-18s were able to carry air-to-ground weapons. Furthermore, they were able to carry those air-to-ground weapons at the same time as their requisite air-to-air loadout. This provided a considerable degree of flexibility in the tasking of the F/A-18s—flexibility that was used on the very first night of 'shock and awe' when a pair of RAAF F/A-18s were directed to bomb a target of opportunity near Al Kut in Iraq's south-east. As it became clear that the Iraqi Air Force was not a threat (especially after most of their bases had been secured by land forces) the F/A-18s were able to be shifted to dedicated air-to-ground tasking. This was

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13 Self-escort is where a strike aircraft is able to adequately protect itself from adversary aircraft, without the need for specialised air combat aircraft.

14 Robert Wall, 'F-14s Add Missions in Anti-Taliban Effort', *Aviation Week & Space Technology*, 19 November 2001, p. 38.

15 Fiszer and Gruszczynski, 'Eyes of the Eastern Eagles'.

16 Douglas Barrie and Alex Komarov, 'Multirole Appeal: Russian Air Force Edging Away from Single-Role Aircraft as Upgraded Platforms Arrive', *Aviation Week & Space Technology*, 2 February 2004, p. 56.

not the case for the F-3 and F-15C contingent. In developments since *Iraqi Freedom*, the F-3 has been slated for withdrawal from service to be replaced by the Eurofighter Typhoon—which will (eventually) be a multi-role aircraft—and the USAF has stated its intentions to fit the F-15C with an air-to-ground munition such as the satellite-guided Joint Direct Attack Munition (JDAM).[17]

Furthermore, the F-22 program intended to replace the F-15C as an air superiority fighter was expanded to include air-to-ground capabilities,[18] partly in recognition of lessons learnt from *Iraqi Freedom*, but also in an effort to protect the program from further budget cuts that threatened its future. Again, by expanding the number of roles that an aircraft can perform, the platform can be made more attractive to potential buyers—in this case the US Congress.[19]

It should be noted that this is not a situation limited to fighter aircraft. Recent developments across all aircraft have begun to include more and more roles. During Operation *Allied Force* over Kosovo and Serbia in 1999, USN P-3 maritime patrol aircraft launched standoff air-to-surface missiles. The RAAF AP-3 serving in support of Operation *Iraqi Freedom* was used not only to reconnoitre small boat traffic in the tight waterways leading to Iraq's vital ports, but also to provide ISR pictures to land forces on the Al Faw peninsula. B-52, B-1B and B-2 bombers can all now conduct Close Air Support (CAS), either through the use of JDAM or on-board laser targeting pods. Air-to-air refuellers, both in duty and under development, are going to be fitted with a variety of sensors to contribute to the bigger ISR picture. Tactical fighter aircraft can carry small reconnaissance pods to assist ISR, or use their targeting pods to provide what has been dubbed non-traditional ISR (NTISR).[20]

Perhaps most notably, the current program to develop the USAF's next generation of manned ISR platforms—the E-10[21]—is a fundamentally multi-role aircraft originally envisioned to perform the functions of E-8 JSTARS,[22] E-3 AWACS, EC-130, several variants of the RC-135, and to replace the sorely missed Airborne Battlefield Command Control Center (ABCCC).[23] Due to difficulties deconflicting the gamut of

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17 Michael Sirak, 'US Looks at Bomb Role for F-15Cs', *Jane's Defence Weekly*, 21 May 2003.

18 The fighter has now been renamed F/A-22 in recognition of its multi-role development. Congressional Research Service, *Iraq War: Defense Program Implications for Congress*, Library of Congress, Washington DC, 2003, p. 34.

19 Brendan P. Rivers, Ted McKenna and Pulkit Singh, 'Raptor: Right or Wrong?', *eDefense*, 28 July 2004, http://www.edefenseonline.com/article.asp?print=1&idarticle=1016, accessed 31 August 2004.

20 Major General Ronald F. Sams (USAF), *Testimony on Air Force Fiscal Year 2005 ISR Programs*, Senate Armed Forces Committee, 7 April 2004, United States Senate, Washington DC, p. 2.

21 'E-10 Development Gathers Steam', *Intelligence, Surveillance & Reconnaissance Journal*, 1 May 2004, http://www.isrjournal.com/story.php?F=2881199, accessed 2 June 2004.

22 Joint Surveillance and Target Attack Radar System.

23 Gerald F. Perryman Jr, 'ISR Imperatives', *ISR Journal*, March/April 2003.

electromagnetic signals the program has now been scaled back to encompass just air-to-ground radar and the passive SIGINT collection capabilities of RC-135 Rivet Joint.[24] The 'back end' will consist of modularised payloads of operator consoles based on the required mission, one of which will be an airborne version of the AOC. The system is likely to be complemented by a wide range of smaller specialist aircraft to replace the existing AEW&C and Information Operations aircraft. There are many clear benefits to this approach. Firstly, the US will be effectively able to deploy three or four times as much ISR/ABCCC capability into a theatre of operations. Secondly, it creates a degree of redundancy[25] among those platforms in use and can cover a wider window of operations. The communications bandwidth required to relay the generated ISR picture to the wider network will place a further burden on the already constrained network.

Directly related to this bandwidth challenge is the fact that despite its large size, the E-10 will mean fewer personnel on board per role to conduct initial analysis and assessment of the information being collected. Some of this slack will be picked up by automation of processes but humans remain a critical part of the Intelligence processing,[26] and the lack of initial 'triage' analysis to ensure relevance will mean large volumes of unprocessed data will need to be piped into the network.[27]

This situation is analogous to the multi-role fighter. Many of the tenets of NCW and EBO rely on staff being able to collaborate and provide the commander with the best assessment of courses of action. This situation is premised on the commander having both the necessary quantity and quality of staff and the time in which to collaborate with them. These are not commodities available to the fighter pilot. Figure 2 represents the relationship between urgency of task and the cognitive process used. As urgency increases, the ability to collaborate reduces and the commander is then more reliant on his or her own knowledge.

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24 It should be expected that due to the current US focus on ballistic missile defence that launch detection equipment similar to that of the RC-135 Cobra Ball aircraft would also be included.

25 Dennis Lewis, 'Supporting Close Combat: Intelligence Synchronisation', *Military Intelligence Professional Bulletin*, Vol. 29, No. 1, January–March 2003.

26 Stephen K. Iwicki, 'Synchronized Chaos: Visualization, Integration, and Dynamic Thinking', *Military Intelligence Professional Bulletin*, Vol. 29, No. 1, January–March 2003.

27 Glenn W. Goodman Jr, 'ISR Comes to the Forefront: Networking is the Next Key Step', *Intelligence, Surveillance & Reconnaissance Journal*, http://www.isrjournal.com/story.php?F=328039, accessed 3 September 2004.

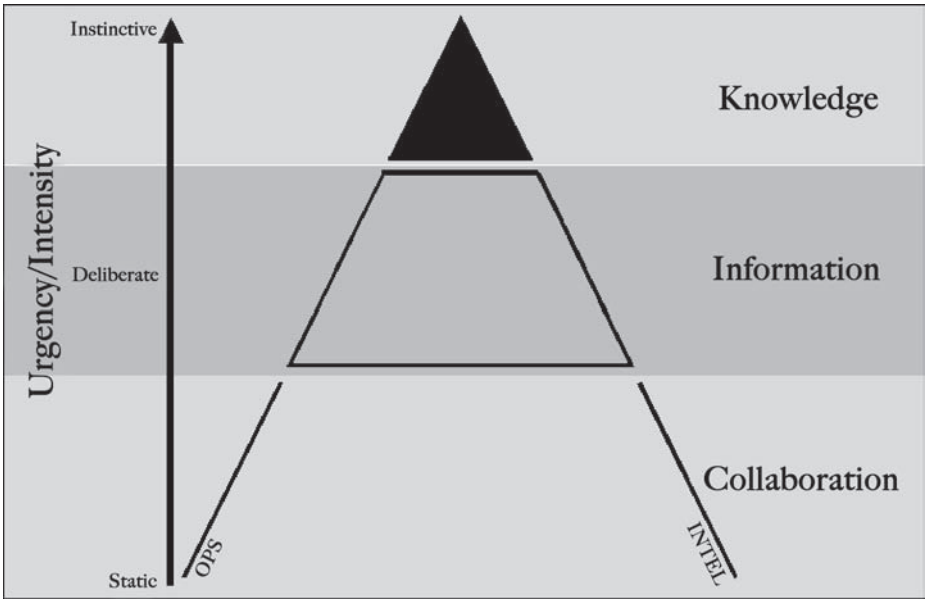

Figure 2 – Collaboration pyramid – impact of urgency/intensity of task on cognitive process

The development of 'collaboration spaces' in NCW aims to firstly allow 'staffs' to be geographically displaced and then allow those staffs to interact more efficiently. This allows collaboration to be used in higher urgency tasks. This shift is shown in Figure 3. A collaboration space among tactical decision-makers is generated through systems like intra-flight datalink which passes information among members of a formation of aircraft. However, while the fighter pilot is able to collaborate to a better extent with other aircrew, he or she does not have direct access to Intelligence staff, lawyers, logisticians, public affairs officers or any of the other staff that a commander sitting in a headquarters has. Furthermore, certain tasks within the cockpit continue to rely on near instinctive application of training—such as aircraft emergencies and manoeuvres to counter threats—that do not allow for collaboration in any sense. All of this processing must be done 'on-board', which for a single-seat fighter such as the RAAF F/A-18 or the JSF means in the cognitive space of one person.

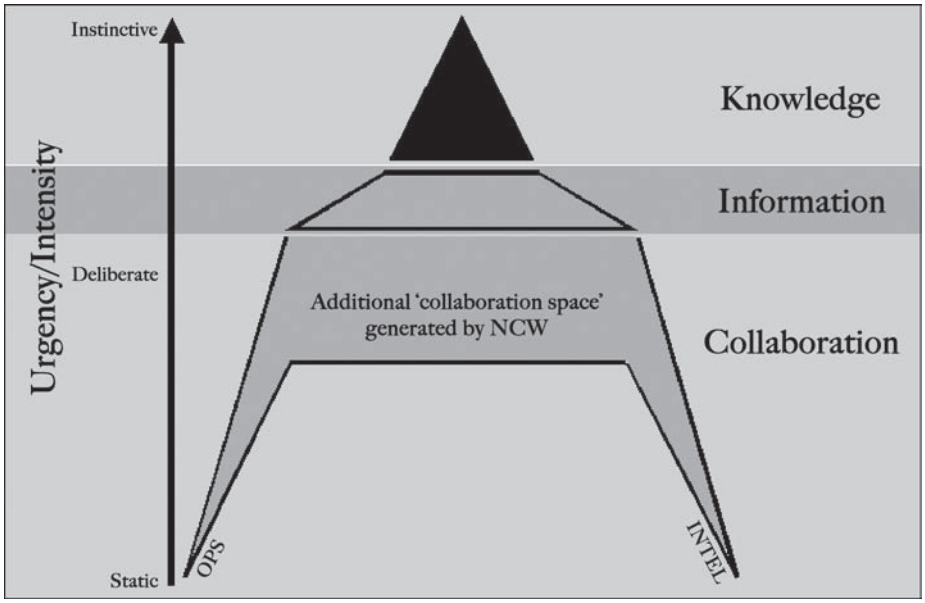

Figure 3 – Collaboration pyramid – impact of NCW on 'collaboration space'

The use of multi-role platforms provides a force with a degree of inherent flexibility to adapt to meet the natural ebbs and flows of war. Clearly, having a multi-role aircraft does not mean having multi-role capability—you must also have multi-role aircrew.[28] Even with the ever improving user-friendly nature of cockpits, the demands on aircrew to meet the multi-role requirement are high. One further doctrinal development takes multi-role adaptability a step further into swing-role fluidity—Time Sensitive Targeting.

DYNAMIC RE-TASKING OF MULTI-ROLE AIRCRAFT

The desire to increase the tempo and flexibility of operations has meant commanders are likely to want to re-allocate aircraft at short notice to prosecute targets of strategic value. Quite often, these are of fleeting nature and may only be available for targeting for a handful of minutes after detection.[29] In the past this has meant either re-tasking aircraft prior to launch or having aircraft on airborne standby for allocation to tactical level 'commanders', such as Forward Air Controllers (FACs).

The problem with re-allocating aircraft prior to launch is that it still takes considerable time for those aircraft to transit into the battlespace—often in the order of hours. Meanwhile, allocation of aircraft to airborne standby, such as for 'on-call' Close Air

[28] Charles D. Dusch Jr, 'Anaconda Offers Lessons in Close Air Support', *Proceedings*, United States Naval Institute, Vol. 129, No. 3, March 2003.

[29] 'Networking Will Drive ISR Success', *Intelligence, Surveillance & Reconnaissance Journal*, 8 December 2004, http://www.isrjournal.com/story.php?F=328035, accessed 3 September 2004.

Support (CAS), requires additional assets and may not be the most efficient use of available resources.[30] This has led to the demand for dynamic re-tasking of assets by operational or strategic level commanders, known colloquially as Time Sensitive Targeting (TST) or Time Critical Targeting (TCT).

In order to conduct TST, a force requires the following attributes:[31]

a. **Robust C4ISR.** An improved Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) network evolved from efforts such as NCW is vital to allow for the acquisition and identification of targets of opportunity, re-tasking of elements in flight, and post-strike assessment.[32]

b. **Supporting doctrine and procedures.** Complicated operations such as TST require strong supporting doctrine and procedures so that disparate personnel have as unified an understanding of their responsibilities as possible. Doctrine deals with longer-term understanding of processes, while shorter-term procedures, such as Special Instructions (SPINS), Targeting Directive (TD) and Rules of Engagement, provide guidance on the tactical and operational application of that doctrine.

c. **Freedom of action.** Air superiority allowing friendly air power freedom of action over the battlespace is necessary so formations can operate independently of the protection provided by larger packages. Air superiority must also include self-protection from (or absence of) ground-based threats.

d. **Near-continuous aircraft availability.** Closely associated with the freedom of action requirement is the need for platforms to be available to apply the necessary effects in an appropriate timeframe. Coalition operations over Afghanistan and Iraq had the requisite air superiority and were thus able to operate in small elements around the clock, rather than be limited to 'vulnerability' windows. Aircraft with greater persistence in the battlespace—such as heavy bombers and uninhabited aerial vehicles fitted with air-to-ground munitions—provide another way of achieving this near-continuous availability, but once again rely on a prerequisite degree of air superiority.

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30 CAS is used to support ground forces that often require short-notice firepower. This differs from the dynamic re-tasking being discussed here in that it is under tactical control, usually with an extremely well-informed controller, whereas TST are operational/strategic efforts that arise very rarely in any given timeframe and which are likely to be based on imperfect intelligence.

31 The discussion here assumes the use of air power for conducting TST, which is not necessarily the case. TST can be conducted by any element able to bring force to bear on the enemy in a short period of time, including land and maritime forces.

32 William A. Owens, 'Intelligence in the 21st Century', *Defense Intelligence Journal*, Vol. 7, No. 1, 1998, p. 33; 'Networking Will Drive ISR Success'.

e. **Proficient aircrew.** Assuming any aircraft tasked with such a role is capable of performing it, then the aircrew must be proficient in the conduct of that role, and familiar with the aforementioned doctrine and procedures. This means preparation for a combat mission may require preparation of several missions at once, over a much larger area. This increases the workload of aircrew prior to and between missions, and may lead to detrimental levels of stress being placed on personnel.

CONCLUSION

Strategic requirements for force projection and the continuing reliance on land-basing for tactical aircraft as well as 'heavy' force multiplier aircraft has led to the 'multi-role imperative'. The ability to conduct many different roles, especially on the one mission, makes more efficient use of scarce ramp space. It also provides the force with an inherent degree of flexibility to adapt to changing circumstances as a conflict progresses.

The roles and responsibilities of aircrew are changing and this has occurred in part because of the availability of technology (although, as seen in Chapter 1, this too can be seen as a strategic context) but largely due to the strategic challenges posed by the 21st century and the military's doctrinal responses to those drivers. The fighter pilot, once just another means of keeping an aircraft in the air, has evolved to become a tactical commander empowered to make decisions of operational and strategic significance. Not only must he or she concern themselves with self-preservation in a complex environment, they also have to make command decisions, lead formations, command packages of aircraft (pre-planned or ad hoc) and be ready to transition to different missions in different locations at short notice. Merely having multi-role aircraft is not sufficient—aircrew must be multi-role also.

Dynamic re-tasking of aircraft through procedures such as TST is increasing in popularity among military commentators and commanders. There are a number of challenges associated with the use of TST, but conducting appropriate planning and putting necessary procedures in place can mitigate most of these. For the purpose of this discussion the most critical challenges are those facing aircrew and tactical Intelligence. As alluded to above, TST increases the complexity of mission preparation, not only with respect to the role being conducted but also the geographic operating area. The aircrew of a multi-role fighter operating under a doctrine that includes TST must be prepared for more roles, more threats, more targets and more operating environments than any other person in the battlespace.

The next chapter examines where the Intelligence Officer fits into this equation and what pressures this new environment places on them. Not only does it generate a more complex set of considerations for Intelligence support, it may bring into question the very relevance of the Intelligence trade in the postmodern battlespace.

CHAPTER 4 – TIMELY, ACCURATE AND RELEVANT: EVOLVING CHALLENGES FOR INTELLIGENCE

Simply providing people with information may not be helpful, particularly today when we are all overloaded with information.

Clinton Brooks[1]

Key Points:

1. To be of value to the warfighter, Intelligence support must be accurate, timely and relevant.
2. Increased tempo and complexity of operations makes it far more difficult to deliver timely Intelligence support.
3. Intelligence Officers may suffer a crisis of relevance, but could have a role in helping prevent aircrew Information Overload.
4. Strategic uncertainty or ambiguity diminishes the Intelligence system's capacity to prepare aircrew for operations.
5. Complex threat environments and tasking for fighter operations increases the information environment of aircrew, and hampers the ability for Intelligence Officers to provide timely, relevant and accurate support.

The inherent relationship between Intelligence and operations means that the challenges faced by the warfighter are effectively replicated for the Intelligence Officer (INTELO). A common paradigm used to describe the relationship is that the decision-maker is a customer of the Intelligence provider.[2] This is useful for giving focus to the activities of the Intelligence system in general and INTELOs in particular. By applying the observations from the previous chapters it is possible to determine many of the challenges that are going to face tactical air Intelligence in the future battlespace.[3]

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1 Clinton Brooks, 'Knowledge Management and the Intelligence Community', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 17.

2 William M. Nolte, '"Information Control is Dead: What's Next?": The Knowledge Management Challenge for the Intelligence Community in the 21st Century', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 12; Margaret S. MacDonald and Anthony G. Oettinger, 'Information Overload', *Harvard International Review*, Vol. 24, No. 3, Fall 2002.

3 Dennis C. Blair 'The Future of Intelligence Support to the Armed Forces', *Defense Intelligence Journal*, Vol. 4, No. 2, 1995, p. 7; Stephen L. Caldwell, 'Defense Intelligence Training: Changing to Support the Warfighter', *Defense Intelligence Journal*, Vol. 4, No. 2, 1995.

The mantra of the Intelligence professional is 'timely, accurate and relevant',[4] but the questions that need to be asked are how timely, how accurate and how do we know what is relevant? There is obviously a balance required between taking time to assemble the perfect picture and getting the information to the customer with the necessary degree of urgency. The currently anticipated Revolution of Military Affairs (RMA) provides ever-improving Intelligence collection and more reliable and rapid means of information dissemination, but ironically it places greater burden on the Intelligence provider than ever before and may even bring the future of tactical air Intelligence into question.

This chapter begins by establishing the most critical challenge to future Intelligence and how it will adjust the imperatives for Intelligence providers. It will then revisit observations from previous chapters that represent direct challenges to tactical Intelligence providers with respect to timely, accurate and relevant delivery of Intelligence. The role of Intelligence in the sensor-to-shooter cockpit is going to change. The shift will only be subtle and in many respects marks a return to what Intelligence should have always been.

THE STATUS QUO

As it currently stands, the focal point for Intelligence in the Royal Australian Air Force (RAAF) is direct support to operations. At the operational level this is performed through participation in the targeting process and the accumulation, fusion and dissemination of common operating pictures in centralised headquarters. This effort is assisted by the more palpable efforts of the Intelligence, Surveillance and Reconnaissance (ISR) assets, such as ground-based air defence radar, over-the-horizon radar, AP-3C Maritime Patrol Aircraft (MPA) and, eventually, the Wedgetail Airborne Early Warning and Control (AEW&C) aircraft and RQ-4 Global Hawk Uninhabited Aerial Vehicle (UAV). These are the assets owned and operated by the RAAF that are used to directly support the Air Component Commander (ACC) and Joint Force Commander (JFC) conduct of the campaign, but feeds can also include national/strategic assets, such as those operated by the Defence Signals Directorate (DSD) and the Defence Imagery and Geospatial Organisation (DIGO), as well as other coalition assets as agreements permit. Obviously, the assets available to coalitions incorporating the US are far more diverse.

At the tactical level, support to operations comes in the form of mission support—those Intelligence services provided in direct support of individual sorties. The exact nature of this support varies from platform to platform, but the approach described here

[4] Michael C. Taylor, 'Benchmark for Intelligence Transformation', *Military Intelligence Professional Bulletin*, Vol. 29, No. 1, January–March 2003; Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, United States Air Force, 2003, p. 54.

is illustrative of many of the common requirements.[5] Theoretically, mission support is a standardised process consisting of three discrete phases of INTELO to aircrew interaction: the mission-planning brief, the pre-launch update and the post-flight debrief. In reality a far more ad hoc and fluid approach to provision of Intelligence is required.

A squadron conducting operations is busy and time constraints can be severe. At any one time the unit may be conducting each of its different mission types, sometimes during the same sortie. Aircrew have to contend with lengthy missions, truncated planning times, limits on the length of their work day and the routine requirements of the body such as eating and sleeping. There are also the corresponding stress loads associated with conducting operations over hostile territory. In spite of efforts to standardise Intelligence provision in this environment, a degree of flexibility is going to be required. Nevertheless, the three distinct phases do provide all of the fundamental elements of mission support, and understanding these provides insight to the question of timeliness, accuracy and relevance.

The Mission Planning Brief

After the squadron receives its tasking, members of an assigned formation (or their proxy representatives) will gather to conduct the necessary preparation for the upcoming sortie. The degree of preparation required varies depending on the type of mission being conducted, how standardised the procedures are and how familiar the aircrew are with the operating environment.[6] For multi-role fighter aircraft, the general rule is deliberate strike takes the most planning, with offensive air support next. Counter air missions take the least amount of planning. There are a number of challenges that become evident immediately.

Firstly, in both Australian and US doctrine, tasking is released every 24 hours with a single Air Tasking Order (ATO) covering the entire 24-hour block of following operations. This can generate discrepancies between the planning time available to sorties at the start of the ATO 'day' and that available to sorties at the end. The complexity of the battlespace, and the corresponding complexity of trying to coordinate missions into that battlespace mean ATOs can—and often do—get released late, further restricting the time available to those first missions on the ATO.[7] This situation can lead to particularly high rates of workload, meaning this may not be the most effective time to be teaching aircrew about the inner workings of the new surface-to-air missile observed operating in the theatre.

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5 This is based on a standardised approach used by No 81 Wing Intelligence Section up to the time of Operation *Falconer* in Iraq. No 81 Wing operates F/A-18 Hornets, and provided one squadron (No 75 Squadron) plus wing and operations centre support staff to Operation *Falconer*.

6 Karlene H. Roberts, Suzanne K. Stout and Jennifer J. Halpern, 'Decision Dynamics in Two High Reliability Military Organisations', *Management Science*, Vol. 40, No. 5, 1994, p. 615.

7 Indeed some long endurance aircraft such as Maritime Patrol Aircraft (MPA) and the USAF's global assets can be airborne well before the ATO is released.

Secondly, the nature of multi-role aircraft operations means a number of missions may have to be planned for the single sortie. This may be as simple as including preparation for counter air operations during a self-escorted strike sortie, through to the potential for dynamic re-tasking in flight that could lead the formation to an entirely different part of the AO, conducting a very different type of task, and coordinating with a different set of supporting capabilities.

As stated in Chapter 3, the aircrew of multi-role aircraft have to cover more territory, more threats, more targets and more tasks than any other warfighter in the battlespace. The preceding discussion serves to demonstrate the impact of that complexity on the information environment of the fighter pilot during mission planning. Enter the Intelligence staff who must now inform the aircrew on the adversary's form, ability and intent within this complex environment.

The mission planning brief contains a wide number of factors that need to be conveyed to the aircrew for them to undertake planning. In an ideal environment the brief is shared across a number of functions within the mission planning cell including INTELOs, Ground Liaison Officers (GLOs), Imagery Analysts (IAs), Legal Officers and operations staff. The exact format will vary depending on personal preferences, but should open with an overall picture of the current situation for both friendly and enemy forces. This is intended to provide a context within which the mission is to occur, and for the application of the commander's intent by understanding the commander's priorities. A more detailed picture of the operating environment, tailored to expected operating areas, is then given. The target or anticipated target areas are introduced to the aircrew and a threat picture is provided.

The threat picture will include the early warning capability of the opposing force; the surface-to-air threat—both fixed and mobile—air-to-air threat; and other forms of threat, such as electronic attack. Finally, the brief should also include meteorological factors and any changes to procedural and legal guidelines such as Special Instructions (SPINS), Airspace Coordination Order (ACO), Rules of Engagement (ROE) and Targeting Directive (TD). Although certain circumstances—particularly during exercises—may require the INTELO to perform most or all of this brief, the priority for the INTELO should always remain the threat picture.

Under past constructs of how operations would be conducted, the provision of Intelligence to even the most complicated mission—deliberate strike—could be restricted through the knowledge of ingress and egress routes and of course the target area itself. In this way, the INTELO's criterion of 'relevance' was more readily met due to geographic limitations on the mission, and the briefing could be curtailed to contain the shortest and simplest picture possible. The increased complexity of missions demanded by the factors described in preceding chapters, generate corresponding complexities for the threat picture. INTELOs will effectively be required to provide threat pictures and target details for several different missions across large swathes of the AO—if not the

entire AO—under tight time constraints. Having the time to convey this information is one issue, but making it stick in the minds of overworked aircrew is another.

The Pre-Launch Update

While the mission planning brief is intended to occur as many as three hours prior to 'walk'—the time at which the aircrew plan to head out to their aircraft—the pre-launch update is an opportunity to inform aircrew of Intelligence that has become available since the original brief. The key difference between the two briefs then is the degree to which the information can be assimilated and turned into knowledge/orientation. In the ideal case, the Intelligence provided in the mission planning brief will have already been used in a practical sense, thus aiding its assimilation by aircrew. The Intelligence provided in the pre-mission update, however, is last minute advice constituting little more than information/observation.

The trap for even the most experienced of INTELOs is to be descriptive of the threat environment—that is, detailing all of the events of the preceding days of the conflict—with the only 'relevance' qualifications being that it has occurred since the last briefing of those aircrew and it has ramifications to the mission at hand. This approach risks making tactical INTELOs mere mouthpieces for the reporting compiled at the operational level.

This criticism of tactical air Intelligence is made all the more scathing by the fact that much of the Intelligence that they will convey in the pre-launch update will be several hours old. Add to this the timeframe from briefing to launch, and then the often lengthy transit into the battlespace, and the Intelligence provided to the aircrew is going to be at best six hours old, and quite likely more. Once in the battlespace, however, the aircrew of Network Centric Warfare (NCW) or sensor-to-shooter aircraft will be bombarded with all manner of real-time information and near real-time Intelligence. This degree of information availability has the potential to nullify immediately much of the benefit of any pre-launch briefings.

Post-Flight Debriefing and Reporting

After the mission has been conducted the INTELO is responsible for debriefing the aircrew on what occurred during the mission, and then compiling the mission report (MISREP). The mission report is the only formal reporting made from the flight and, although the requirements are laid out by the coalition air Intelligence system, the reports enjoy far wider readership among the operational hierarchy. This was particularly the case during Operation *Falconer* where the mission reports from No 75 Squadron were used by the Australian national command element to remain abreast of the results from missions. The mandated deadline for their production made the mission reports a particularly useful tool for this as they were disseminated in a timely fashion.

The mission reporting process is intended first and foremost to provide Intelligence data and initial Battle Damage Assessment (BDA) to the Air Operations Centre (AOC) for compilation into the broader operational assessment and common operating picture.[8] The reports are highly structured and require very specific types of information in order to minimise time taken to compile the report, and maximise the value of its content. The dichotomy of readers means the mission report holds an awkward place in the eyes of its producers. On one hand, the urgency required to release the report so it remains valuable to the AOC means the picture portrayed is not always complete for the purposes of operational assessment that might be desired by other interested readers. If those other readers fail to appreciate the true purpose and nature of the reporting requirements, then higher headquarters may misinterpret the fragmented nature of the material.

Three other challenges arise from the post-flight debriefing and reporting process. Firstly, the information is effectively being relayed second-hand to the AOC. This means the observations during a mission are first interpreted by the aircrew, then verbalised to the INTELO who places his or her own interpretation on the observations before passing that material on to the AOC in the form of the mission report. This reporting chain can generate schisms of understanding similar to the childhood game of 'chinese whispers'. Another challenge closely related to this is that in order to get the most out of the debrief, the INTELO needs to know what questions to ask to prompt more detailed explanations, and aircrew need to be familiar with the format and purpose of the debrief so they can pro-actively provide the best feedback.

Finally, as with the information flow into the cockpit, reporting made by the aircrew while in the battlespace—either automatically through datalink or by voice to the various command agencies—would appear to largely negate the value of the debrief to the operational level. The Intelligence gleaned from debriefing will already be several hours old before it reaches the AOC and thus of questionable value. However, experience from the major air campaigns since the end of the Cold War has shown the limited capacity of the ISR architecture to keep up with the BDA requirement, and that during high tempo operations BDA gained from weapon system video and the post-flight debrief may be the only indication of the success of any strike undertaken. This change in the focus of mission reporting means the process is no longer an Intelligence function, but rather an operational analysis tool.

WHITHER TACTICAL AIR INTELLIGENCE?

As can be seen from the discussion above, air force INTELOs at the tactical level will suffer a crisis of relevance in the future battlespace. Traditional mission support tasks,

[8] H.B. Keightley, *Intelligence Support to Air Operations*, Air Power Studies Centre, Canberra, 1995, p. 31.

such as the mission planning brief, pre-launch update, and post-flight debriefing and reporting, will lose their significance as more information can be shared directly between operational level command agencies and the tactical warfighter. Time constraints on these processes, particularly pre-mission, will mean the information provided will stay just that: information. The aircrew will not have enough time to assimilate the information, and in some cases the use of proxy planners conducting planning in the place of the aircrew that actually conduct the mission will mean they have even less opportunity to work with the information—a critical process that allows people to turn that information into knowledge. Furthermore, the fact that everybody in the battlespace will be expected to apply intelligence processes, thereby becoming INTELOs in every respect but job title, might suggest the waning importance of tactical air Intelligence.[9] Finally, the almost certain end of manned combat aircraft means tactical air Intelligence may quickly run out of customers and thus its very *raison d'être*.

So the question remains, what is the role of specialised tactical air Intelligence, if any, in the future? In order to answer this question it is necessary to return to Boyd's Observation-Orientation-Decision-Action (OODA) Loop as explained in Chapter 2. Given the extremely complex information environment facing aircrew during preparation for missions, the risk of information overload has increased.

To prevent information overload a two-prong approach is required. New information constitutes the 'observation' step of the OODA Loop and must be presented in a way that complies to the coherence and consensus measures. Next, aircrew must have the necessary 'orientation' to accept, analyse and assimilate it for use during the mission. For the most part, operational information tends to be more readily assimilated by aircrew due to their familiarity with it. Moreover, such operational information, while extensive and complicated, is a knowable quantity; that is, it is factually correct, and the complete body of knowledge is available in the form of manuals, orders and instructions. This is not the case for other types of information that may be open to interpretation (such as ROE or commander's intent) or are not entirely/reliably complete and accurate (such as Intelligence).

Intelligence professionals have always been required to tailor their product for consumption by their customers (how well they do this is another matter) and this speaks directly to the criterion of 'relevance'. However, the role of the INTELO in constructing the orientation of their aircrew, thereby imbuing them with the ability to accept, analyse and assimilate information more efficiently, has not been widely identified. This second concept represents the future of tactical air Intelligence. RAAF INTELOs will be more instrumental in developing the knowledge of their customers rather than merely bombarding them with information. Chapter 5 deals with the more

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[9] Donald Maclean, 'Improving Intelligence Performance: Integrating Processes and Structure for Effective Decision Support', *Journal of the Australian Institute of Professional Intelligence Officers*, Vol. 7, No. 3, 1998, p. 40.

practical application of this approach, but first it is necessary to examine other challenges to the provision of 'timely, accurate and relevant' product.

LACK OF STRATEGIC GUIDANCE

The strategic challenges identified in Chapter 1 impact the work of the INTELO as much as, if not more than, the military planner or warfighter. Intelligence regarding the tactics and technology of an adversary takes considerable time—often in the order of years or even decades—to gather and the issue of political stalling interferes with that process. Factors that impact the required timeframe for Intelligence collection include necessary strategic guidance, available resources, identification and exploitation of sources, the analysis of the information and the dissemination of the resultant Intelligence product.

Selecting targets for Intelligence collection relies on clear strategic guidance for two reasons. Firstly, the finite availability of resources means that Intelligence collection has to be restricted and prioritised.[10] Although it should be the nature of Intelligence to lead decision-makers, the Intelligence community cannot afford to target every conceivable actor.[11] Secondly, the sensitive nature of Intelligence collection, particularly against 'friends', means any government will wish to curtail those Intelligence efforts deemed high risk, either in the likelihood of their compromise, or the political message such a compromise might send.

Resources have already been mentioned, but it is probably worthwhile illustrating the complexity of resources required to collect Intelligence. One of the most constraining elements of the Intelligence collection process is having the necessary corporate knowledge to conduct the collection and analysis. The most fundamental elements of required corporate knowledge are linguists, closely followed by analysts with the necessary background and understanding to analyse and process the information. Linguists in particular are difficult to maintain for every conceivable circumstance, because there are likely to be periods where they will not be used. When the East Timor issue flared up in 1999, the Australian Defence Force was faced with the problem of having entirely inadequate numbers of Portuguese linguists available.[12] It would appear few people in the organisation understood the importance of having such personnel; after all, Australia was never going to go to war with Portugal. The US Intelligence system found a similar problem when looking at the Somalia problem in 1994, and anecdotal evidence would suggest that the Army's Foreign Language Proponency

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[10] Philip Flood, *Report of the Inquiry into Australian Intelligence Agencies*, Australian Government Inquiry into Australian Intelligence Agencies, Canberra, 2004, pp. 9, 63.

[11] William R. Grundman, 'Reshaping the Intelligence Production Landscape', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 27.

[12] John Blaxland, *Information-Era Manoeuvre: The Australian-Led Mission to East Timor*, Working Paper No. 118, Land Warfare Studies Centre, Canberra, 2002, p. 45.

Office response began with 'what do they talk in Somalia?'.[13] Likewise, experts in specific cultural areas may lose their proficiency due to lack of employment in those areas. The Intelligence community suffers from these challenges more acutely than other organisations because of the sensitivity of the work and the subsequent requirement for rigorous security screening of personnel.

Once strategic guidance has been provided and initial resources allocated, it is then necessary for the Intelligence community to identify sources for exploitation. These can be technical sources such as those targeted by Signals Intelligence (SIGINT), persons of interest to be targeted by Human Intelligence (HUMINT) or even facilities and topography to be targeted by geospatial Intelligence disciplines including Imagery Intelligence (IMINT). Sources are the most valuable asset to the Intelligence professional and as such need careful cultivation and protection. This in itself takes a considerable period of time, with some sources requiring literally decades of cultivation. For HUMINT this involves establishing trust between both parties, determining the credibility of the source and the bounds of that credibility, creating modalities of intercourse, and instituting means of verifying the information from that source. While slightly less nuanced, many of the requirements for technically exploited sources are similar.

This demonstrates that sources should not exist in isolation and need to be contained within a complex structure of collection that permits cross-validation.[14] As many sources as possible should be used, from many different forms of collection, including SIGNIT, HUMINT, IMINT and even Open Source Intelligence (OSINT). In this way, each source can face rigorous testing for accuracy.[15] Creating the necessary multi-faceted architecture of sources can take long periods of time, not only with respect to the time taken to cultivate individual sources, but also for analysts to establish the links between sources and become familiar with using the structure.

As discussed in previous chapters, in order to become actionable information must be turned into intelligence through the application of knowledge. Intelligence analysts must have an existing knowledge of the subject matter they are handling as well as familiarity with how the information was collected and how individual elements relate to each other. This familiarity is necessary to fuse together incomplete and sometimes competing pieces of Intelligence. The analyst must consider the veracity of the Intelligence, isolate contradictions with other sources and compare it with what he or

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13 Ray Lane Aldrich, 'Language Choices', *Military Intelligence Professional Bulletin*, Vol. 29, No. 4, 2003, p. 23.

14 David L. Christianson, 'Signals Intelligence' in Gerald W. Hopple and Bruce W. Watson (eds.), *The Military Intelligence Community*, Westview Special Studies in Military Affairs, Westview Press, Boulder, 1986, p. 39.

15 Keightley, *Intelligence Support to Air Operations*, p. 12.

she already knows about the subject in order to fully accept, conditionally accept or fully reject individual fragments.[16]

The preceding discussion covers just the first, although arguably most time-consuming, steps in the Intelligence process. Once the 'truth' (or best representation of it) has been divined from the mosaic of sources, further processes have to be used to disseminate the Intelligence to those who need it, and allow those users to assimilate it as required. Clearly this all takes time and the earlier that strategic guidance can be provided to allow the process to begin, the more smoothly the process should run. Even when the Intelligence community is reliant on great and powerful allies to provide the bulk of Intelligence product, as it often is, one cannot simply expect that 'the floodgates will open', effectively circumventing these timeframes. Such an attitude leaves the Intelligence advice provided in doubt, places severe burdens on the system to assimilate the information flood quickly, and places too much burden on the ally to push all the necessary Intelligence.

COMPLEX THREAT ENVIRONMENTS

The increased complexity of global geopolitics has resulted in a coinciding increase in the complexity of the battlespace.[17] Militaries are being asked to conduct operations across the entire spectrum of conflict, and this introduces many more actors that the warfighter has to cooperate with or fight against.[18] Theatres of operations are expanding to include 'virtual theatres' where NCW allows warfighters to operate from bases in their own country while the 'real' war is fought on the other side of the world. Commanders have to consider the impact of their actions not only with respect to the Laws of Armed Conflict (LOAC) but also in the court of public opinion. Non-state actors with a fanatical determination to win are becoming more prevalent and are able to learn and adapt quickly to attack vulnerabilities of notionally superior conventional militaries. State actors are looking on with interest at the success of the non-state actors, and the lack of success by the West to confront them. Information technology embodied in the RMA represents a considerable advantage to Western militaries, while at the same time generating a new centre of gravity able to be attacked. Increased complexity of the future battlespace means more environments and more threats an Intelligence system has to deal with.

Those states that believe a conflict with the US is possible are developing tactics to complicate the conduct of air campaigns. Air defence forces are being developed to take

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16 Margaret S. MacDonald and Anthony G. Oettinger, 'Information Overload', *Harvard International Review*, Vol. 24, No. 3, Fall 2002.

17 George A. van Otten, 'Educating MI Professionals to Meet the Challenges of Changing Geopolitical Circumstances', *Military Intelligence Professional Bulletin*, Vol. 28, No. 3, 2002.

18 ibid.

advantage of mobile and man portable threats, and to use tactics that deny targeting.[19] The use of camouflage, concealment and deception by potential adversaries is increasing in sophistication and innovation.[20] Passive denial of targeting by air power is one thing, but many countries are now attempting to use such measures to force behaviour counterproductive to the overall air campaign, such as creating more unintentional damage or accepting greater risk of aircraft losses.

Tactical air Intelligence does not often have the benefit of a complete 'system' to tackle this complexity, rather it must rely on a few individuals at the squadron to process and rationalise the numerous feeds coming into the unit. For a complex battlespace, those individuals have to understand the technology behind and tactical employment of fighter aircraft, bombers, transport aircraft (particularly after September 11), maritime patrol aircraft, radar-guided air defence missiles, man portable air defence systems (MANPADS), anti-aircraft artillery, integrated air defence systems, ground-based radars, AEW&C aircraft, armoured units, mobile infantry units, electronic attack systems, special forces, naval vessels and every other type of potential threat or target in that battlespace. This can place a significant burden on those individuals, and is probably impossible to achieve. During Operation *Falconer* in 2003, the Intelligence staff had the benefit of working alongside embedded army personnel in the role of GLO. These personnel were able to assist the Intelligence staff in the interpretation of the ground picture, and were used in many cases to brief the aircrew on enemy ground activity.[21]

COMPLEX THREATS

While the number and types of threats are proliferating, the nature of the threats is also becoming more complicated making them increasingly difficult to identify and understand.[22] In the past, threat systems were based principally on hardware and any modifications to systems had to be done by specialist technicians. This often limited the number of variants of any given type of threat system, with most variation coming through easily identifiable 'blocks' of production. In this way, variation in systems was physically recognisable either through visual observation or by signatures, such as electromagnetic emissions.

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[19] Tim Ripley, 'UK Identifies New Iraqi SAM Launcher', *Jane's Intelligence Review*, 1 July 2002; Miroslav Gyürösi, 'New Self-Propelled Launcher for S-125 SAM', *Jane's Missiles and Rockets*, 1 September 2004.

[20] Christopher J. Bowie, *Destroying Mobile Ground Targets in an Anti-Access Environment*, Northrop Grumman Analysis Center, Washington DC, 2001, p. 3.

[21] The formal role for GLOs is to provide a picture of friendly ground force activity and liaise between the squadron and ground force elements on offensive air support procedures.

[22] van Otten, 'Educating MI Professionals to Meet the Challenges of Changing Geopolitical Circumstances'.

For radar-guided or datalink-based systems the nature of the hardware also made individual emitters discernible from each other. Through manufacturing inconsistencies, damage or deterioration of the hardware each emitter gradually developed its own fingerprint that could aid individual identification of units. This could be used to track the unit's activity and movement, and thus help identify trends in activity for the adversary as a whole.

Technological developments have dramatically increased the availability of upgrades to existing inventories as well as the adaptability of new systems. Advances in the areas of digital electronics and processing mean that two physically identical systems can have remarkably different capabilities based purely on software modifications. Furthermore, because emissions are digitally generated and higher manufacturing standards are required, the ability to 'fingerprint' individual systems is waning, impacting the ease of tracking those systems.

The complexity has come about from the never-ending desire to evolve weapons systems that are more lethal and survivable. New systems employ sophisticated Electronic Protection (EP) measures designed to deny the effectiveness of Electronic Attack (EA) such as jamming and chaff. Digital systems can be designed to be more survivable by decreasing the probability of their detection and targeting. These systems are called Low Probability of Intercept (LPI) and are critical for maintaining radar survivability in an Anti-Radiation Missile (ARM) threat environment.[23] Low Probability of Intercept also acts as a form Electronic Protection by reducing the range at which jamming systems detect the radar and react to changes in the signal.

The complexity of threats has obvious ramifications for the INTELO who must intimately understand those threats, the ability for their platform to deny them and the tactics their aircrew can use to defeat them. By understanding the threat in these ways, the INTELO is then able to apply his or her knowledge in the following ways:

1. identification of adversary operating patterns of relevance to the INTELO's aircrew;
2. providing senior aircrew with advice to assist in development of responses to the threat;
3. aiding in the education of aircrew on the appropriate responses to the threat; and
4. prioritisation of threats in the battlespace for the overall threat picture.

[23] Owen R. Cote Jr. 'The Look of the Battlefield', *Aviation Week & Space Technology*, Vol. 159, No. 24, 15 December 2003, p. 72.

Clearly, more complex and sophisticated threats increase the challenge to Intelligence providers by substantially increasing the background knowledge required to perform the task.

COMPLEX TASKS

Having discussed increased complexity with respect to the information environment, the threat environment and the threats themselves, it is now necessary to examine the impact of increased complexity of tasks. As discussed in Chapter 2, NCW draws on commander's intent to inform mission command and facilitate self-synchronisation. This is within the context of new imperatives for the way in which war is conducted, such as the notion of the 'strategic private' where even the most junior personnel can make significant impacts on the campaign. Thus, the responsibilities we are placing on our warfighters is increasing, and along with it the complexity of the tasks.

The greatest challenge of mission command and self-synchronisation as operating philosophies is that they require the decision-maker to apply analysis of numerous complex factors to the information at hand. These factors include one's own operating capability, the commander's intent, the enemy's intent and capability, weather and other elements of situational awareness. This process comes along with all of the associated impacts of orientation that can distort interpretations of each of the factors.[24] Remembering that *analysis* consists of applying *knowledge* to *information*, thus generating *intelligence*, the complex tasks expected of the future warfighter rely on higher order cognitive processes.[25] If the factors listed above are provided to the warfighter as information, that information may not be actionable due to information overload or through adverse interpretation. Therefore, in order to be of use to the warfighter those factors should be inculcated as knowledge wherever possible.

A critical example of this type of process is the use of Rules of Engagement (ROE) and the Laws of Armed Conflict (LOAC). It should be noted that while LOAC prohibit certain actions, vital public opinion either at home or among populations of neutral, allied or adversary nations may demand even more prohibitions on the use of force. This should be embodied completely within the national ROE, but often these are augmented through the 'spirit' of other orders such as Targeting Directives, Operations Plans, ATOs and even verbal orders.

Two central and closely associated themes of LOAC remain important guiding institutions for the litany of other, more restrictive guidance: 'proportionality' and

[24] Distortions such as 'confirmation' or 'predecisional' biases will be discussed in more depth in Chapter 5.

[25] Roberts, Stout and Halpern, 'Decision Dynamics in Two High Reliability Military Organisations', p. 615.

'military necessity'. Both of these concepts are used to measure the appropriate use of force against a target given its importance to the war effort, the environment surrounding the target and the expected effects of available weaponry.[26] Weapons effects are an essential element of training for aircrew, and new software applications being developed by the US can augment this training with higher fidelity modelling if timing and communications permit. The two sticking points for the fighter pilot are the importance of the target and the surrounding environment. In most circumstances a controlling agency such as a Forward Air Controller or the Air Operations Centre will provide the necessary checks of 'proportionality' and 'military necessity'. However, the aircrew remain responsible for calling off or adjusting any attack based on a change in circumstances, where they have the tools to observe those changes.

Judging the importance of the target requires an intimate knowledge of not only the commander's intent, but also the target's capabilities and relevance to the adversary's war effort. It may not be proportional to bomb a tank in a city street with a given weapon, but attacking a more significant asset such as a ballistic missile launcher in the exact same circumstances may well be. Being able to discriminate between the tank and the missile launcher relies on more than just appropriate sensors—aircrew must be trained in the recognition of ground vehicles in a way that prevents counterproductive prejudice such as 'confirmation bias' or 'predecisional distortion'.[27] Furthermore, given that existing sensors cannot provide adequate discrimination between serviceable and unserviceable systems or real and decoy systems, aircrew are reliant on already established ideas of the importance of any given asset. Believing a majority of the enemy's tanks are unserviceable may tip the scale in calling off an engagement, while knowing the enemy's intention is to protect critical assets for deploying WMD in close proximity to civilian centres may tip the balance toward continuing the attack.

The use of the 'reasonable' measure for behaviour under LOAC means that perception of events is the determining factor for whether an attack was justified. However, that does not excuse recklessly uninformed actions. The weighty treatment given to application of ROE by RAAF F/A-18 aircrew during Operation *Falconer* is demonstrative of the importance that the media and the public give to collateral damage prevention. This means the ADF has a duty to ensure their personnel's 'reasonable' perception of an event and their use of 'reasonable' precautions is as well informed as possible. INTELOs are

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[26] Australian Air Publication 1003 (AAP1003), *Operations Law for RAAF Commanders*, Second Edition, Air Power Development Centre, Canberra, 2004, pp. 64–65.

[27] These concepts are very similar and deal with how people process information based on existing knowledge and options determined prior to the actual decision being made. People will tend to distort information to support an existing hypothesis, or even dismiss totally information refuting that hypothesis. Kurt A. Carlson and Lisa Klein Pearo, 'Limiting Predecisional Distortion by Prior Valuation of Attribute Components', *Organizational Behavior and Human Decision Processes*, Vol. 94, 2004, pp. 48–59.

not adequately qualified to provide direct advice on ROE,[28] but as with all operational detail concerning the enemy they have a role in developing aircrew knowledge about the likely target sets and how they fit into the enemy's overall operations.

Throughout any engagement the process of analysis required for applying ROE in the cockpit is a continual one. The wide range of issues to be considered and the ramifications of any mistakes make it the most complex and important task expected of our aircrew, and is indicative of many of the challenges facing the warfighter of the future. Aircrew are rarely, if ever, able to consult written documents during an engagement and although there is scope for some discussion with the relevant control agency, the cognitive process is reliant on significant pre-existing knowledge in the form of professional mastery.

A WORD ON UAVS

As alluded to earlier, the advent of Uninhabited Aerial Vehicles (UAVs) and particularly Uninhabited Combat Aerial Vehicles (UCAVs)—those UAVs able to employ munitions—means that the days of aircrew appear numbered. Some commentators also suggest that UAVs will be more readily placed in harm's way because there are no fears of losing personnel over hostile territory, although it should be noted that some of the payloads and other technology in use on UAVs will be of such a sensitive nature that their compromise would be as dangerous as losing a pilot.

The notion of a squadron INTELO looks questionable in a pilot-less air force. The operators of UAVs are likely to be geographically displaced from the location at which their aircraft are based. An evolving threat will require software—and sometimes hardware—changes to UAVs to help better deny or defeat threats. To inform these changes, it will be necessary to have personnel providing Intelligence services to the software and hardware technicians. This may best be conducted by somebody with in-depth technical knowledge, such as an electronic engineer, but these personnel will need to be as adept at analysis as they are at implementation.

For the foreseeable future, however, human control of UAVs will remain, and this will require direct Intelligence support. This may consist of control by committee with several advisers being at hand during the mission to provide the operator with assistance in decision-making, or it may consist of far more deliberate pre-briefing of material. Certainly the fact ground stations provide more scope for this activity than the cockpit of a modern fighter jet means the collaborative option is available. The Intelligence support provided in this sort of circumstance would predominately be targeting related advice but some tactical Intelligence, such as enemy fighter tactics or surface-to-air

[28] Formal advice on the interpretation of ROE should only come from an adequately informed Legal Officer or the commander that issued the ROE.

missile capabilities, may also be given. This is likely a matter for greater consideration by those who initiate the first UAV squadrons in ADF service, but in the interim it will be interesting to observe how the US approaches it in its nascent form.

CONCLUSION

The challenges facing tactical air Intelligence providers in the future are many, and one challenge threatens the very relevance of the profession. The speed of the postmodern battlespace means Intelligence product briefed to aircrew prior to their launch on missions will fail to be relevant. The aircrew will be inundated with real-time information and near real-time Intelligence from a wide variety of sources, thus negating the Intelligence they had received on the ground. However, a subtle change in the focus of squadron INTELOs could reinvigorate the role and help alleviate many of the challenges faced by warfighters.

Squadron INTELOs need to build orientation, or knowledge, rather than merely provide observation, or information. The role of Intelligence has always been to be proactive and predictive. Unfortunately, squadron INTELOs tend to fall into the trap of being reactive to their clients needs, and descriptive of the environment. A subtle realignment back to ‘proactive and predictive’ will help simplify the aircrew’s information environment and better equip them with the resources to analyse enemy behaviour and apply appropriate assessments to their own decisions. The next chapter will detail recommendations for the practical implementation of this insight.

CHAPTER 5 – MAKING TACTICAL AIR INTELLIGENCE WORK

At the base of transformation of knowledge into working knowledge that can be managed is a transformation of value: from an individually tacit asset to an organizationally explicit and measurable factor of production. Not just another factor of production but the factor—sustaining vitality, reproducing capital and providing competitive edge.

John Garrick and Stewart Clegg[1]

Key Points:

1. Intelligence Officers must know their customers and their motivations for seeking advice.
2. There are a number of methods to increasing aircrew acceptance of Intelligence advice, including the customer's existing knowledge base, the quality of the adviser and the quality of the advice.
3. In order to cope with strategic ambiguity, Intelligence Officers will need to examine broader sets of threats and educate aircrew early.
4. Aircrew education can be aided by developing a supportive culture, breeding familiarity with the material and using a building block approach.
5. The use of adaptable and scalable products could be used to ease the rapid production of tailored products.

On paper the future warfighter is an impressive entity indeed. They will be able to conduct many different roles and make complex decisions with strategic ramifications in complex environments against complex enemies, probably with little preparation time. These warfighters will be sensitive to the cultures they operate in and against, speak some of their adversary's language and understand the political imperatives behind their actions. They will be asked to apply strategic, operational and tactical art in a single mission. While a few luminaries might be able to live up to these expectations, they will be few and far between.

[1] John Garrick and Stewart Clegg, 'Knowledge Work and the New Demands of Learning', *Journal of Knowledge Management*, Vol. 4, No. 4, 2000, p. 285.

Likewise, the Intelligence professionals there to support the warfighter will be faced with the same complexity of tasks, environments and threats, although their task is made that much easier by being at 'zero knots, one g'—that is, not under the pressures of actually having to fly the mission. How tactical air Intelligence providers meet these challenges will help decide the effectiveness, or otherwise, of those aircrew.

The Royal Australian Air Force (RAAF) is at a crossroad and must make a decision about the future of tactical air Intelligence. It is already embarking on a future that is heavily focused on knowing the adversary and highly reliant on Intelligence. This path appears to be the correct one, but tactical air Intelligence as a specialisation need not be a part of that path. Everybody in the battlespace will apply their knowledge to information; the very heart of Intelligence practise. Operators are ultimately far better trained and experienced for conducting this type of analysis; they are familiar with the environment in which they operate, how weapons systems function and how they can be defeated, and how tactics can be employed to best leverage strengths or exploit weaknesses. Most importantly they speak the dialect of their fellow operators and automatically establish trust and rapport with them. The RAAF must decide if it is going to retain the concept of specialist squadron Intelligence Officers (INTELOs) or abandon it altogether.

Were the RAAF to abandon squadron INTELOs, there would still be a need for analytical skills for tactical air Intelligence at the operational and strategic levels that would feed Intelligence to the squadrons. Targeting would be another critical role that would remain relevant for RAAF INTELOs, but that is a different matter.

If the RAAF is to retain the concept of squadron INTELOs then it must invest some significant policy assistance to the role, and show it is serious about providing quality Intelligence to its warfighters. The following chapter presents recommendations on how these issues might be tackled. These are largely practical suggestions about how INTELOs at the squadrons can improve the way they do business, but policy that inculcates a supportive and nurturing culture for direction, production, dissemination and exploitation of Intelligence would assist these efforts considerably. It is hoped many of these elements can be used by Intelligence providers at all levels to improve their service to their most important customer: the warfighter.[2]

The overall theme for the recommendations has been alluded to in previous chapters; the INTELO of tomorrow will have to construct aircrew knowledge rather than simply provide information. To do this they will need to become educators. Almost all of their work will occur well in advance of a squadron's deployment, with time in theatre spent refining and reinforcing aircrew knowledge rather than presenting anything new.

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[2] Clinton Brooks, 'Knowledge Management and the Intelligence Community', *Defense Intelligence Journal*, Vol. 9, No. 1, 2000, p. 17.

The focus here is on delivery of Intelligence that maximises acceptance, assimilation and actionability, as opposed to the analytical skills required to generate the Intelligence. While analysis remains at the heart of the Intelligence craft,[3] Intelligence that is not actionable or floods the operator with too much information is counterproductive. Furthermore, sufficient literature is available on analytical skills, while material specifically related to the appropriate delivery of Intelligence is scarce. In order to develop this discussion, literature from behavioural psychology and education disciplines has been consulted and combined with the experiences of a number of Intelligence professionals,[4] including those of the author.

RE-VISITING INTELLIGENCE TASKS

People use advisers for several different reasons, and these reasons can provide an insight into what it is the customer requires. At a squadron, these different motivations often relate to distinctly different groups of customers or subject sets. Understanding these differences and what each group requires is vital to the INTELO's ability to provide appropriately tailored and actionable information. The following types of advisers exist, based on the customer's reason for seeking the advice:

1. **Subject matter experts.** Some customers are looking for advice from subject matter experts in order to fill gaps in their own knowledge.[5] These types of advisers attempt to convey their existing knowledge to inform their customer. This is probably the most common reason and one that Intelligence professionals are theoretically intended to fulfil. The subject matter expertise the INTELO is supposed to provide is of enemy intent, capability and behaviour.

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3 James A. Marks and Steve Peterson, 'Lessons Learned: Six Things Every "2" Must Do – Fundamental Lessons From OIF', *Military Intelligence Bulletin*, Vol. 29, No. 4, 2003.

4 Sources considered for this discussion include: C.W. Simpson and L. Prusak, 'Troubles with Information Overload: Moving from Quantity to Quality in Information Provision', *International Journal of Information Management*, Vol. 15, No. 6, 1995, pp. 413–25; Peter Juslin, Anders Winman and Henrik Olsson, 'Calibration, Additivity and Source Independence of Probability Judgments in General Knowledge and Sensory Discrimination Tasks', *Organizational Behavior and Human Decision Processes*, Vol. 92, 2003, pp. 34–51; Kurt A. Carlson and Lisa Klein Pearo, 'Limiting Predecisional Distortion by Prior Valuation of Attribute Components', *Organizational Behavior and Human Decision Processes*, Vol. 94, 2004, pp. 48–59; 'Sherman Kent's Principles for Intelligence Analysis', published in Stephen Marrin, 'CIA's Kent School: Improving Training for New Analysts', *International Journal of Intelligence and Counterintelligence*, Vol. 16, No. 4, 2003, pp. 630–31; Amos Kovacs, 'The Nonuse of Intelligence', *International Journal of Intelligence and Counterintelligence,* Vol. 10, No. 4, 1997, pp. 383–417; Christopher J. Tatarka, 'Overcoming Biases in Military Problem Analysis and Decision-Making', *Military Intelligence Professional Bulletin*, Vol. 28, No. 1, January–March 2002, pp. 8–10.

5 Eva Jonas and Dieter Frey, 'Information Search and Presentation in Advisor–Client Interactions', *Organizational Behaviour and Human Decision Processes*, Vol. 91, 2003, p. 154; Ilan Yaniv, 'Receiving Other People's Advice: Influence and Benefit', *Organizational Behavior and Human Decision Processes*, Vol. 93, 2004, p. 1.

2. **Information brokers.** Other customers have the existing background knowledge to search for the information, but cannot afford the time or effort to do so.[6] In this way the adviser acts as an 'information broker'. This is the role that squadron INTELOs have come to fulfil by being descriptive rather than predictive.

3. **Diversifiers.** Another reason for seeking advice is to apply a more diverse set of opinions and observations to the decision-making process.[7] Advisers tend to be less susceptible to 'confirmation bias' and are thus able to diversify the information considered.[8] This process includes activities like acting as a 'sounding board' or playing 'devil's advocate'.[9]

INTELOs will often be called upon to fulfil each of these roles. During squadron training cycles, the squadron INTELO will provide a number of briefs about adversary weapons systems, geopolitics and the Intelligence community. These are areas in which it is reasonable to expect the INTELO has expertise. With the proliferation of detailed and credible open source reporting, as well as substantially improved access to Intelligence product by aircrew, INTELOs no longer hold this unique position. However, INTELOs have the time to focus their efforts on searching for and disseminating this type of information, so they become information brokers. As stated above, operators have the necessary technical and tactical background to conduct analysis of enemy systems and behaviour. However, two clear problems exist with this approach.

Operators are expensive and time-consuming to train. A pilot will take a minimum of three years to go from the start of basic flying training through to an operational level of competency on the F/A-18.[10] The actual time taken is usually much longer due to bottlenecks in the training system, but this allows for critical consolidation at each step. In this time the RAAF will spend several million dollars on their training. Whether the use of a multi-million dollar investment to carry out Intelligence duties is a cost-effective approach or acceptable from a retention perspective is debatable.

The fact that operators already have established knowledge about the way they carry out their tasks can also have negative impacts on their ability to conduct intelligence analysis. Adversaries' weapons, training, and doctrine almost always differ from one's own. Furthermore, studies have shown people will search for and analyse information in a manner favouring existing beliefs or desired conclusions, and acceptance of

6 Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 154.

7 ibid., p. 155.

8 ibid., p. 156.

9 Yaniv, 'Receiving Other People's Advice', p. 1.

10 Australian National Audit Office, *Developing Air Force's Combat Aircrew*, Report Number 47, Australian National Audit Office, Canberra, 2003–2004, pp. 25–28. The figure of three years includes six months formal continuation training for junior aircrew upon reaching a squadron to reach an operational degree of proficiency.

information is dependent on its 'distance' from the originally held opinion.[11] These are also important concepts for examining the requirements for building orientation discussed later in this chapter. It should be noted that INTELOs are not immune from these effects, but hopefully sufficient training and experience in the craft of analysis can mitigate them.

	Junior Aircrew	Senior Aircrew	Commanding Officer
Subject Matter Expertise	Adversary weapons systems and tactics Geopolitics Cultural studies Tactical Intelligence functions	Geopolitics Cultural studies Operational Intelligence functions	Geopolitics Cultural studies Intelligence community
Information Brokerage	Tactics and countermeasures to defeat/deny threats	Adversary weapons systems and tactics	Intelligence and security policy guidance
Diversification	General weapons knowledge	Tactics and countermeasures	Squadron planning

Table 1 – Examples of the differing Intelligence requirements of squadron aircrew.

Table 1 shows some examples of the different Intelligence requirements of groups within a squadron. These are certainly not cut and dry distinctions. For example, a Commanding Officer (CO) may have been away from flying duties for several years before returning to the platform. The nature of CO duties is such that they are unlikely to have time to re-learn (or catch up on) much of the Intelligence knowledge that other senior aircrew at the squadron hold. In these circumstances, the INTELO may be required to include the CO in the 'junior aircrew' bracket for items such as adversary weapons systems and tactics and the means of defeating/denying those threats. A more proficient INTELO may also look to assist with the movement of squadron members up the chain. Senior aircrew are going to move on to staff jobs or even a command where they will need the baseline Intelligence knowledge held by somebody in the CO's position. Also, junior aircrew are going to be senior aircrew one day, and need similar education so that they can lead junior aircrew in the future.

IMPORTANT TRAITS FOR ACCEPTANCE OF INTELLIGENCE

There are a number of factors that aid in the acceptance of information from others and understanding these factors can greatly enhance the ability of an adviser to deliver information in an efficient manner. RAAF INTELOs in the past have often been led

[11] Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155.

to believe, somewhat inaccurately, that credibility is the sole determining factor in aircrew openness to information and any error or mistake in analysis or delivery will spell certain doom for one's career at the tactical level. Credibility is important, but nobody is perfect and other factors impacting the acceptance of information are the confidence, expertise and trustworthiness of the INTELO, the quality of the advice and the customers themselves.

The Customer

The customer's receptivity to information is based on their motivations for seeking the information and their existing knowledge or beliefs.[12] The subject matter expert is in a strong position for this as the customer establishes a need for a certain type of information and has an acknowledged knowledge gap in that area. The information broker is less well off, because the customer has sufficient background knowledge to critically assess the product they receive. If the product is sufficiently close to their existing knowledge, then they will more readily accept it. If the product is more distant from their existing knowledge then they may accept parts of it or reject it entirely.[13] This does not necessarily impact the customer's view of the adviser, but a pattern of advice that is assessed to be poor may eventually degrade that perception. Advice provided by diversifiers should not be faced with the same scepticism, largely because the customer is specifically looking for a wider range of opinions and information. This is discussed further below.

Adviser Confidence

Advisers must be confident in the advice they are providing, and assert it in a way that depicts that confidence.[14] This does not mean pushing assessments that are only partially complete or of questionable accuracy as if they are gospel. It is necessary to point out degrees of certainty and any potential pitfalls, but the adviser should portray confidence in their *opinion* and *analysis*. Customers are more likely to accept and assimilate information that is presented with vigour.

Adviser Expertise

Demonstrable expertise in the subject area is another factor in the customer's acceptance of information,[15] although portraying this expertise to the customer is difficult. One trap is to try to display knowledge depth by flooding the customer with non-essential

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12 Yaniv, 'Receiving Other People's Advice', pp. 2–3; Carlson and Pearo, 'Limiting Predecisional Distortion by Prior Valuation of Attribute Components', p. 49; Kovacs, 'The Nonuse of Intelligence', p. 400.

13 Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155.

14 ibid., p. 155; Kovacs, 'The Nonuse of Intelligence', p. 399.

15 Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155; John E. McLaughlin, 'New Challenges and Priorities for Analysis', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 18.

background information. This is a problem where the information environment is already very complicated, potentially being counterproductive in terms of customer acceptance.[16]

The clearest way of demonstrating expertise is through established relationships with the customers, and easily translatable experience. The customer is more likely to understand the benefit of experience they have had and courses they have attended than the different courses and experience accumulated by the adviser.

For example, in-house INTELO training at No 81 Wing includes the Fighter Intelligence Qualified (FIQ) course, which places junior INTELOs alongside pilots undertaking operational conversion (OPCON) to the F/A-18 Hornet. This course not only provides an unparalleled level of training in the fighter Intelligence craft, but also begins exposing junior aircrew to the role of Intelligence and allows senior aircrew to correlate their INTELOs' qualifications with something they understand. Similar conversion course programs are run at No 82 Wing.

Reputation for Accuracy

Some INTELOs have been inculcated to fear aircrew—particularly fighter pilots—and the ramifications for providing 'inaccurate' Intelligence. This can have deleterious effects on the INTELO's willingness to provide product of value. Fear of being wrong hampers the confidence mentioned above and restricts the use of analysis and prediction.[17]

A distinction needs to be drawn between errors in fact and 'inaccurate' predictions. Anybody can make an accurate prediction—even a stopped clock is right twice a day. Intelligence is a profession surrounded by confusion, based on incomplete facts and conflicting sources. Even in hindsight divining the 'truth' is difficult at times. However, some elements of Intelligence enjoy sufficiently universal acceptance that they can be considered facts and making an error with respect to these is nearly inexcusable. Nearly. INTELOs should remember that aircrew—without exception—also make mistakes, including errors of fact. The important thing is to acknowledge the error, rectify it, learn from the experience and move on.[18]

The Role of Trust

Trust should not be confused with adviser expertise or reputation for accuracy, although they are elements that can lead to the establishment of trust. Trust is established between people by identifying common elements in each other's background, responsibilities and motivations. This is necessary for recognising aligned interests and creates expectations

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16 Frank Watanabe, 'How to Succeed in the DI: Fifteen Axioms for Intelligence Analysts', *Studies in Intelligence*, 1997, http://www.cia.gov/csi/studies/97unclass/axioms.html, accessed 7 July 2004.

17 Marrin, 'CIA's Kent School', p. 631.

18 ibid.

by a person that the other party will behave in a way commensurate with those common interests. The ultimate measure of trust is the 'willingness to make oneself vulnerable to another party'.[19]

Trust impacts the way in which we interpret information provided to us by placing established expectations of accuracy and value on that information. This can distort the receiver's assessment of the information and their acceptance of it. If the customer does not trust the adviser, then they are unlikely to trust their product.[20]

Trust also impacts the information advisers are willing to provide to the customer, particularly where that information is of a sensitive nature. Where an individual is unsure the customer is going to handle the material in a responsible manner, the adviser is less likely to provide that material. Sufficient coincidence of interests may nullify any objection to irresponsible handling of the material. In the Intelligence community this is formally embodied by the 'need to know' principle used to constrain flow of classified information. It is not sufficient to merely have a clearance to access material; one must demonstrate a need for that access.

Quality of Advice

While the discussion so far has examined the impact of the customer, adviser and the relationship between the two, the quality of the advice itself is also an important factor in determining acceptance.[21] Each individual element of advice is going to be judged separately and, provided the other factors described above are sufficiently met, will be accepted on the basis of its quality. There are three critical elements that will affect the customer's perception of the quality of the advice: internal consistency, consistence with other advisers, and demonstrable robustness.[22] The 'distance' measure evoked in the discussion above on the nature of the customer is not considered to relate to the quality of advice because 'distance' is dependent more on the nature of existing beliefs held by the customer than anything intrinsic to the advice itself. After all, those existing beliefs could well be wrong.

Information must be internally consistent and logical if it is to be accepted as reliable by the customer.[23] This means individual pieces of data must support each other and

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19 David Allen and Tom Wilson, 'Vertical Trust/Mistrust During Information Strategy Formation', *International Journal of Information Management*, Vol. 23, 2003, p. 224.

20 Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155; Donald Maclean, 'Improving Intelligence Performance: Integrating Processes and Structure for Effective Decision Support', *Journal of the Australian Institute of Professional Intelligence Officers*, Vol. 7, No. 3, 1998, p. 45.

21 Simpson and Prusak, 'Troubles with Information Overload', pp. 415–18.

22 Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155.

23 Samuel N. Fraidin, 'When is One Head Better than Two? Interdependent Information in Group Decision Making', *Organizational Behavior and Human Decision Processes*, Vol. 93, 2004, p. 110.

the conclusions developed. For instance, if while briefing aircrew on a radar-guided surface-to-air missile (SAM) an INTELO suggests flares as a possible countermeasure (these are usually related to defeating infra-red homing, or 'heat-seeking', missiles), the audience may consider the advice to be internally inconsistent and of very low reliability. However, if the INTELO links the use of flares to defeating the optical guidance of the system, the aircrew are more likely to consider the advice internally consistent—it may or may not be accurate, but it is internally consistent.

Consistency between the advice provided and material from other advisers is another means customers will use to judge quality.[24] This is likely to make the customers revisit the issues related to the quality of the adviser in an effort to determine who they should listen to. Inconsistency with other advisers undermines each of the advisers, but one is likely to lose more credibility than others. This is an issue when an INTELO first arrives at a squadron and during operations where aircrew are likely to interact with several different Intelligence professionals, including Imagery Analysts (IAs) and INTELOs from other countries. In order to overcome inconsistencies generated by other Intelligence staff being wrong or simply misunderstood, it is necessary to openly flag an inconsistency, explain why it exists and then provide the corrected information.

A further measure of the quality of the advice is the robustness of it. Customers are comforted by demonstrable proficiency of analysis, including the use and cross-referencing of multiple sources, logical reasoning and the application of expertise. This is sometimes difficult to demonstrate to customers who are relying on the adviser as the subject matter expert, the risk being that the adviser can breach the aforementioned rule of not flooding the customer with information for the purpose of proving one's expertise. Robustness can eventually be replaced with trust in complex information environments where time and headspace is limited, but during peacetime squadron training robustness will not only aid in aircrew acceptance of the information but will enhance the level of trust they are eventually willing to place in the INTELO.

COPING WITH A LACK OF STRATEGIC GUIDANCE

Preparing aircrew for operations is difficult when the nature of those potential operations is unclear. This lack of strategic guidance can restrict the required focus of effort within the tactical community, or deny sources of Intelligence because of resource decisions at the operational or strategic level. An example of this dilemma was the focus of Australian defence policy in the 1980s and 1990s on the near region. This focus meant that 'valid' scenarios for planning would have pitted the RAAF's air combat capability against regional air forces of severely limited or even non-existent capability. Had the fighter world restricted itself to that strategic guidance, its development of tactics, training and procedures to face more sophisticated capabilities would have been stunted.

[24] Jonas and Frey, 'Information Search and Presentation in Advisor–Client Interactions', p. 155.

Thankfully, fighter aircrew determination to keep pace with their colleagues from other countries, particularly the US, and the eagerness to utilise the full capabilities of the F/A-18 Hornet, led them to train and develop tactics for far more superior threats.

INTELOs working in an environment of strategic ambiguity—a hallmark of the current world order—may well have to adopt similar improvisation to ensure that the corporate knowledge of their tactical community continues to grow. The porous nature of borders in the world's trouble spots will mean sophisticated weapon systems may be rapidly acquired by adversaries, in ways difficult to detect.[25] These systems may be user-friendly enough to put into action immediately or, more likely, instructors or mercenary operators may be hired to assist with a fast transition. At the same time, technical knowledge about these systems and corresponding tactics to defeat them take long periods of time to develop.

Tactical air INTELOs will need to look at a broader set of threats than the current inventories of weapons held by potential adversaries. Two problems arise with this. Firstly, the resultant degree of complexity will be too much to deal with comprehensively. This relates not only to INTELO knowledge, but also the viability of instructing aircrew in that complexity. Secondly, Intelligence collection and analysis at the operational and strategic levels would need to be further stretched, potentially to include targets of an unacceptably sensitive nature. In order to cope with a lack of strategic guidance, the INTELO or the Intelligence system will need to initiate some fundamental changes including fomenting a supportive aircrew culture, imbuing aircrew with the right knowledge to assimilate rapidly new threat environments, devolving liaison authorities, and developing adaptable and scalable products.

Supportive Aircrew Culture

Aircrew understanding of the importance of Intelligence has improved substantially over the last few years. A decline in this understanding came about due to the lack of operations, particularly between the war in Vietnam and Operation *Desert Storm* in 1991. Not surprisingly then, the improvement of the understanding has coincided with the increased operational tempo since East Timor in 1999.

No 81 Wing in particular established a number of important programs in the 1990s that recognised the need to develop and embrace tactical air Intelligence. These programs included the aforementioned Fighter Intelligence Qualified (FIQ) course that began in 1998, and a similar concept called the Fighter Intelligence Instructor (FII) course starting in the early 1990s that runs parallel to the Fighter Combat Instructor (FCI) and Fighter Combat Controller (FCC) postgraduate courses. Both of these courses are six months in length and are usually limited to one student at a time. Since the FII course

[25] Anil R. Pustam, 'Countering the MANPADS Threat', *Asia-Pacific Defence Reporter*, May 2004, p. 28.

runs with the FCI course, it is available only once every two years or so. This represents a substantial investment in time and resources, and the production of qualified officers is slow, but the value of these programs is undisputable.

These have been largely operator-initiated evolutions, but it is the role of the INTELO to help in the building of this supportive culture also. By educating aircrew at all levels on what Intelligence can provide to them,[26] those aircrew will see that a strong Intelligence system is in their best interest. Establishing trust through interaction with aircrew, both professionally and socially, will further assist aircrew receptiveness to Intelligence. Squadron INTELOs can also demonstrate their professionalism and expertise through enthusiastic involvement in the squadron's planning and conduct of exercises. Handled correctly, this type of behaviour even by a single INTELO will encourage aircrew to become more inquisitive about the adversary and more open to threat education. They may even begin searching for information by themselves.[27]

Teaching Aircrew How to Learn

Working with strategic ambiguity may require a rapid transition from peacetime training cycles to high-intensity workup for operations. During this period, already tight time constraints will become even more so as aircrew familiarise themselves with the various peculiarities of the operation at hand. Formal access to aircrew by an INTELO (such as briefings) is unlikely to increase, although maintaining aircrew interest in the material should be easier. It is vital that during this period any formal interaction between INTELO and aircrew is as efficient as possible so the customer walks away with a demonstrable increase in knowledge. There are a number of ways INTELOs can assist this learning process including increasing aircrew familiarity with the type of material, using structured formats for delivery and instituting a building block approach to threat education.

By becoming more familiar with the nature of technical Intelligence about threat systems, aircrew will more readily accept and assimilate the information. Familiarity will allow aircrew to understand the importance of information, how they will apply it during planning and in the cockpit and the potential limitations of the Intelligence. As they receive it they will begin to process the information, not in an effort to understand it, but in anticipation of how they will use it. Adult education techniques such as the Socratic Method should be used to further reinforce the material, with questions asked of aircrew being based around practical applications of the information.

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[26] H.B. Keightley, *Intelligence Support for Air Operations*, Air Power Studies Centre, Canberra, 1995, p. 7.

[27] Robert D. Gourley, 'Intuitive Intelligence', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 67; Richard E. Hayes, 'Establishing and Maintaining a Social Science Enterprise: Decision Making in the Military', *The American Behavioral Scientist*, Vol. 43, No. 10, 2000; Brian D. Janz and Pattarawan Prasarnphanich, 'Understanding the Antecedents of Effective Knowledge Management: The Importance of a Knowledge-Centred Culture', *Decision Sciences*, Vol. 34, No. 2, 2003, pp. 351–84.

An already established means of improving aircrew assimilation of Intelligence material is to use standardised briefing formats. Aircrew use similar structured briefings for instruction because they infuse familiarity with the format, allowing briefed personnel to remain cognisant of the context of the information they are receiving and be aware of what information is forthcoming. This reduces the cognitive load of personnel receiving the briefing by reducing the distractions of disparate approaches.

Another means of improving aircrew familiarity with technical Intelligence is to provide sufficient background knowledge so aircrew can immediately apply reasoning to material they receive. This can be achieved through a building block approach that gradually introduces fundamental technical concepts to the aircrew. Courses such as the Electronic Warfare (EW) Course provided by the Joint Electronic Warfare Operational Support Unit (JEWOSU) and Weapons Employment Course (WEC) offered by the School of Air Navigation (SAN) are excellent foundation programs for establishing this type of knowledge. However, it is difficult for aircrew to find the time to attend these courses, and there is little palpable motivation for them to do so. For those aircrew that do attend these courses, they must be supported by continued refresher education throughout their careers if the knowledge is to be retained. Adaptable formats for delivery of this education such as e-learning might aid this and WEC has already been developed to include a distance learning element. The squadron INTELO can assist the acquisition and retention of this knowledge through refresher education and by applying aircrew knowledge to threat weapon systems. This is likely to require a commensurate increase in INTELO expertise in both EW and instructional techniques.

Devolution of Liaison Authority

Australia's geographic location coupled with its limited resources, mean its Intelligence services are largely reliant on the Intelligence sharing relationships established with strategic partners. This is particularly true with respect to Intelligence relating to adversaries outside of its immediate neighbourhood. This reliance has bred a culture among the Intelligence community that for those areas not of immediate importance, friends such as the UK and US will provide the necessary Intelligence should it be required for operations. The notion that the floodgates would open at the appropriate time is not only false, it is dangerous. Even if Australia's partners have the Intelligence and the willingness to share it, there is no guarantee that it will be able to be passed in the short duration that is available prior to operations. The notion places considerable burden on the strategic partners to push all of the information, and further burden on Australian Intelligence professionals and operators to assimilate it.

Intelligence sharing is practically implemented through the application of Direct Liaison Authority (DIRLAUTH) between appropriate agencies, and this can be a very political instrument. As has been previously described, targeting of certain countries for Intelligence collection can be extremely sensitive. Furthermore, notions of knowledge as power can often get in the way of individuals devolving such authority. Liaison

authority will be established depending on the perceived need for that liaison. The problem with this lies in the fact that people and organisations will behave in a way most in their interest at any given time. The commander of a senior Intelligence service at the operational or strategic level will have a distinctly different view of what is required than the tactical commander,[28] and this can distort who is given liaison authority.

Where possible, liaison authority should be devolved so Intelligence professionals with a better understanding of their customers' needs can interact with the agencies of Australia's strategic partners.[29] In this way these Intelligence professionals can undertake a process of discovery whereby they can identify what knowledge is shared between the partners and what knowledge is held uniquely by external agencies. This knowledge can then be used to establish push-pull Intelligence exchanges; partners can push Intelligence as they produce it, and Intelligence professionals at home can pull Intelligence from the partners as required. Some additional measures such as compartmentalisation may be required to prevent certain elements of Intelligence being disseminated too widely and to reassure the strategic partners that the material is being used appropriately.

Adaptable and Scalable Products

In a complex environment where new threats, theatres of operation or even missions can arise at short notice, Intelligence product will often have to be delivered incomplete.[30] This will require many Intelligence professionals to abandon their infatuation for attractive, well-edited product and come to grips with delivering fragmented information with enough clarity and conviction to be actionable.[31] Using this approach will also allow customers to see more of the material, at an earlier stage, which can assist with gaining confidence in the material and elicit timelier customer feedback.[32]

The provision of incomplete Intelligence does not mean INTELOs should attempt to fill in all the blanks, rather they should be able to communicate the extent of what is known, what is unknown and what has been assessed. As Chairman Joint Chiefs of Staff, Colin Powell's guidance to his Intelligence staff was 'tell me what you know; tell me what you

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28 Philip Flood, *Report of the Inquiry into Australian Intelligence Agencies*, Australian Government Inquiry into Australian Intelligence Agencies, Canberra, 2004, pp. 75, 122.

29 This sort of approach has been broadly supported by the Flood Report although the focus there was on the use of 'liaison officers'; see 'Flood Report', pp. 157–58. Liaison officer positions represent an ideal as they are embedded in an agency and can use face-to-face interaction to improve their visibility of relevant product. However, formal liaison officer positions are expensive to maintain and with the current availability of computer-to-computer communication between the partners, existing positions should be adequate in facilitating an expansion of intelligence relationships.

30 Louis E. Andre, 'Intelligence Production: Towards a Knowledge-Based Future', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 39.

31 Gourley, 'Intuitive Intelligence', p. 61.

32 Hayes, 'Establishing and Maintaining a Social Science Enterprise'.

don't know; tell me what you think; and make sure I know the difference'.[33] By using this philosophy, INTELOs will ease the delivery of incomplete product to their customers.

One solution to the time pressures of adapting to an emerging battlespace is to develop a range of products that can be taken 'off-the-shelf' and adapted at short notice.[34] This is similar in many respects to the use of the building block approach recommended above for aiding aircrew learning. By having an existing baseline of generic threat knowledge available, INTELOs can then take the relevant information, discard what is unnecessary, blend it with other sources and deliver an interim product to the customer. Current efforts by No 81 Wing Intelligence to introduce a customer-focused threat publication is in keeping with this philosophy. Another example of this approach is the 'net assessment' used most notably by two civilian geopolitics and security analysis organisations—the Center for Strategic and International Studies (CSIS) and Strategic Forecasting Inc (Stratfor)—although the approaches by each vary slightly.

The CSIS[35] use of net assessment is similar to the Operational Net Assessment (ONA) concept introduced in Chapter 2, being an attempt to cover exhaustively all of the relevant factors impacting a given scenario or environment. While the product provides the authors' assessments on the various issues, this approach gives sufficient material for readers to undertake their own analysis. As a completed document, this type of product falls into many of the same pitfalls as other formal Intelligence product; it takes a long time to create and is too detailed to be assimilated quickly. However, new commercially available collaboration tools, including some available inherently in word processing and e-mail software, mean that such product can be made available as living, breathing documents. Notably, one of CSIS's most influential analysts, Professor Anthony H. Cordesman, who wrote the Center's military lessons from Operation *Iraqi Freedom*, regularly released incomplete and fragmented drafts of the work on the Center's website for comment. In this way, Professor Cordesman was able to release timely analysis on the war from the opening days of combat operations, even though it opened him to unnecessary academic and professional scrutiny.

Stratfor's net assessments were originally intended for internal guidance to its analysts, but are now published on its subscription site to provide readers with background insight into why certain assessments in its other product have been made.[36] These

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33 Peter Brooks, 'Shaken not Spun', *The Heritage Foundation*, 10 June 2003, http://www.heritage.org/Press/Commentary/ed061003a.cfm, accessed 24 September 2004.

34 Stephen K. Iwicki, 'CSA's Focus Area 16: Actionable Intelligence: Introducing the Concept of "Actionable Intelligence"', *Military Intelligence Professional Bulletin*, Vol. 30, No. 1, 2004; Andre, 'Intelligence Production', p. 41.

35 See: www.csis.org.

36 An example, which includes the explanation of the product, is available at Stratfor, 'Africa Net Assessment: New Cooperation and International Attention', *Stratfor*, 24 September 2004, http://www.stratfor.com/free-scripts/comsite2.pl?page=netassess&category=NET&pageid=BZ, accessed 1 October 2004.

documents are not particularly long, being just a few pages for each topic. They identify the major issues, provide some background detail on historical and current events, and then provide high-level guidance on how to apply analysis to details as they emerge. The intent is to provide coherence to the assessments being produced by the company, without hampering the timely delivery of that product through a cumbersome editorial process.

One way of viewing this difference is that the CSIS approach provides an 'information' perspective, while the Stratfor approach represents the 'knowledge' element. A combination of the two approaches—one providing necessary background detail, while the other provides coherence to assessments among diverse analysts—might also prove useful to Military Intelligence professionals. A fundamental step in using these products would be to instigate a sufficient knowledge management policy and architecture that encourages and rewards appropriate participation by Intelligence community members and reduces the additional burden as much as possible.[37]

CONCLUSION

This chapter has examined a number of ways tactical INTELOs can improve their performance in the postmodern battlespace. It also issued a challenge to the RAAF to ensure it adequately values the expertise and contribution of those Intelligence professionals; if it does not do so in the future then it may as well abandon altogether the notion of tactical air Intelligence as a task for INTELOs. Most operators not only have the necessary skills and knowledge to carry out those tasks, they will be expected to do so once in the battlespace with little or no direct link to an INTELO. The key for tactical air Intelligence retaining its relevance will be to build knowledge rather than simply inform, educate rather than narrate, predict rather than describe, anticipate rather than react.

INTELOs act as advisers in a number of different capacities, and in order to understand their customers' requirements it is important they understand the capacity for which they are being sought: as subject matter experts, information brokers or diversifiers. The customer's motivations for seeking advice along with the quality of the adviser, the quality of the advice and the trust relationship between adviser and customer are all important factors in determining how aircrew will accept and assimilate Intelligence. Squadron INTELOs must have the courage to be wrong with their assessments, while building a reputation for accuracy. This dichotomy will be difficult to achieve, but by building a supportive aircrew culture, implementing flexible knowledge management processes and developing a range of adaptable and scalable products INTELOs will be better equipped to cope with it.

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[37] Andre, 'Intelligence Production', p. 41; William R. Grundman, 'Reshaping the Intelligence Production Landscape', *Defense Intelligence Journal*, Vol. 6, No. 2, 1997, p. 31.

CONCLUSION

When someone tells us that he has met someone who is a master of every craft and has a more exact understanding about all subjects than any individual expert, we must answer that he is a simple-minded fellow who seems to have been taken in by the work of a charlatan, whose apparent omniscience is due entirely to his own inability to distinguish knowledge, ignorance and representation.

Plato[1]

Strategic drivers that have emerged since the end of the Cold War have established two clear but competing dynamics. The anticipated 'peace dividend' meant that militaries worldwide were placed under significant pressure to downsize and become more efficient. At the same time peace was not forthcoming. Successive interventions in troubled regions including Bosnia, Somalia, Haiti and East Timor brought peacekeeping and humanitarian operations to the fore. From the mid-1990s the activities of al Qa'eda gradually increased in ambition and sophistication, culminating in the attacks on September 11. While military forces were under resource pressures, the roles expected of them were increasing dramatically.

In order to deal with these competing challenges, many militaries have undertaken a process of doctrinal and force transformation. The general goal is to maximise efficiency by allowing agile application of operations as dictated by evolving strategic circumstances. Australia's future warfighting concept (FWC) is based upon Multidimensional Manoeuvre which brings together Network Centric Warfare (NCW) and Effects-Based Operations (EBO), and applies them to the manoeuvrist approach to effect changes in an adversary's behaviour. In this way Multidimensional Manoeuvre is firmly rooted in the cognitive dimension. This is a fairly standard, if sometimes confusing, lexicon for the approaches being sought by many militaries.

Under this construct, every warfighter must be able to make difficult decisions that could have ramifications at the strategic level. The much vaunted Revolution in Military Affairs (RMA) and the related 'CNN Effect' have evoked the notion of the 'strategic private'—the idea that even the most junior person in the battlespace can produce far-reaching effects. NCW encourages innovation by flattening the organisation structure, and empowering warfighters to exercise mission command through the application of professional mastery, commander's intent and self-synchronisation. This places a considerable burden on the warfighter, none more so than the aircrew of multi-role aircraft.

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[1] Plato, *The Republic*, translation by Desmond Lee, Second Edition (revised), Penguin Classics, London, 1987, p. 364.

In order to justify scarce aircraft accommodation or 'ramp space' at deployed bases, most aircraft in the postmodern battlespace will need to be multi-role. This provides the force with inherent flexibility to adjust force composition effectively by transitioning roles as the operational situation dictates. When combined with a dynamic re-tasking doctrine, such as Time Sensitive Targeting (TST), this represents improved agility by enhancing the force's ability to deal with emerging and fleeting targets. These concepts—multi-role and dynamic re-tasking—increase the burden on the aircrew asked to conduct those missions. Pilots of single-seat multi-role fighter aircraft can potentially cover more territory, more threats, more targets and more missions than any other actor in the battlespace.

Tactical air Intelligence must evolve to meet the demands facing their most important customers: aircrew. At the same time the strategic context described above further complicates the role of the squadron Intelligence Officer (INTELO). Specialist squadron INTELOs are likely to suffer a crisis of relevance if they do not evolve.

The technology that will enable NCW will also deliver an incredibly detailed picture of the battlespace directly into the cockpit. This will occur real-time or near real-time thus making nugatory the picture provided by the INTELO several hours earlier on the ground. The aircrew will need to take this flow of information and analyse it, either to inform decision-making directly or to continue constructing their situational awareness. They will effectively be their own intelligence provider. If aircrew are inadequately prepared for this information environment, then they may be at risk of information overload.

Information overload occurs when an individual is unable to process the information being provided to them. The critical element of consideration then is the processing aspect. Knowledge, or Boyd's 'Orientation', is the central feature of processing information. Both of these concepts represent our existing cultural patterns, beliefs, behaviours and experience. They are the lens through which we see the world, and the way that we generate choices for decision-making. Information overload occurs when the information (Boyd's 'Observation') flow does not fit with the knowledge base of an individual, either in terms of its amount or its nature.

To combat this potential for information overload, and in response to their waning relevance, the INTELO may be able to provide some assistance. Acting as a source of information is clearly inappropriate. Describing the battlespace is redundant. The INTELO must provide predictive Intelligence, and deliver it in a way that reflects the customer's knowledge; that is, in a manner that best allows for acceptance and assimilation. Furthermore the INTELO should take a pivotal role in building that knowledge in the first place. To do this, tactical air INTELOs will need to become educators rather than mere briefers and will have to become intimately aware of the needs of their aircrew.

RECOMMENDATIONS

Beyond the more practical advice provided in Chapter 5, this thesis establishes a number of procedural and systemic recommendations, particularly regarding the adoption and exploitation of knowledge management tools. INTELOs should pursue their own professional development, including seeking out programs and information that expand their knowledge not only of Intelligence practices but also of Operations related material. Nevertheless, there is little guidance to junior INTELOs as to how they should continue their development. By establishing an Intelligence community of expertise, all INTELOs would be able to learn from the efforts and advice of their colleagues, despite being dislocated by geography, hierarchy and function. One means of doing this would be to establish an Intelligence professional journal similar to the *Studies in Intelligence* (CIA), *Military Intelligence Professional Bulletin* (US Army) or *Defense Intelligence Journal* (Joint Military Intelligence College). This journal could be published in both a classified and unclassified form similar to the approach taken by the CIA's *Studies in Intelligence*.

> **Recommendation 1.** A professional journal for joint operational and tactical Intelligence providers should be established to facilitate a sense of a shared intellectual community and to promote understanding across function, Service and level.

Other tools to connect this community of expertise and help enhance the sharing and building of knowledge include a number of computer tools that allow collaboration. RAAF policy should encourage and reward the use of these systems so that INTELOs actually participate. Short-term 'loss' of time spent participating will be repaid in the long term with improved depth of knowledge and a more efficient production of future product.

> **Recommendation 2.** Knowledge management principles should be embraced by the Intelligence community and the community should seek to set a benchmark for best practice in their implementation.

> **Recommendation 3.** Tools for near real-time and ongoing collaboration to enable the knowledge management policy should be aggressively sought out.

RAAF training and culture needs to embrace the notion of INTELOs as educators through the provision of necessary courses, adjusting career management to reflect the importance of specialist knowledge-bases and providing the necessary information environments.

> **Recommendation 4.** RAAF INTELOs at the most junior levels should be provided with training and education opportunities that enhance their instructional techniques and capacity to educate others.

> **Recommendation 5.** Posting and promotion policies should reflect the importance of having thoroughly trained INTELOs at the squadron level.

OPPORTUNITIES FOR FURTHER RESEARCH

The broad and inter-disciplinary nature of this thesis has meant that many subjects have only been introduced and not examined fully. The following areas represent opportunities for further research:

- **Knowledge Management for Intelligence.** How RAAF and ADF Intelligence might best leverage opportunities offered by knowledge management with respect to enhancement of the Intelligence categories development and retention of corporate knowledge, and how knowledge management might provide better means of interacting with customers and clients;
- **Innovative Delivery of Learning.** How INTELOs might improve aircrew access to Intelligence by delivering it in innovative ways. Examples might include self-paced e-Learning, tutorial-style discussions or wargaming; and finally
- **Career management for Intelligence Officers.** How effective the current approach to INTELO recruitment, training and retention is in ensuring that warfighters get the Intelligence that they require to do their job.

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