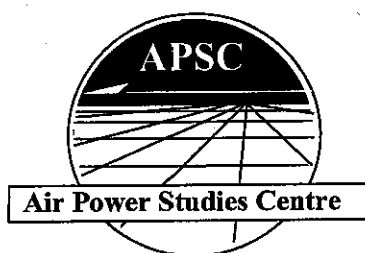


# **INTELLIGENCE SUPPORT FOR AIR OPERATIONS**

Squadron Leader H.B. Keightley, AFC  
RNZAF



Air Power Studies Centre  
RAAF Base Fairbairn  
Canberra

1996

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## **THE AIR POWER STUDIES CENTRE**

The Air Power Studies Centre was established by the Royal Australian Air Force at its Fairbairn base in August 1989 at the direction of the Chief of the Air Staff. Its function is to promote a greater understanding of the proper application of air power within the Australian Defence Force and in the wider community. This is being achieved through a variety of methods including development and revision of indigenous doctrine, the incorporation of that doctrine into all levels of RAAF training, and increasing the level of air power awareness across the broadest possible spectrum. Comment on this publication or enquiry on any air power related topic is welcome and should be forwarded to:

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## ACRONYMS AND ABBREVIATIONS

AO	Area of Operations
AAP	Australian Air Publication (RAAF)
ADF	Australian Defence Force
ADFP	Australian Defence Force Publication
ANZUS	Australia, New Zealand, United States
APSC	Air Power Studies Centre
BDA	Battle Damage Assessment
CDF	Chief of Defence Force
CEP	Circular Error Probable
EO	Electro-Optical
ESM	Electronic Support Measures
I&W	Indicators and Warnings
JFHQ	Joint Force Headquarters
JIC	Joint Intelligence Centre
LRMP	Long Range Maritime Patrol
MAD	Magnetic Anomaly Detector
MLOC	Minimum Level of Capability
MOOTW	Military Operations Other Than War
MRI	Military Related Intelligence
NZ	New Zealand
NZDF	New Zealand Defence Force
OLOC	Operational Level of Capability
OODA (Loop)	Observation, Orientation, Decision, Action (Loop)
ORBAT	Order of Battle
RAAF	Royal Australian Air Force
RNZAF	Royal New Zealand Air Force
ROE	Rules of Engagement
UN	United Nations
USAF	United States Air Force
UTM	Universal Transverse Mercator



## Introduction

*Air power is distinguished from sea and land power by its flexibility, speed, ubiquity, range and shock effect. These characteristics give air power a unique ability to concentrate force and manoeuvre rapidly over long distances.<sup>1</sup>*

The unique abilities which differentiate air power from sea and land power generate unique requirements for intelligence in support of air operations. Air power is able to respond quickly over large distances and so aircraft are often first on the scene in a crisis; intelligence must strive to match this responsiveness and reach by providing timely, fused, all-source products to decision makers and commanders at the strategic, operational and tactical levels.

Even the limitations of air power generate their own intelligence requirements. Aircraft and the bases on which they are dependent must be protected; intelligence must provide assessments of the nature and capabilities of the threat and counter intelligence must protect against the intelligence efforts of other nations. The cost of aircraft and their limited numbers make them a valuable resource. This, combined with their vulnerability in the air, means that intelligence must be provided so that enemy threats can be avoided or negated where possible.

Warfare in the modern age has developed to encompass conflict of global proportions, culminating in the two world wars of the 20th century and a cold war which brought the major powers to the brink of nuclear exchanges. In more recent times, while the likelihood of major conflict has reduced, involvement in United Nations (UN) sponsored peace operations has increased. Most of these operations do not involve combat in the traditional sense of the word, but the risks faced by UN forces are nonetheless real, and the situations they face can alter quickly and dramatically. Rather than just peacekeeping duties, UN forces are now becoming increasingly involved in peace-making and peace-enforcement operations; such operations are closer to combat and must be planned and prepared for from that perspective.

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<sup>1</sup> DI(AF) AAP 1000, *The Air Power Manual: Second Edition*, Australian Government Printing Service, Brunswick, 1994, p. 29.

Figure 1 shows the increasing number of active UN missions over the last six years and it is reasonable to assume that this trend will continue. Air power in almost all its forms has contributed extensively to the conduct of modern peace operations. As the current situation in the former Yugoslavia shows, in some cases, air power offers the only viable method to bring warring factions to the peace table. Intelligence is no less important to these missions than it is to combat and therefore the need for intelligence will continue in the future and is likely to increase rather than diminish.

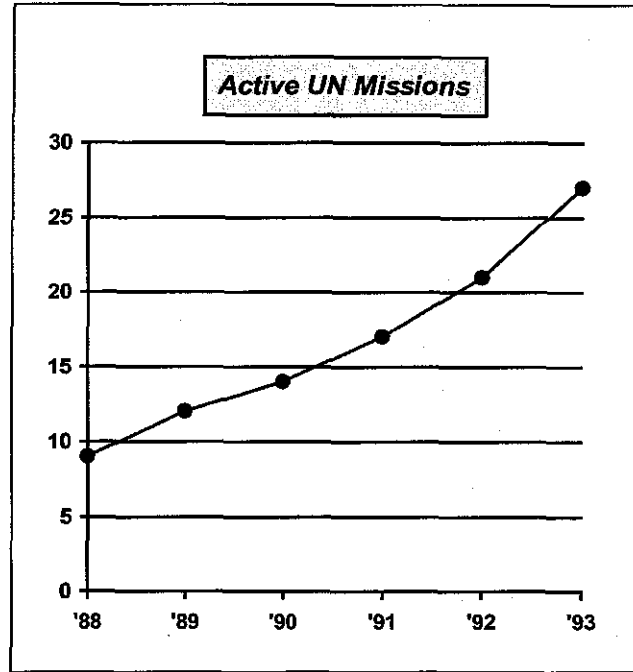


Figure 1 - Active UN Missions <sup>2</sup>

To the commander, intelligence is an essential element in planning and executing both combat and non-combat operations. It provides an assessment of an adversary's capabilities, vulnerabilities and intentions, enabling the commander to prepare and employ his forces more effectively. Intelligence helps a commander identify an adversary's centre of gravity and critical vulnerabilities so that they can be exploited. Intelligence, by reducing the uncertainty faced by the commander, reduces the risks to friendly forces and helps the commander assess the effect of operations. Accurate, timely and relevant intelligence forms the basis for sound planning and is essential to the conduct of air operations.

There has been little evaluation of intelligence specifically required to support air operations in current doctrine or literature. In the New Zealand and Australian context especially, there is a need to draw together the doctrinal and political aspects of intelligence and air power. This is necessary so that appropriate arrangements can be provided to ensure that the advantages air power can offer in the modern theatres of war are fully realised.

The aims of this paper are firstly to establish the need for an intelligence organisation specifically orientated to the support of air

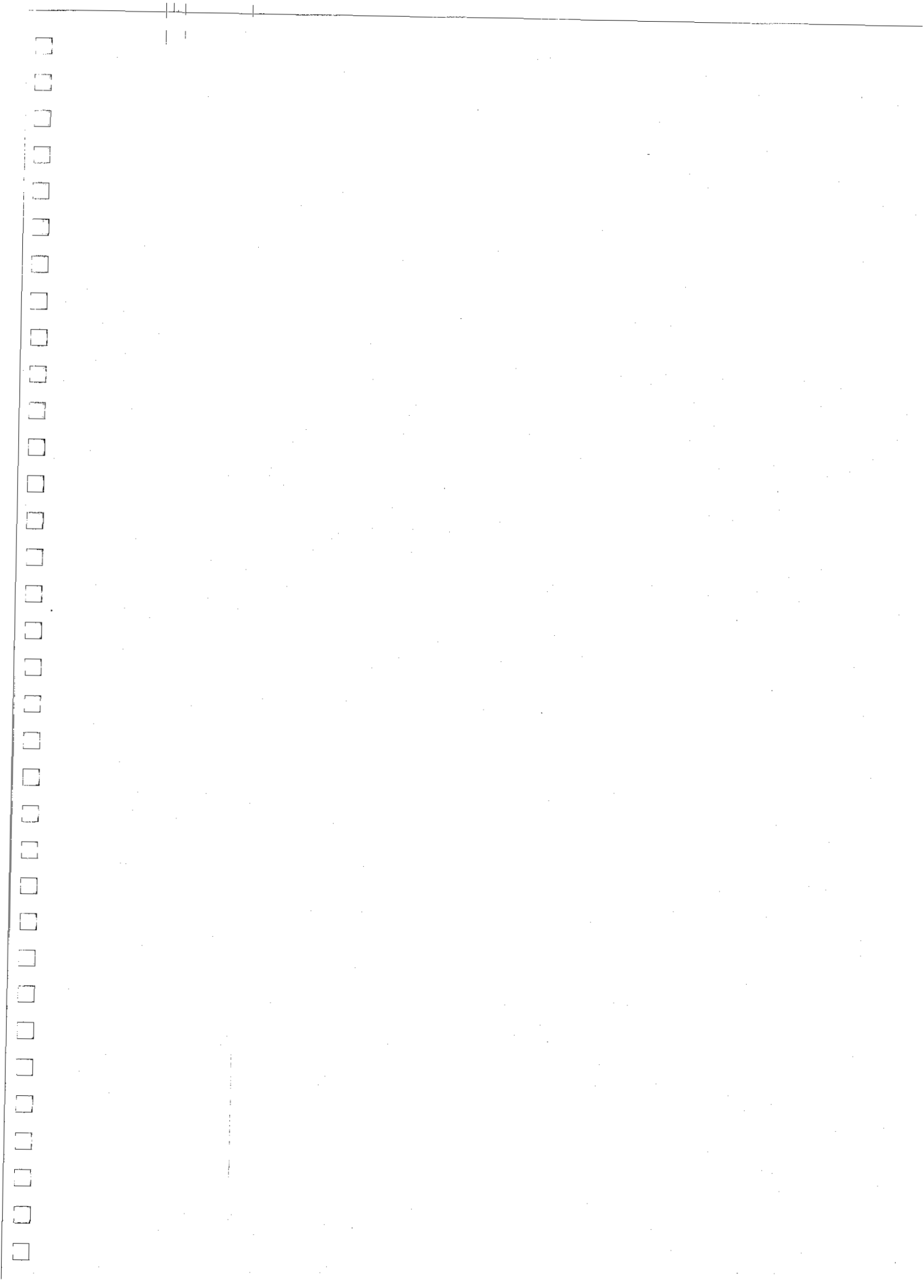
<sup>2</sup> *United Nations Peace-keeping Operations*, United Nations Department of Public Information, March 1994.

operations, secondly to identify the services and products needed at the strategic, operational and tactical levels for the planning and conduct of operations, and thirdly to suggest a suitable organisation structure to provide the support needed for air operations.

This paper is divided into four chapters. Chapters One and Two address doctrinal issues and set the scene by defining intelligence, explaining the processes of the intelligence cycle, specifying its scope, detailing the purposes to which it can be put and explaining its fundamentals which include its principles, key attributes and functions. Although doctrine is authoritative, it is not directive. Doctrine states what should be considered and what generally should be done and its application requires judgement and an understanding of the situation in which it will be applied. Intelligence doctrine outlines the principles of intelligence for the effective support of commanders and their forces. It provides a framework within which intelligence should be used to support the commander in the planning and conduct of air operations.

Chapter Three carries out a top-down appraisal of intelligence support. This chapter defines the intelligence support needed, using the New Zealand model, by following the development of government policy through defence policy to defence outputs and hence the need for strategic intelligence support. From defence outputs flow the roles and tasks of the RNZAF which need operational intelligence for the planning of operations; and finally, from the roles and tasks, come the squadrons involved in the conduct of operations, which need tactical intelligence support. Specific services and products are needed at all three levels and these are identified along with the organisation best suited to provide them.

Chapter Four looks at the developments currently occurring in modern warfare and the direction that intelligence is taking in order to cope.



## CHAPTER ONE

### The Nature of Intelligence

*Nothing is more worthy of the attention of a good general than the endeavour to penetrate the designs of the enemy.*

Niccolo Machiavelli, 'Discorsi, xviii', 1531

The process of gathering intelligence has been described as the second oldest profession, with fewer morals than the oldest. But unlike the oldest profession which never seems to suffer from a shortage of funds, intelligence is often at the mercy of reductions in government funding. Peter Gudgin, in his book *Military Intelligence*, noted that the less a country spends on its armed forces and defence in peacetime, the more it *needs* to spend on intelligence; the better its intelligence the more notice it will have to prepare itself should the need arise. Many governments have ignored this self-evident truth in the past and, as a result hostile actions have caught them with unprepared and ill-equipped forces.<sup>3</sup>

#### Definitions

Carl von Clausewitz defined intelligence in general terms as 'every sort of information about the enemy and his country - the basis, in short, of our plans and operations'.<sup>4</sup> General H.H. ('Hap') Arnold was more specific in his explanation of intelligence as the 'detailed and moment-by-moment knowledge of all aspects of civilian and military activity within the territory of an enemy or a potential enemy, covering their entire political, social, industrial, scientific, and military life'.<sup>5</sup>

The terms intelligence and information are often used interchangeably yet there is an important distinction between the two. At this stage it is instructive to define both.

#### Information

Information is an assimilation of data that has been gathered, but not fully correlated, analysed or interpreted. While not fully analysed or

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<sup>3</sup> Gudgin, Peter, *Military Intelligence: The British Story*, Arms and Armour Press, London, 1989, pp. 132-133 (emphasis added).

<sup>4</sup> Quoted in Air Force Manual 1-1 Vol II, *Basic Aerospace Doctrine of the United States Air Force*, March 1992, p. 288.

<sup>5</sup> *ibid.*

correlated, information still has significant value to the tactical commander. US Joint Pub 1-02 - *Department of Defence Dictionary of Military and Associated Terms*, defines combat information as 'unevaluated data, gathered by or provided to the tactical commander which, due to its highly perishable nature or the criticality of the situation, cannot be processed into tactical intelligence in time to satisfy the user's tactical intelligence requirements'.

## **Intelligence**

Intelligence on the other hand is the product resulting from the processing of information concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations. Integration and analysis, *combined with an understanding of relevant mission requirements*, convert information into useable intelligence. Thus intelligence is the product derived from the analysis of all available information.

Intelligence has been separated into two components: the enemy's capabilities and dispositions (the facts) and the enemy's intentions (the forecast).<sup>6</sup> The term intelligence is also applied to the activity which results in the intelligence product and to the organisations engaged in such activity.

## **The Intelligence Cycle**

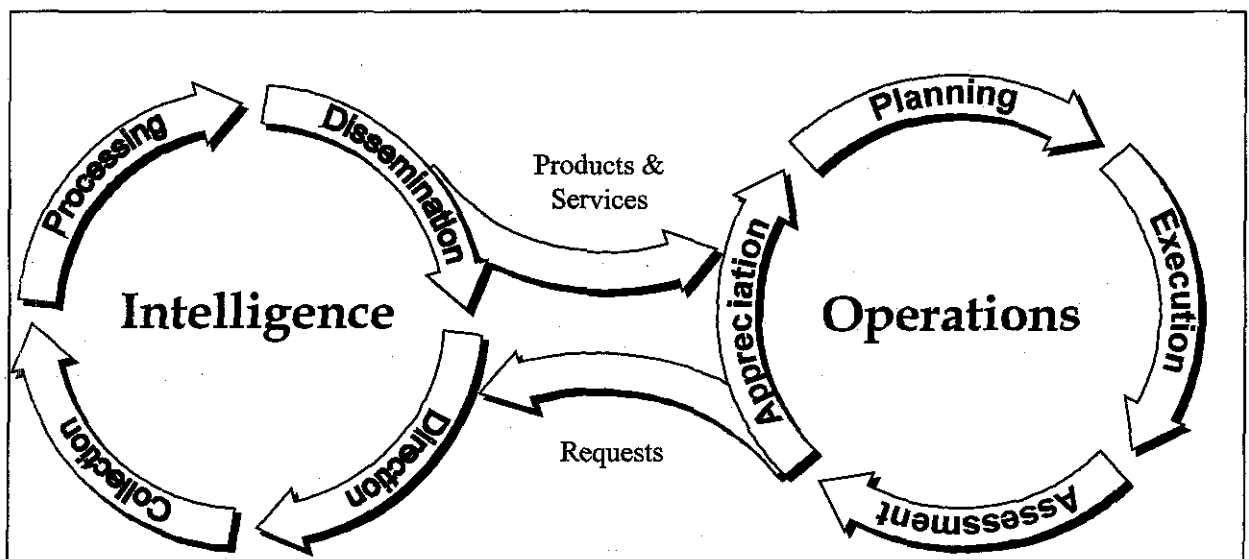
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<sup>6</sup> Jackson, Air Commodore M. R., 'The Gulf War: Strategic Overview', in Taylor, Group Captain M.E. (ed.), *The Gulf War and Some Lessons Learned: Proceedings of an Air Power Conference held in London*, 4 September 1992, p. 12.



The related actions that turn information into intelligence (processing, evaluation, analysis, integration and interpretation) form the basis of the intelligence cycle which is defined in the ADFP 101 - *Australian Joint Services Glossary*, as direction, collection, processing and dissemination.<sup>7</sup> By comparison, the US intelligence cycle has five steps: planning and direction, collection, processing, production and dissemination.<sup>8</sup> US Joint Pub 2-0 divides intelligence into two categories that relate to the intelligence cycle: 'raw intelligence' and 'finished intelligence'. Raw intelligence is information that has been collected but has not been further developed through analysis, interpretation, or correlation with other intelligence, while finished intelligence is information that has been analysed, integrated, interpreted, and evaluated.<sup>9</sup>

Throughout intelligence doctrine, mention is made of the critical part that intelligence has to play in the planning and conduct of operations. Indeed, the relationship between the commander's intelligence, planning and operations staffs is crucial to the success of the commander's mission. Figure 2 depicts the relationship of the intelligence cycle to the operations cycle, and demonstrates that intelligence is not an end in itself but only exists to support operations.



<sup>7</sup> ADFP 101, *Australian Joint Services Glossary*, First Edition, 1994, p. i-6.

<sup>8</sup> NATO combines the processing and production steps into one step which is called processing. Some US agencies have suggested that the evaluation of information processes be recognised as the sixth step of the intelligence cycle. It would be placed between the 'dissemination' and 'planning and direction' steps and would complete the cycle by evaluating previous steps. The information would then be used to enhance further cycle activities.

<sup>9</sup> Joint Pub 2-0, *Doctrine for Intelligence Support to Joint Operations*, United States Department of Defence, 30 June 1991, p. iv-4.

Both cycles act interdependently because they link together through the appreciation process. A major part of an appreciation is the analysis of the enemy's aim, capabilities, possible courses of action, likely course of action, and vulnerabilities, written from the 'blue' point of view. Any information needed for the appreciation that is not known must be obtained. This generates an intelligence request which is incorporated into the collection plan. Once the information has been obtained and processed into intelligence product, it is then disseminated to the requesting unit, thereby completing the cycle. The intelligence is then used to complete the appreciation, formulate the plan and execute the operation. By assessing the success or otherwise of the operation, a further mission may emerge. Another appreciation will be carried out and so the process continues. It is important to note that the processes described above are applicable to all three levels of operations.

In the intelligence cycle, the process of analysing the enemy's aim, capabilities, and so on is termed the intelligence estimate and is written from the enemy's point of view. The distinction between the appreciation and the intelligence estimate is very important as it is not possible for one group of staff to consistently adopt both perspectives which are diametrically opposed. Therefore it is vital that the commander has a separate intelligence staff.

### **Direction**

Direction is the process which determines the intelligence requirements, plans the collection effort, issues the orders and requests to the collection agencies and then continuously monitors the productivity of those agencies. Intelligence planning flows from the commander's mission, appreciation of the situation and operational objectives. The commander's requirements must be the principal determinants of the intelligence organisation's activities. Once the commander has determined the nature and scope of his intended operations, the intelligence staff assist in identifying and selecting specific objectives and targets, and the planning staff then determine the means, operations and tactics to be used. Confirmation of a commander's intelligence requirements leads, through the intelligence estimate, to the identification of a series of more detailed information requirements which further focus the intelligence collection effort.

### **Collection**

Collection is the gathering of information by collection agencies from all available sources and the delivery of the information obtained to the appropriate processing unit for use in the production of intelligence. The information requirements derived from the intelligence estimate form the basis for preparing a collection plan. The purpose of such a plan is to ensure a methodical collection of information to satisfy intelligence and information requirements. A collection plan should:

- detail the commander's intelligence requirements, information requirements, indicators and specific orders and requests in order of priority;
- include all available sources and agencies, showing those which are capable of meeting specific orders or requests and those which are to be tasked;
- indicate to each source or agency the priority to be afforded to specific tasks or requests levied on it, the form of reports and the time by which reports are required;
- denote which information has, or has not, been collected so that all available sources may be re-tasked to meet new, or as yet unsatisfied, information requirements; and
- indicate the time by which the information is required.

## **Processing**

Processing is the phase in the intelligence cycle which converts information into intelligence and includes collation, evaluation, analysis, integration and interpretation. *Collation* draws together all the information available on a specific subject; *evaluation* determines the reliability and credibility of information and its relevance to the operation at hand; *analysis* separates information into its component parts; *integration* combines the analysed material with other information, including previously produced intelligence, so that meaningful relationships are clarified; and *interpretation* deduces the significance of the information and makes predictions of enemy intentions or other factors likely to impact on the battlespace. This sequence of actions has been likened to the operation of a filter which progressively purifies or refines the product according to pre-arranged settings.<sup>10</sup>

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<sup>10</sup> Otis, General G. K. and Johnson, Major J. F., 'A Commander's Perspective on the Tactical Intelligence System', *Military Intelligence*, April-June 1986, p. 19.

## **Dissemination**

Dissemination is the timely conveyance of intelligence, in an appropriate form and by any suitable means, to those who need it. Dissemination could be considered the most vital element of the intelligence cycle. If any of the other elements are missing or carried out incorrectly, intelligence can still be useful, but without dissemination the intelligence cycle is being carried out for its own sake. The goal of the dissemination process is to provide the right amount of appropriately classified intelligence when, where, and how it is needed. Getting the product to the user is the last step in the intelligence cycle, but because the cycle is dynamic, the process does not end with dissemination. Intelligence personnel must ensure that the product is used and that, through feedback, intelligence requirements have been satisfied and the finished products are useable.

## **Scope of Intelligence**

Air forces must be prepared to operate at the strategic, operational and tactical levels of war. Intelligence provides an understanding of an adversary's capabilities and intentions which supports planning and operations at all levels of war. Intelligence support to operations can be divided into the same three levels, each of which influences the others and overlaps to the extent that information collected to satisfy one level may also satisfy others.

## **Strategic Intelligence**

Australian Defence Force Publication (ADFP) 19 - *Intelligence*, defines strategic intelligence as the 'intelligence required for the formation of policy and military plans at national and international levels'.<sup>11</sup> It is primarily concerned with the capabilities and intentions of countries and their allies and involves the study of geographic and environmental factors, economic capacity, alliances, and the personalities who determine policy.

## **Operational Intelligence**

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<sup>11</sup> ADFP 19, *Intelligence*, Canberra, April 1995, p. xiv.

Operational intelligence is a term which embraces the operational commander's intelligence requirements associated with planning and executing all types of operations within regional theatres or areas of operations. It is primarily concerned with enemy strengths, capabilities, dispositions and intentions. It also covers weather and geographical features in the likely areas of operation, both of which assist the operational commander in deciding how best to employ forces while minimising risk.

### **Tactical Intelligence**

Tactical intelligence is that knowledge required at the tactical level of war for the planning and execution of missions and tasks at the component or unit level. It differs from operational intelligence in that it concentrates on a potential adversary's tactical capabilities, his *immediate* intentions, his equipment and tactics and the operating environment.

### **Purposes of Intelligence**

Intelligence, which supports all aspects of air operations, has the following purposes:

- |   |   |
|---|---|
| • Supporting the Commander                        | • Identifying Centres of Gravity and Critical Vulnerabilities |
| • Supporting Planning and Execution of Operations | • Supporting the Operating Forces                             |

**Figure 3 - Purposes of Intelligence**

### **Supporting the Commander**

For intelligence to be effectively applied, the commander and his forces must have a clear understanding of what intelligence can and cannot provide, and how it will support the operation. Intelligence is a tool that commanders need to assist in determining the feasibility of, or the risks associated with, an operation. As the previous section of this paper shows, once the decision to proceed with an operation has been made, intelligence becomes vital for planning, direction and evaluation. The intelligence officer must support the commander not only with tailored intelligence, but with an understanding of the capabilities and limitations of the intelligence system as well. He should help the commander understand the adversary's intent and

decision-making process and furthermore should analyse the situation to provide assessments of the enemy threat and friendly opportunities.

### **Identifying Centres of Gravity and Critical Vulnerabilities**

Centres of gravity are those characteristics, capabilities or localities from which a military force derives its freedom of action, physical strength or will to fight. Critical vulnerabilities are those elements of a military force that are vulnerable to attack and whose degradation or destruction will lead to defeating a centre of gravity.

As part of the overall planning process, the intelligence staff compares the adversary's situation, objectives, intentions and capabilities with their own forces from the enemy's perspective. The operations and planning staffs have an identical function but from the commander's perspective. Through analysis the staff can identify those enemy capabilities that pose the greatest threat to friendly forces and those friendly vulnerabilities they predict the enemy will seek to exploit.

### **Supporting Planning and Execution of Operations**

During planning, intelligence requirements which will support the operation are continuously identified. Gaining knowledge of an adversary's capabilities and intentions may alter operational plans significantly. Similarly, changing operational tasking may in turn modify the intelligence that is required. A close partnership between intelligence and operations will assist by keeping operations focused on the mission and by helping intelligence to meet the mission requirements. Throughout all phases of planning and execution, intelligence and operations remain critically interdependent.

### **Supporting the Operating Forces**

As well as supporting the commander, intelligence also supports operating forces according to their specific environmental needs. In the case of air forces, for example, specific requirements for intelligence support come about because of their mobility and forward deployment, the unique nature of the air environment, the vulnerability of aircraft and their dependence on support infrastructure. Air force intelligence must therefore be designed and structured to meet these support requirements.

## *The Nature of Intelligence*

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Communications are vital in ensuring that intelligence is available to the commander and his forces at every level throughout the battlespace. Relevant intelligence must be made available to the commander on the basis of planned contingencies; similarly, because forces must be capable of responding quickly, the commander must be able to obtain timely and relevant intelligence at any time, at any location and from all available sources.

All elements of the national intelligence system, including civilian agencies, can ultimately provide effective support in some way to the commander and his forces. Yet effective intelligence support can only be assured when the commander and the members of his intelligence organisation have a clear understanding of the fundamentals of intelligence.





## CHAPTER TWO

### Fundamentals of Intelligence

The fundamentals of intelligence, distilled from years of experience, guide both the commander and the intelligence officer. The commander who understands these fundamentals can employ intelligence to his best advantage; likewise, the intelligence officer who understands these fundamentals can provide the best support to the commander. The fundamentals of intelligence include basic principles, key attributes, and intelligence functions. They apply across the spectrum of military operations - from peacetime exercises, to operations short of war and to combat.

### Principles of Intelligence

The principles of intelligence, listed in Figure 4, provide enduring guidelines for the effective use of intelligence. Understanding and applying these principles will assist in the planning and conduct of operations and make the most efficient and effective use of assets.

- |   |  |
|---|--|
| • Know the Adversary                          | • Plan for Combat                              |
| • Centralised Control and Methodical Planning | • The Commander's Needs are Paramount          |
| • Use an All-Source Approach                  | • Distinguish Between Knowledge and Conclusion |
| • Pursue Interoperability                     |  |

**Figure 4 - Principles of Intelligence**

### Know the Adversary

In his report on the conduct of the Gulf War, General H. Norman Schwarzkopf attributed 'the great military victory achieved in Desert Storm and the minimal losses sustained by US and Coalition forces to the excellent intelligence picture the coalition forces had on the Iraqis'.<sup>12</sup>

The fundamental responsibility of intelligence is to help decision-makers at all levels of command by providing the fullest possible

<sup>12</sup> Schwarzkopf, General H. Norman, *Conduct of the Persian Gulf War (Title V Report)*, p. 333.

understanding of the enemy and the situation. Knowing how the enemy thinks is essential in forecasting his likely courses of action. This understanding is gained by knowing the adversary's goals, objectives, strategy, intentions, capabilities, methods of operation, vulnerabilities and values. This knowledge is gathered by studying his character, culture, social mores, customs and traditions, language and history.

Air forces may be called into action in a variety of contingencies and will often be first on the scene in a crisis. Intelligence must therefore identify potential adversaries in peacetime and gather intelligence for anticipated crises. Therefore intelligence is a core function in peacetime. While it is desirable to know all potential adversaries, resource constraints, amongst other factors, can necessitate intelligence efforts being focused on the most likely.

### **The Commander's Needs are Paramount**

Intelligence is at the heart of combat decision-making because it enables forces to 'fight smarter' by reducing uncertainty about the adversary.

When considering intelligence support, it is important that the commander and the intelligence provider acknowledge that intelligence support is driven by the needs of the customer. The intelligence community must provide a series of products and services that, as much as possible, meet the needs of the commander. This places a responsibility on the commander to specify the intelligence support that is needed, including the type of service or product, its form, content and media. The intelligence community has a responsibility to educate the commander and his staff so that they understand what intelligence can and cannot do, what products and services are presently available, and which best meet their needs. It is just as inefficient for the commander to ask for a product which cannot be provided as it is to provide a product that does not meet the commander's needs.

As discussed in Chapter One, the best means of ensuring the commander's needs are satisfied is to link the intelligence process directly to the operational cycle around the central pivot of the commander's mission.

### **Centralised Control and Methodical Planning**

Intelligence must be centrally controlled to avoid duplication of effort and gaps in collection. Any requirement for intelligence must be specifically expressed to ensure that its collection is planned efficiently and economically. Sources and agencies all have their own characteristics and limitations, and these must be known by the intelligence staff. Methodical planning will take priorities into account, prevent duplication (unless it is deliberately arranged for confirmation), avoid gaps and ensure that sources are not tasked beyond their capabilities.

### **Plan for Combat**

A military intelligence system structured to provide wartime support for any military operation can be adapted for peacetime operations. The converse is not necessarily true. Thus warfighting intelligence structures, resources, methodologies and products should be established, viable and operational in peacetime so that they are available in any type of conflict or for any form of operation.

Today's armed forces can be employed in all manner of operations that cover the continuum from combat to Military Operations Other Than War (MOOTW). This paper concentrates on the combat end of the operations continuum and therefore mentions such things as strategies, objectives, centres of gravity, targets, adversaries and enemies. In war these are often relatively easy to recognise, however, they may also apply in MOOTW. For example, in war, an objective may be to stop an enemy's armoured advance, which could involve dropping bombs; by contrast, in MOOTW, an objective may be to stop a refugee exodus which could involve dropping food and supplies. In war, a centre of gravity may be the adversary's industrial capacity, while in MOOTW it may be the need to feed the population. While a target in war may be a power plant, in MOOTW it may be a drop zone for food and supplies. Finally, in war, the adversary may be easy to determine, in MOOTW it may be less recognisable and may include such things as drought and disease.

Combat operations place the highest demands on the operational commander, the tactical units and the supporting elements. The commander must make decisions that, if wrong, place the lives of his people, and possibly the security of his country, in jeopardy. The tactical units are in the front line and must 'get it right' the first time or pay the penalty. The support needed, the urgency with which it is required, and the consequences if it is not forthcoming, place added pressure on the supporting elements. An organisation that is structured and trained for combat operations, will be able to adapt to MOOTW, however, the converse is seldom true.

### Use an All-Source Approach

Developing an intelligence assessment is comparable to doing a jigsaw puzzle without all the pieces and without a picture of the finished product. To develop the full picture, the intelligence analyst should seek as many of the pieces as possible. This approach is known as the principle of 'all-source' analysis. The most complete and reliable intelligence assessments usually emerge after a fusion of intelligence and information from multiple sources and perspectives.

Imagery Intelligence	IMINT
Human Intelligence	HUMINT
Measurement and Signature Intelligence	MASINT
Acoustic Intelligence	ACINT
Infra-red Intelligence	IRINT
Open Source Intelligence	OSINT
Signals Intelligence	SIGINT
Communications Intelligence	COMINT
Electronic Intelligence	ELINT
Scientific and Technical Intelligence	S&TI
Medical Intelligence	MEDINT

**Figure 5 - Principal Intelligence Sources**

Intelligence sources vary greatly in capability, method, sophistication and usefulness, ranging from a local informant to a billion dollar reconnaissance satellite. Each source possesses capabilities that make it unique, yet each has limitations. A reconnaissance satellite, for example, may provide coverage over a desired area that is not available from any other source, yet it may be affected by adverse weather or orbital geometry. The usefulness of a source is not necessarily dependent on its level of sophistication and often the best intelligence comes through the simplest means of collection. Figure 5 lists the current sources of intelligence and their usual abbreviations. While collection from some of these sources is beyond the capability of most countries, their inclusion serves to illustrate the variety and breadth of intelligence sources that can be available. Use of an all-source technique guards against analytical errors or enemy deception, because it is more likely to provide corroborating data. All-source analysis can highlight conflicting data and thereby serves as a focus for further analysis to form a more accurate picture.

## **Distinguish Between Knowledge and Conclusion**

The decisions a commander makes concerning objectives and operations may rest on knowing the particular logic used to develop an intelligence estimate. The intelligence officer must therefore recognise those situations where the commander must be made aware of the full range of opinions, possibilities, hypotheses, interpretations, and conclusions. General Colin L. Powell made this point very well when he said 'tell me what you know ... tell me what you don't know ... tell me what you think ... always distinguish which is which'.<sup>13</sup>

The intelligence officer must distinguish between intelligence that is developed from fact and that which is developed from hypothesis, opinion, or probability. Intelligence can be facts that have been observed, or it can be a conclusion based on facts of such certainty that it is considered to be knowledge. Intelligence can also be conclusions and estimates deduced from incomplete sets of facts or induced from potentially related facts. Where intelligence is to be used for operations, these distinctions should be maintained. The key points of an intelligence product should be identified as 'fact', 'knowledge', 'hypothesis', 'opinion', or 'probability'.

## **Pursue Interoperability**

Intelligence systems, communications, concepts, products and language must be interoperable to allow the effective exchange and use of intelligence among intelligence organisations and operating forces worldwide. An intelligence system should provide data and information in a form suitable for employment by the user. For example, if one user requires maps with Universal Transverse Mercator (UTM) coordinates while another uses charts with geographic coordinates, then location information should be expressed in both UTM and geographic coordinates.

Air power can prove vital in meeting these principles of intelligence mainly through the reconnaissance role. Because of its reach, speed and responsiveness, air power can provide intelligence from nine of the eleven sources listed in Figure 5. Through the provision of intelligence air power can assist in knowing the adversary, help to distinguish between knowledge and conclusion through specific tasking of reconnaissance assets, meet the commander's needs and help plan for combat. Not only does air power provide intelligence, it

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<sup>13</sup> General Colin L. Powell, US Army, Chairman, Joint Chiefs of Staff, 1990, quoted in Naval Doctrine Publication 2, *Naval Intelligence*, Department of the Navy, Washington, 30 September 1994, p. 18.

is also a major user which relies on intelligence provided by the other services. The pursuit of interoperability is therefore imperative.

### **Key Attributes**

Effective intelligence has several mutually supportive attributes or qualities. In certain cases these qualities can appear as competing goals. For example, although both thoroughness and timeliness are attributes of any intelligence product, concentrating totally on thoroughness could have an obviously detrimental effect on timeliness. To be effective, intelligence must strike a realistic balance between the two. The key attributes of intelligence are listed in Figure 6.

- |                |                |
|----------------|----------------|
| • Timeliness   | • Objectivity  |
| • Useability   | • Availability |
| • Thoroughness | • Accuracy     |
| • Relevance    |                |

**Figure 6 - Key Attributes of Intelligence**

### **Timeliness**

Intelligence must be available in time for the commander to assess what needs to be done and to take appropriate action. The principle of timeliness applies to the whole intelligence cycle, from determining the collection plan right through to disseminating the finished product. However, a key consequence of timely intelligence is that the more quickly the data is provided, the less likely it has been fully analysed for its significance and accuracy. This causes a dilemma for the intelligence analyst because if the time is not taken to verify the accuracy of a piece of information, resources may be wasted and the credibility of the intelligence staff harmed. However, if too much time is taken verifying information, then that information may be received too late to be applied.

### **Objectivity**

For intelligence to be effective it must be objective, that is, it should be truthful, unbiased, undistorted and free from political or other constraints. To satisfy the first three of these criteria, intelligence analysts should be meticulous in their efforts to discount their own preconceived notions and not allow these to influence, much less drive, the intelligence effort. To satisfy the final two criteria, the way

in which intelligence is produced, the products and services provided and the uses to which it is put must not be directed to achieve an institutional position or a pre-determined objective.

### **Useability**

The form in which intelligence is provided to the user should be tailored for particular applications or at least suitable for general use without additional analysis or manipulation. Intelligence should therefore be produced in a form suitable for application by the user so that relevant information can be quickly identified and applied. In order to achieve this principle, intelligence producers should understand the circumstances under which their products will be used, but equally important, intelligence users must make known the situation in which they are operating, the intended use of the intelligence product, and any particular requirements of content, form, medium or presentation.

### **Availability**

To support the commander's planning and operations, intelligence should be available when and where needed. However, there are conflicting priorities for the intelligence producer in meeting this attribute. On the one hand is the need to protect sensitive intelligence sources and methods. On the other is the danger that the overly restrictive classification of intelligence may deny it to those who truly need it. Intelligence producers should therefore, where possible, sanitise intelligence products by removing references to the highly classified sources of data and release them at a lower classification, thereby making them available for much wider distribution. Such wider distribution must still be governed by the 'need to know' rather than the 'right to know'.

### **Thoroughness**

Commanders, staffs and forces should receive all the intelligence they need to accomplish their missions and for the security of their forces and operations. However, the intelligence picture will seldom be complete, and so the commander should be made aware of any gaps in the available information, since it is only by recognising the known and the unknown, that the commander can apply appropriate judgement to reduce the risks faced by his own forces.

## **Accuracy**

Intelligence must be based on facts and the application of sound judgement. It must also convey an appreciation of the situation and estimate future situations and likely courses of enemy action. The accuracy of intelligence can be verified by using an all-source approach which gathers information from any and all sources, including unclassified ones, to build a comprehensive picture of the situation.

## **Relevance**

For intelligence to be effective its products must be relevant. They should relate directly to the operations at hand and to the level of command for which they are intended. In addition, they should be appropriate for the purpose to which they will be applied and for the way in which they will support the operation. At the same time intelligence products should contribute to the commander's understanding of the enemy and the situation of his own forces relative to that of the enemy.

Given the nature of air operations (distance, responsiveness and destructive power), success depends on the provision of intelligence that meets these key attributes. For example, air defence aircraft held at cockpit readiness, awaiting the detection of unidentified targets. These aircraft need intelligence early enough to scramble and carry out an intercept; the intelligence, when it is passed to the crews, must be in a useable form, it must be accurate, there must be sufficient to successfully complete the mission and it should only cover information relevant to the mission; if the intelligence does not meet these attributes then valuable time is wasted either waiting for intelligence or interpreting and analysing it when it arrives.

## **Intelligence Functions**

There are 10 primary intelligence functions which, when performed, will normally meet the strategic and operational requirements of the commander. These functions are listed in Figure 7.



- |  |                                      |
|--|--------------------------------------|
| • Indications and Warnings                 | • Current Intelligence               |
| • Military Capability Assessments          | • Enemy Courses of Action Assessment |
| • Military-Related Intelligence Assessment | • Target Intelligence Support        |
| • Collection Management                    | • Operational Intelligence           |
| • Force Protection                         | • Combat Assessments                 |

**Figure 7 - Intelligence Functions**

### **Indications and Warnings**

Indications and Warnings (I&W) is the evaluation and assessment of the likelihood of an enemy attack. The I&W process anticipates hostile operations and aims to provide sufficient warning time to allow friendly operations to prevent, pre-empt, counter or moderate the effects of enemy action. Strategic I&W is long-term and the assessment is built-up over time, while operational and tactical I&W may be very time-dependent and time-critical.

### **Military Capability Assessment**

The military capability assessment provides the commander with an assessment of a potential enemy's military capabilities and includes five major components:

- Leadership and Command and Control - an assessment of how enemy commanders direct their forces to accomplish a designated mission.
- Order of Battle - the identification of enemy force components and an assessment of the strength, structure and disposition of personnel and equipment.
- Force Readiness and Mission - an assessment of the readiness and anticipated actions of a force to achieve its objectives.

- Force Sustainability - an assessment of the ability of a force to maintain the level and duration of combat activity needed to achieve objectives.
- Technical Intelligence - an assessment of the technical capabilities of forces, units and weapon systems, as well as their capabilities, constraints and countermeasures.

The collection of information for the military capability assessment is an on-going activity and is subject to regular review.

### **Military-Related Intelligence Assessment**

There are many capabilities that a potential enemy has that are not specifically military in nature but which may have an impact on the ability to fight. Military-related intelligence assessments (MRI) result from the analysis of foreign military-related situations of significance to national interests and are continuous and long-term in nature. Subjects associated with MRI are:

- C<sup>4</sup> Systems - an assessment of C<sup>4</sup> availability and connectivity.
- Defence Industry - an assessment of production capacity, stockpiles of goods and raw materials and natural resources.
- Energy Sources - an assessment of the capacity and the distribution network.
- Military Geography - an assessment of natural and man-made physical features.
- Demography - an assessment of population locations, composition, size and fighting ability which includes a continuing assessment of the political, social and economic situation.
- Transportation - an assessment of the lines of communication and the equipment required to conduct military operations.
- The Environment - an assessment of the weather and other environmental factors that could impact on military operations.
- Medical - an assessment of the availability and capacity of medical facilities, equipment and supplies as well as the ability of professional medical personnel to treat casualties.

## **Current Intelligence**

Current intelligence monitors those on-going matters or areas of concern that affect the national interest and supports and updates ongoing operations. It involves the integration of current, all-source information into concise, objective reporting on the current situation in a particular area, and usually contains judgements on how the situation will develop and what the *national implications* are.

Because the current situation can change rapidly, current intelligence is time-critical. Current intelligence is tailored to the requirements of the level being supported, for example CDF may wish to know about enemy politics, while the force commander is more interested in hostile force disposition and sustainment issues.

## **Enemy Courses of Action Estimate**

Intelligence for all levels of command must attempt to see the situation through the eyes of the enemy commander. It must visualise which courses of action are open to the enemy and estimate which is most likely to be adopted. By helping the commander and operations staff to better understand how the enemy will see the situation, what options he will consider, and how he will react (the forecast), the intelligence staff provide an essential complement to the 'facts'. This function can either be time-critical or medium-term depending on the situation and the level of decision being supported.

## **Force Protection**

Protecting the force encompasses indications and warnings, deception of the adversary and the avoidance of deception and surprise. Intelligence should provide the commander with advance indications and warnings of threats or impending attacks in sufficient time to prevent, to pre-empt, to counter or to avoid them. At the same time as the planning for an operation is being conducted, deception and denial measures must be set in place to counter the efforts of the adversary's intelligence system as it attempts to determine friendly courses of action and capabilities. These measures are defined as operations security and require detailed knowledge of the adversary's perceptions, vulnerabilities, intelligence-gathering capabilities and limitations, tactics, techniques and procedures. The adversary will, of course, have instituted similar measures to protect his own forces. Effective force protection therefore limits the adverse effects of deception and surprise.

## **Combat Assessments**

Combat assessment is the procedure by which the commander weighs the effectiveness of operations and determines when objectives have been attained so that friendly forces can be redirected or operations ended. Battle damage assessment, munitions effectiveness as well as an analysis of the enemy's reaction to friendly operations, his morale, materiel status and ability to continue hostilities are all examples of combat assessments.

## **Target Intelligence Support**

Not only does target intelligence support assist the commander in the selection of targets, it also locates and shows the components of a target or target complex and details the information needed to disrupt, debilitate, or destroy the target, whichever suits the commander's aim. This function is subject to regular review.

## **Collection Management**

Collection management is essentially an administrative function which involves the management of all activities that collect information in response to the commander's requests. It is a subset of the more general management of the intelligence process, and it follows the direction phase. The identification of gaps in knowledge and the resources and time available make collection management a critical function.

## **The Provision of Operational Intelligence**

The provision of operational intelligence (defined on page 6) allows the commander to formulate objectives, select options, plan and conduct operations, and analyse the effects. Because of the nature of the information involved in operational intelligence, this function is time-critical.

## **Intelligence Functions and the Operations Cycle**

The conduct of operations is a continuous, cyclic process involving: the identification and assessment of the situation, the development and selection of a course of action, the planning and execution of the operation, and an assessment of the outcome which may lead to

further action. The intelligence functions are carried out to support operations and Figure 8 illustrates the way in which they fit into the operations cycle to provide this support.

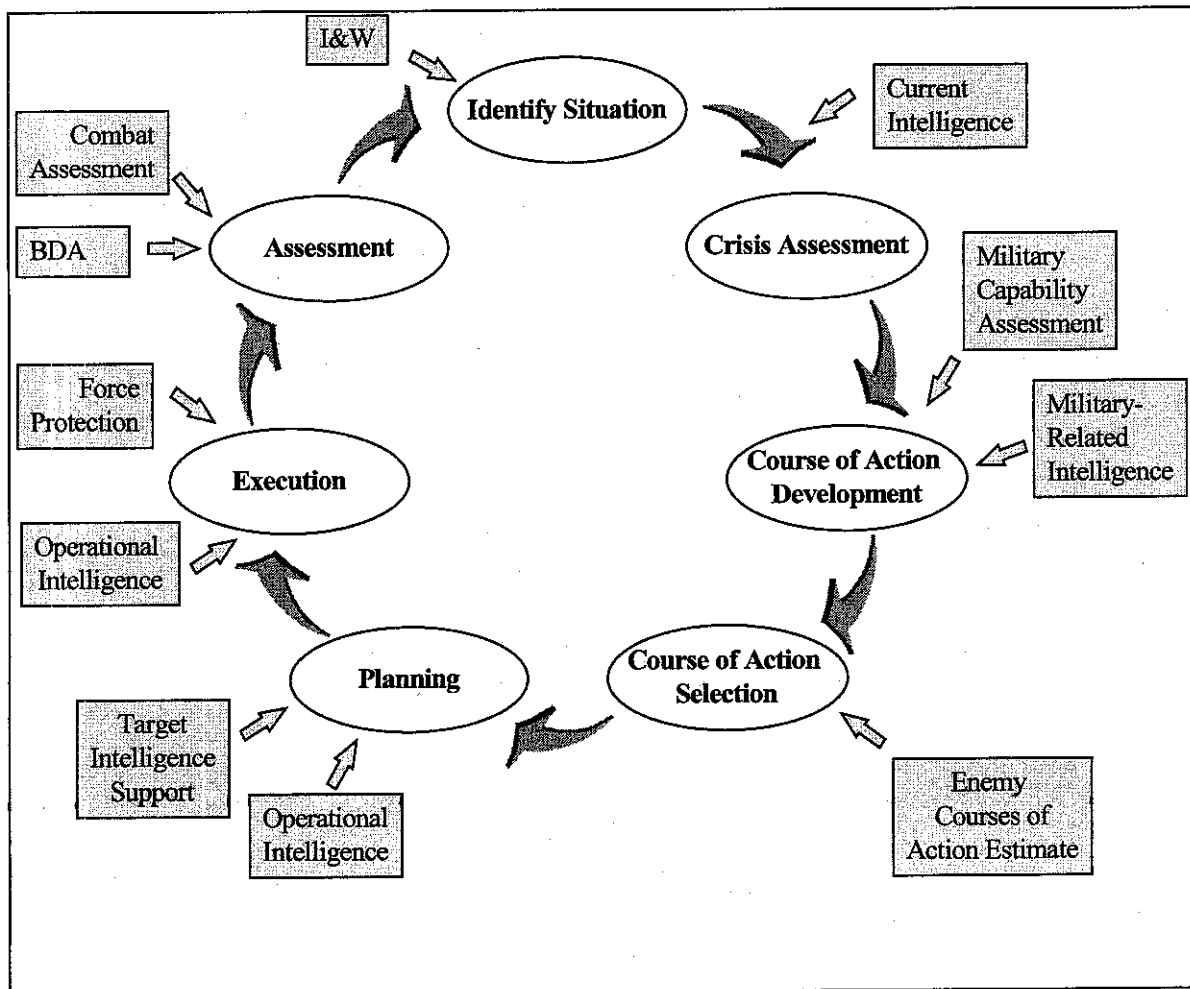


Figure 8 - Intelligence Functions and the Operations Cycle

## CHAPTER THREE

### Intelligence Requirements

*Somewhere...there's...an all-knowing intelligence service. The only trouble is, it's in heaven!*

John le Carré<sup>14</sup>

#### Introduction

When trying to determine the requirements of an intelligence organisation in terms of its structure and the functions it should be capable of performing, doctrine has an important but limited role. Consideration must also be given to the needs of government and how they connect to the roles of the defence forces. The process in Figure 9 explains the way in which a government's security goals flow down through outcomes and policies to determine the force structure and the organisation needed to satisfy national security requirements. Throughout this top-down process, intelligence is required at the strategic level to provide policy advisers and policy makers with the information they require to make informed recommendations and decisions; of equal importance, intelligence at the operational level must support commanders appointed by government, their staffs and those units under their command in the planning of operations; and at the tactical level, intelligence must support units in the conduct of operations. The following analysis uses the New Zealand Government and Defence Force processes to illustrate how the requirements of air operations and the intelligence systems necessary to meet them are defined.

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<sup>14</sup> le Carré, John, *A Perfect Spy*, Authors Workshop, Great Britain, 1986, p. 306.

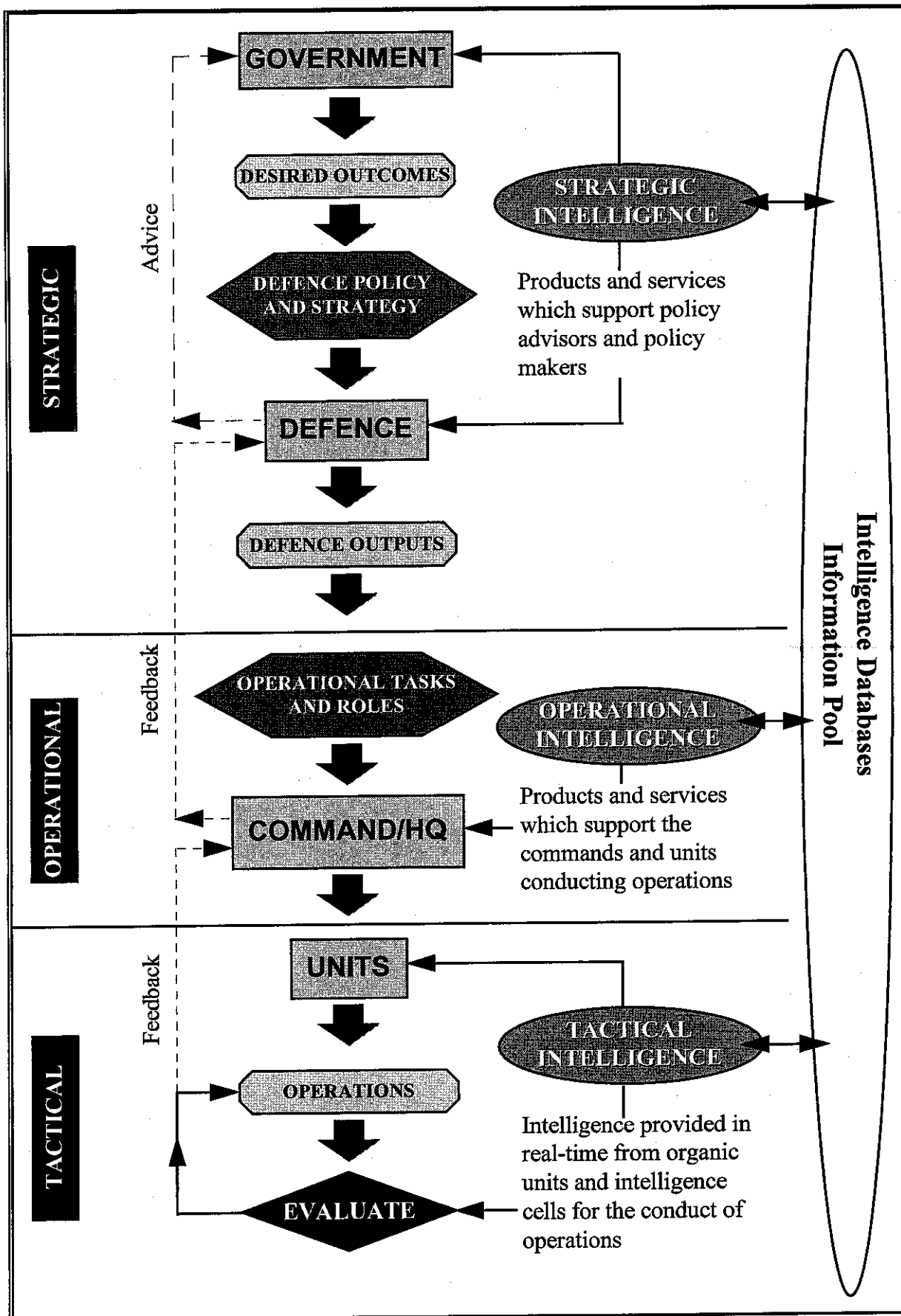


Figure 9 - Policy Development & Intelligence Model



## National Policy

An elected government will have a number of goals which it intends to achieve during its tenure in office; these will cover, amongst other things, such areas as ensured defence and security, the financial well-being of the country, and the provision of social services such as health, welfare and education; the Government will have in mind a number of desired outcomes which will contribute to achieving these goals. The New Zealand Government, for example, has determined the following four national security outcomes in support of its security goals:

- the maintenance of New Zealand's sovereign integrity and the development of its national profile;
- the promotion of New Zealand's exclusive national interests,
- the stability of the area of New Zealand's direct strategic interest - specifically Australia, South East Asia and the South Pacific; and
- the ongoing promotion of world peace and international stability.<sup>15</sup>

## Defence Policy

From these desired outcomes are formed the government's national policies and strategies which are more detailed and formalised. In countries following the Westminster model of government, Defence policy is often expressed in a defence white paper which is produced at intervals of five to eight years. The current examples for Australia and New Zealand are *Defending Australia - 1994* and *Defence of New Zealand - 1991*.<sup>16</sup> A white paper defines a nation's strategic situation and outlook, the defence strategy to be followed, the capabilities required to protect the nation and the resources which will be made available. The New Zealand Government's current defence strategy is termed 'Self-Reliance in Partnership' which requires the NZDF to meet three broad objectives:

- to provide the government with a range of options to contribute to multi-national peace support or peace enforcement operations;

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<sup>15</sup> *Vote Defence Force*, Draft 12, Ministry of Defence, Wellington, 13 March 1995, p. 4.

<sup>16</sup> *Defending Australia: Defence White Paper 1994*, Australian Government Publishing Service, Canberra, 1994, and *The Defence of New Zealand 1991: A Policy Paper*, Government Printing Press, Wellington, 1991.

- to be able to contribute to the maintenance of regional security, including the defence of Australia; and
- to be able to ensure the sovereign and territorial integrity of New Zealand, its outlying islands, and provide security assistance in the South Pacific.<sup>17</sup>

### **Defence Outputs**

Using the white paper as a blueprint, defence officials, in consultation with the Government, determine a set of outputs which best implement the Government's strategy of self-reliance in partnership. In New Zealand there are two types of Defence outputs that contribute to the Government's desired outcomes: Contingent Military Capability (CMC) and Annually Produced Services (APS).

### **Contingent Military Capability**

The NZDF maintains specified levels of military capability that are set at the minimum state of preparedness consistent with warning times and the likelihood of use. When the Government requires the NZDF to increase the level of military capability beyond the minimum, the output produced is called contingent military capability.

### **Annually Produced Services**

Annually Produced Services are specifically quantified services delivered to the Government, eg. 180 hours of Orion flying for search and rescue. During peacetime, many APS are by-products of the NZDF's activities to prepare and maintain agreed levels of capability. The delivery of some APS outputs also provides the NZDF with opportunities for training and testing preparedness, deployment methods and operational procedures.

### **RNZAF Outputs**

The RNZAF outputs include the following CMCs and APSs:

- CMC to conduct maritime surveillance and presence operations,

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<sup>17</sup> *Vote Defence Force*, p. 5.

- CMC to conduct anti-surface operations in the maritime environment,
- CMC to conduct anti-submarine operations,
- CMC to conduct maritime protective operations in a multi-threat environment,
- CMC to conduct air land attack operations (close air support, battlefield air interdiction and air interdiction),
- CMC to provide tactical air mobility for land operations (fixed-wing and rotary-wing),
- CMC to conduct strategic deployment and support deployed forces,
- provision of military advice,
- contribution to peace support operations,
- air defence support flying,
- training assistance in the region,
- maritime surveillance,
- emergency services, and
- ancillary services.<sup>18</sup>

## **Strategic Intelligence**

So far, the flow and structure of the model at Figure 9 have been focused at the strategic level and the intelligence required to assist in the process is also strategic. The government has at its disposal all the agencies of the national intelligence system to provide advice and information to its policy advisers and policy makers. Strategic intelligence can be separated into two parts, support for the determination of policy and support for the planning and conduct of operations at the national (strategic) level.

## **Policy Support**

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<sup>18</sup> *ibid.*, pp. 22-49.

For the government to determine achievable outcomes, effective defence policies and workable defence strategies it must be provided with strategic intelligence which adheres to the key attributes of timeliness, objectivity, useability, availability, thoroughness, accuracy and relevance (outlined in Chapter Two). The foundation for determining defence policy and strategy is an accurate assessment of the current and future threat to national sovereignty and interests. Intelligence required on countries in the region includes coverage of their military capabilities, their long term intentions, the stability of their government, the strength of their economy, and the alliances and defence arrangements they have entered into. Once an accurate picture of the strategic situation and the outlook has been compiled, the government is in a position to determine the best policies and strategies to pursue.

### **Planning Support**

For the planning and conduct of operations, the government needs additional intelligence to that provided for the determination of policy in peacetime. When a crisis develops that may involve the application or threat of force, one of the first decisions facing the government is whether or not to commit forces. Strategic intelligence gives an assessment of the situation, the threat posed by the adversary and therefore the risks which will be faced by friendly forces. Strategic intelligence contributes to the structuring of friendly forces such that their capabilities match or better the capabilities of the adversary; it gives an assessment of the tasks that the force may be employed on and how effective they may be. Having decided to commit the force, strategic intelligence staffs monitor the situation and provide advice which allows the government to decide when to commit, reinforce, replace or withdraw the force.

### **Defence Roles and Tasks**

Once defence outputs are agreed upon, they can be analysed to determine what assets and structures are needed to best achieve them. In this way, ideally, the structure of commands and units, the operational roles and tasks and the platforms needed by the defence force are determined. In reality, the defence force has an existing inventory and the government has a limited amount of funds, both of which determine the defence outputs that can be achieved and therefore the roles and tasks for defence. Should the government identify a defence output which it sees as vital but which cannot be met using existing assets, then funding must be provided to acquire what is needed.

In New Zealand's case, the roles and tasks for the RNZAF flow from the defence outputs specified by Government (detailed on Page 28). The roles and tasks are: anti-surface warfare, anti-submarine warfare, close air support, battlefield air interdiction, air interdiction, strategic and tactical airlift, surveillance, air-to-air refuelling and search and rescue.

In Australia, by comparison, the roles for the RAAF are determined by the defence white paper and are articulated in the Air Power Manual. They are covered under the four broad headings of Counter Air, Strike and Interdiction, Anti-Surface Forces, and Force Enhancement.<sup>19</sup> These roles can be broken down further into the air tasks of: air-to-air refuelling, airborne early warning and control, airlift, anti-surface warfare, anti-submarine warfare, battlefield air interdiction, close air support, defensive counter air, electronic warfare, interdiction, offensive counter air, reconnaissance, suppression of enemy air defences, strike and surveillance.<sup>20</sup> While these air tasks are applicable to most air forces, only large air forces will have the assets and the funding to conduct them all.

Once the air tasks have been identified and assets allocated to cover each one, the appropriate structure of an air force can be determined. Assets can be organised into units on the basis of type (squadrons) or task (USAF composite wing concept). Squadrons of like type or similar task are joined into wings which are joined into groups which are in turn joined into commands. Because of the relatively small size of their air forces, in Australia and New Zealand all operational air assets are commanded by one air commander.

### **Contingency Planning**

The government, as part of its threat assessment, will have identified a number of possible contingencies for which it wants defence to be prepared. In order to allow detailed planning to be completed, the government must be quite specific as to the anticipated geographic area in which the force would operate, the response time it wants defence to meet, the anticipated duration of the contingency, and the military tasks it expects defence to perform. It is these operational military tasks which provide the linkage between defence policy and military capability, ie. military capability is only meaningful when it is related to a particular military task which a force element or elements

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<sup>19</sup> DI(AF) AAP 1000, *The Air Power Manual: Second Edition*, Australian Government Printing Service, Brunswick, 1994, p. 48.

<sup>20</sup> *ibid.*, p. 213.

could be expected to perform in plausible operational circumstances defined by defence policy guidance.<sup>21</sup>

The government of a nation that is dependent on maritime trade, for example, may decide that the disruption of its sea lines of communication is a possible contingency for which it must be prepared. This disruption could occur as the result of piracy, the actions of a single country or the result of a wider ranging dispute. It could possibly occur with as little as one month's notice and could last for up to, say, six months. Maritime surveillance and maritime attack are the military tasks associated with this contingency.

Knowing the likely area of operations, the military tasks, the response time, and the expected duration, Defence Headquarters can then allocate forces to cover the contingency. A contingency plan can then be prepared by the environmental command and the wing/units involved. This plan must identify the capability and the threat posed by the likely adversary, and the size of force and capabilities needed to counter this threat. The plan will also identify the requirements for intelligence and logistics needed to support the force. Any shortfalls of logistics support or intelligence which cannot be satisfied within the response time specified by government must be purchased immediately and held in stock (logistics), or obtained and updated on a continuing basis (intelligence). Thus the intelligence support for any operation must be planned for like any other support function.

### **Operational Intelligence**

At the command headquarters, the focus is at the operational level. The intelligence needed to support the commander is operational in nature and is centred on the planning and conduct of operations - in this example, the protection of sea lines of communication. The commander needs to understand the strength, disposition and capability of the adversary and the effect that weather and the environment will have on his forces. This information allows him to select the optimum mix of forces to achieve the task and to assess the risks they will face. The commander will need intelligence to *determine the centre of gravity and the critical vulnerabilities of the adversary's forces.*

The level of capability required to defeat the threat is termed the Operational Level Of Capability (OLOC). Any military capability consists of four components: manpower, the state of training of that manpower, equipment, and the condition of that equipment.

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<sup>21</sup> *Vote Defence Force*, p. 6

Increasingly though, the information required to support the capability is becoming more important and could be considered the fifth component.<sup>22</sup> If the current capability does not match the OLOC then the shortfalls must be analysed to determine those that cannot be redressed within the nominated response time and immediate action taken. A by-product of this process is the ability to determine the Minimum Level Of Capability (MLOC) required which is 'that level of capability which a force needs to generate, and retain, as the minimum start point from which it can generate an OLOC for a designated military task, within a specified degree of notice'.<sup>23</sup>

Once his forces are engaged in operations, the commander needs further intelligence to determine when the task has been accomplished, when forces can be re-assigned and how effective the operation was. The requirement for intelligence is therefore continuous and cyclical.

### **Tactical Intelligence**

At the tactical level, the focus is on conducting operations. The intelligence required is of an immediate nature and is directly concerned with the operation of aircraft, the capabilities and immediate intentions of the adversary and the current environmental conditions. Strategic and operational intelligence agencies may be unable to provide the information needed, and in fact may rely on the unit in the field to provide the most up-to-date information for strategic and operational intelligence assessments. This information is used to evaluate the operation and determine if the desired end-state has been achieved; it assists in determining whether the force should remain in place, be reinforced, withdrawn or replaced. The unit will get tactical intelligence from whatever source is available and in whatever form it comes. If the unit is involved in a combined operation, then the tactical intelligence units of allies may provide the necessary information. There is a need for close liaison and compatible systems and procedures.

### **Intelligence Services and Products**

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<sup>22</sup> For example, 'dumb' bombs with a CEP of 500 feet need maps of a certain accuracy. If the maps are too accurate, then effort has been wasted. However, 'smart' bombs with a CEP of 20 feet need target data that is two orders of magnitude more accurate. Without this more accurate data, 'smart' bombs can not be employed with the same effectiveness and the level of capability is therefore reduced.

<sup>23</sup> *Vote Defence Force*, p. 19.

Having established the typical range of roles and tasks for an air force that are derived from government policy goals for national security, and having determined that these roles and tasks have the need for intelligence at the three levels of war, it is necessary now to specify how the need for intelligence is satisfied in the air power context. In essence the need is typically satisfied by the delivery of a range of intelligence services and products to the headquarters and units responsible for the conduct of air operations.

### **Services**

The full range of intelligence services available to support air operations are detailed in Figure 10. At the strategic level the services available to politicians, policy advisers and makers, Chiefs of Staff and commanders of strategic forces, are long term assessments, watch group meetings, early warning reports and briefings to ministerial personnel and the chiefs of staff. These services are used to make risk assessments, to help determine whether forces should be committed and if so when, where, how they will be deployed, with what equipment and under what priorities and conditions. Strategic intelligence is also used to determine if the mission has been achieved satisfactorily and whether the force should be replaced, withdrawn, reinforced or left as is.

At the operational level the commander is provided with early warnings, assessments on areas of operations and threat assessments. These services are used to determine the composition of a force, to assess the risk faced by deployed forces, to plan operations (which includes the determination of centres of gravity and critical vulnerabilities) and lastly to evaluate the success of an operation.

At the tactical level the services provided to unit and sub-unit commanders, are early warnings, area of operations assessments, enemy disposition, target intelligence, threat assessments and natural phenomena such as weather and the terrain. The services provide the commander with the intelligence needed to plan and conduct operations, to protect his force and to evaluate operations.

### **Products**

The full range of intelligence products available to support air operations are detailed in Figure 10. The products associated with intelligence services at the strategic level are assessment papers, watch group reports and assessments, written and oral briefings and maps. At the operational level the products are early warning reports,



*Intelligence Requirements*

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operational intelligence summaries, capability and order of battle databases, briefings and maps. At the tactical level the products are maps and graphics, briefings and target imagery.

Air forces are primarily concerned with deploying weapons systems. Such systems rely on sensors which are increasingly reliant on intelligence for their efficient operation. This is a reflection of the growing complexity of the weapons systems themselves and those which they oppose.

Aside from the information needed to operate aircraft safely (meteorology, airfields, approach aids, fuel, support services, hangarage and parking) there is a growing requirement for intelligence so that the best use can be made of weapons systems.

Using the Long Range Maritime Patrol (LRMP) aircraft as an example (Figure 11), this type of aircraft has a suite of sensors which combines with torpedoes and anti-ship missiles to form the complete weapons system. To make the best use of the Electronic Support Measures (ESM) system, the electronic order of battle of all naval vessels and aircraft in the area of operations must be known. It must be in a form suitable for briefing or learning so that ESM operators understand the significance of what they detect. It must be available in a suitable form to allow airborne use so that initial analysis can be carried out as soon as possible. This intelligence can come from Signals Intelligence (SIGINT) agencies, from the Navy through the collection efforts of ships, through recorded tapes from previous missions and debriefs from crews (face-to-face or over data link during transit/change over). The intelligence is required as soon as possible in the 24 hours prior to launching the mission, but it can be passed to the crew right up to the point of 'doors closure' for take-off.

A LRMP aircraft is much more than an ESM system. Intelligence is required for radar, acoustic, infra-red, magnetic anomaly and visual detection systems. In each case, the operator needs to be aware of the importance of what is detected.

Finally, there are the weapons themselves. For example, some anti-ship missiles have an option to select a sea-skimming or a pop-up terminal manoeuvre. Thorough knowledge/intelligence on the proposed target will assist in increasing the likelihood of a kill by giving the missile the best chance of surviving the target defensive systems.

**INTELLIGENCE SUPPORT FOR AIR OPERATIONS**

<b>INTELLIGENCE PRODUCTS AND SERVICES</b>				
<b>LEVEL</b>	<b>BY</b>	<b>TO</b>	<b>SERVICES</b>	<b>PRODUCTS</b>
<b>STRATEGIC</b>	Intelligence collection and assessment agencies	<ul style="list-style-type: none"> <li>• Politicians</li> <li>• Chiefs of Staffs</li> <li>• Policy makers</li> <li>• Policy advisers</li> <li>• Commanders of strategic forces</li> </ul>	<ul style="list-style-type: none"> <li>• Long term assessments</li> <li>• Watch group meetings</li> <li>• Early Warning reports</li> <li>• Ministerial and Chiefs of Staff briefings</li> </ul>	<ul style="list-style-type: none"> <li>• Assessment papers</li> <li>• Watch group reports and assessments</li> <li>• Written/oral briefings</li> <li>• Map graphics</li> <li>• Current Intel</li> </ul>
	For:	<ul style="list-style-type: none"> <li>• Risk assessment</li> <li>• Commitment of forces, yes/no, when, where, how, with what, and what priorities</li> <li>• Decision to deploy, continue, reinforce, withdraw, or replace</li> </ul>		
<b>OPERATIONAL</b>	Military HQ Intel staffs (Joint & Single service intel centres)	<ul style="list-style-type: none"> <li>• Chiefs of Staff</li> <li>• Force Commanders</li> <li>• Formation Commanders</li> </ul>	<ul style="list-style-type: none"> <li>• Early Warnings</li> <li>• Theatre or AO level assessments</li> <li>• Threat assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Early warning reports</li> <li>• Intsums</li> <li>• Capability and ORBAT databases</li> <li>• Written/Oral briefings</li> <li>• Map graphics</li> </ul>
	For:	<ul style="list-style-type: none"> <li>• Risk and security assessments</li> <li>• Allocating forces</li> <li>• Commitment of forces</li> <li>• Planning operations</li> <li>• Centre of gravity (ours/theirs)</li> <li>• Critical Vulnerabilities</li> <li>• Evaluation of operations</li> </ul>		
<b>TACTICAL</b>	Dedicated intel units, cells or sections	<ul style="list-style-type: none"> <li>• Unit/Sub-unit Commanders</li> </ul>	<ul style="list-style-type: none"> <li>• Early Warning</li> <li>• AO or battlespace assessment</li> <li>• Enemy disposition</li> <li>• Target intelligence</li> <li>• Threat assessment</li> <li>• Weather</li> <li>• Terrain</li> </ul>	<ul style="list-style-type: none"> <li>• Map graphics</li> <li>• Written/Oral briefings</li> <li>• Target imagery</li> <li>• BDA</li> </ul>
	For:	<ul style="list-style-type: none"> <li>• Planning operations</li> <li>• Conducting operations</li> <li>• Force protection including OPSEC</li> <li>• Evaluation of operations</li> </ul>		

**Figure 10 - Intelligence Products and Services**

**INTELLIGENCE SUPPORT FOR AIR OPERATIONS**

<i>What is being supported</i>	<i>What is being provided</i>	<i>Where is the support coming from</i>	<i>When is it needed by</i>	<i>How is it required</i>
<b>LRMP</b>				
ESM	Naval/Air electronic ORBAT in region - civil & military	Previous missions & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
Radar	Naval/Air regional ORBAT Merchant ships	Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings
Acoustic	Acoustic signatures of regional naval ships & subs & merchant ships	Previous missions acoustic tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
MAD	Magnetic signatures of regional navy subs	Previous missions & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
EO	IR signatures of regional navy's ships & subs & merchant vessels	Previous missions IR tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
Visual	Imagery of regional navy ships & subs & merchant ships	Previous missions & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, recognition tests and hard/soft copy
<b>Strike/Attack</b>				
Radar	Radar predictions of targets	Previous missions radar video & Defence Intelligence	Launch -24 hrs to launch - minutes	Briefings and hard/soft copy
ESM	Threat library of electronic ORBAT	Previous mission RWS tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings and hard/soft copy
BDA	Tgt imagery for BDA or intelligence on damage caused and success/fail	HUD video, IR/Laser video, attack cameras, post strike recce	ASAP after attack	Video, film, radar and hard/soft copy

**Figure 11- Services & Products at the Tactical Level**

*Intelligence Requirements*

<b>What is being supported</b>	<b>What is being provided</b>	<b>Where is the support coming from</b>	<b>When is it needed by</b>	<b>How is it required</b>
Targeting	Tgt imagery, destruction mechanisms, aim points	Previous BDA, civil engineers	Launch - 24 hrs to launch - minutes	Briefings and hard/soft copy
EO	IR signatures of tgt. IR conditions for IR missile employment	meteorology, previous missions IR tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
Visual	Imagery of tgts, threats, weapons systems	Previous missions & Defence Intelligence	Launch - 24 hrs to launch - minutes	Recognition tests, hard/soft copy
<b>Air Defence</b>				
Radar	Enemy tactics, weapons ranges	Own sources Radar video & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
ESM	Electronic ORBAT for aircraft and ground threats	Previous missions RWS tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
EO	Database imagery of enemy and friendly	Previous missions IR video & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
Visual	Imagery of threats, aircraft, weapons systems, intelligence	Previous missions HUD videos & Defence Intelligence	Launch - 24 hrs to launch - minutes	Recognition tests, hard/soft copy
<b>Transport</b>				
ESM	Threat library for RWS, location of emitters, radar horizon	Previous missions RWS tapes & Defence Intelligence	Launch - 24 hrs to launch - minutes	Briefings, hard/soft copy
Visual	Imagery of landing grounds, threats, other aircraft	Previous missions, Imagery & Defence Intelligence	Launch - 24 hrs to launch - minutes	Recognition tests, hard/soft copy

**Figure 12 - Services & Products at the Tactical Level**

Operating LRMP aircraft in a hostile environment is a risky business. The aircraft are not very manoeuvrable, have a low top speed and limited self-protection ability. Intelligence is therefore vital for the air commander in making his decision to employ the aircraft, for the squadron commander in deciding who should crew the aircraft, the sensors to be employed and the weapons to be carried, for the aircraft captain and the Tactical Coordinator in deciding the best tactics to be employed against the threat. Intelligence can tell the crew what the threat is, what the indications of an impending launch of a radar guided Surface-to-Air Missile (SAM) are, what the effective range of the SAM is, its guidance method, its susceptibility to electronic countermeasures and so on. More importantly, intelligence can give an assessment of the state of readiness of the personnel on the target vessel, the effectiveness of the maintenance of the SAM, the reliability of the system, the restrictions (physical and political) on its employment and therefore a threat and risk assessment.

Intelligence not only tells us if we should be in the game but whether it is safe to play, what the rules are, how the opposition plays, whether they cheat, and how to win while surviving to play again. While it is true that long range maritime patrol aircraft can be operated quite successfully in a benign environment without the intelligence described above, the effectiveness of the mission and the safety of the aircraft and crew will be compromised significantly without access to that intelligence in hostile combat conditions.

The same is true for all air assets that can be employed in operations. Some assets, for example fast-jet aircraft, because of their speed, manoeuvrability and their defensive aids are less at risk from enemy activity - however, this aspect is offset by putting these assets against higher value, more heavily defended targets. The need for intelligence is in no way reduced.

## **Structure**

Consideration of the products and services identified in the previous paragraphs gives an indication of the scope of the intelligence effort needed to support air operations. The structure of an intelligence organisation needed to support this effort, naturally breaks down into units at the strategic, operational and tactical levels. The size of each of these units is dependent on the size of the defence force (for the strategic intelligence unit) and the size of the air force and the nature of its flying activities for the operational and tactical units.

## **Strategic Level**

Intelligence needed by the CDF, the Chiefs of Staff, policy advisers and policy makers resides at the national defence headquarters level and is a defence force asset. This requirement should be met by the provision of a dedicated intelligence directorate positioned to support strategic policy branches and linked directly with senior operations staff.

## **Operational Level**

Air Command is where air operations are planned and conducted. The Air Commander and his planning and operations staff must be suitably supported by intelligence staff so that the best-informed planning decisions can be made and the best-available options taken at each phase of an operation. To ensure that this support is available, dedicated and trained intelligence staff are required.

The structure of the operational level intelligence unit will depend on the number of squadrons in the command and the activities they conduct. Regardless of the size of the unit, the functions of intelligence operations, collection management, analysis and planning must be conducted.

Future operations will seldom, if ever, involve just one of the three Services. For the synergistic effects of joint operations to be realised, joint doctrine must be developed and joint planning conducted. Since intelligence is an integral part of the planning and operations processes, it follows that intelligence should also be jointly organised at the operational level.

The formation of a Joint Intelligence Centre (JIC) would offer considerable advantages to a defence force committed to moving to joint operational arrangements.

- A JIC would have sufficient personnel to carry out all the intelligence functions needed by the individual component commanders, including the air commander.
- During contingencies or operations, the efforts of the JIC could be focussed on the intelligence requirements of the lead component commander (if nominated), or on those of the units involved.
- Sufficient personnel could be made available to man the JIC for 24 hour operations if required.

- The JIC would provide the impetus and the vehicle for the development of common procedures and interoperable intelligence systems within the defence force.
- Trained intelligence personnel would be available to deploy with units during contingencies or on operations.
- Personnel working in the JIC would be exposed to the intelligence requirements of the other services, thereby promoting better understanding.
- Synergistic advantages would accrue due to closer liaison between units, for instance LRMP aircraft and Naval vessels.

The formation of a JIC would not be without some problems. Issues that would need resolution are:

- Convincing individual component commanders to give up their intelligence personnel. The JIC would be manned by personnel drawn from the intelligence organisations of the three component commanders, thereby reducing the personnel in these areas.
- The location of the JIC is probably the most contentious issue. The individual environmental commanders will want to have direct access to an intelligence organisation, be it their own or the JIC. If they have to give up some or all of their intelligence staff, they will want direct and easy access to the JIC to compensate.
- It is likely that the individual environmental commanders would want to maintain some form of intelligence organisation in their own headquarters, which would reduce the potential savings in personnel and support costs that the formation of the JIC would give.
- If a Joint Force Commander (JFC) is appointed, he must have direct control of the JIC and will invariably want to be co-located with it. If the JFC was to be one of the three component commanders, then the issue of location and of personnel would still need resolution.

### **Tactical Level**

At the squadron or tactical level, the intelligence officer's position offers a real challenge because time and relevance is of the essence at this level. These positions should therefore be filled by experienced intelligence officers who have a thorough knowledge of the services



and products available, the location of intelligence data and the methods of obtaining it.

**Conclusion**

Military operations require intelligence support to ensure the most effective and efficient use of valuable defence resources. Because air operations are fundamentally different to those conducted on land or at sea, intelligence support must be provided by specialists, schooled in the doctrine of airpower, familiar with its strengths and weaknesses and aware of its special requirements. The ultimate shape and size of an intelligence organisation will depend upon the size of the air force it supports and the activities that air force conducts. However, regardless of its size, the intelligence organisation exists to support the commander, be it the CDF at the strategic level providing advice to government, the Air Commander at the operational level planning an air campaign, or the leader of a formation of aircraft undertaking a tactical mission. The commander at each level has requirements for services and products which must be satisfied.

## CHAPTER FOUR

### The Future

*Now the reason the enlightened sovereign and the wise general conquer the enemy whenever they move, and their achievements surpass those of ordinary men, is their foreknowledge of the enemy situation.*

Sun Tzu, *The Art of War*<sup>24</sup>

*Cyberwar refers to conducting, and preparing to conduct, military operations according to information-related principles. It means disrupting if not destroying the information and communications systems, broadly defined to include even military culture, on which an adversary relies in order to 'know' itself: who it is, where it is, what it can do when, why it is fighting, which threats to counter first, etc. It means trying to know all about an adversary while keeping it from knowing much about oneself. It means turning the 'balance of information and knowledge' in one's favour, especially if the balance of forces is not. It means using knowledge so that less capital and labor may have to be expended.*

John Arquilla and David Ronfeldt  
RAND Corporation<sup>25</sup>

Having considered the intelligence support needed for air operations based on the past and present paradigms, what then of the future? Technology has had a dramatic effect on the capabilities of successive generations of combat aircraft, on the methods of command and control of combat forces and on the way in which information and knowledge have grown in importance in the conduct of military operations. However, the benefits that technology has brought to the conduct of war, has also made modern forces susceptible to attacks on that technology.

### Third Wave Warfare<sup>26</sup>

Retired USAF Colonel, Alan D. Campen hailed the Gulf War as the first information war, stating that it 'differed fundamentally from any

<sup>24</sup> Sun Tzu, *The Art of War*, Wordsworth Editions Ltd, Hertfordshire, 1993, p. 132.

<sup>25</sup> Arquilla, John and Ronfeldt, David, *Cyberwar is Coming*, RAND Corporation Study P-7791, Air University Library, Document No. M-U 30352-16 No. 7791, p. 6.

<sup>26</sup> Third wave warfare is term coined by Alvin and Heidi Toffler in their book *War and Anti-War*. The terms information warfare, command and control warfare and knowledge warfare refer to the same phenomena.

previous conflict' because 'the outcome turned as much on superior management of knowledge ... as upon performances of people or systems'.<sup>27</sup> Alvin and Heidi Toffler in their book *War and Anti-War*, described the Gulf War as 'the arrival of a new form of warfare', something the world had not seen for three hundred years.<sup>28</sup> They recognise three distinct methods of warfare that correspond to three separate levels of development: first wave warfare occurs in agrarian cultures and is fought with small, part-time armies of poorly equipped farmers to capture surplus wealth and land; second wave warfare is used by industrial cultures and involves armies manned by professional full-time soldiers, and equipped with standardised weapons; and third wave warfare is fought by information or knowledge based cultures employing high-technology, knowledge based systems. It is important to note that the Tofflers believe the advent of information warfare does not eliminate other forms of conflict.

Third wave warfare relies on sophisticated communications and computers, access to space, and real-time decision making loops. It uses precision guided weapons, a multitude of sensors which provide real-time data about the battlespace, and complex command and control systems.

Even though Campen uses the term *information warfare*, he agrees with the concept suggested by Sun Tzu that the object of a struggle is to dominate the enemy in *knowledge*, not in information. In describing the importance of knowledge in the Gulf War, Campen states that it 'came to rival weapons and tactics in importance, giving credence to the notion that an enemy might be brought to its knees principally through destruction and disruption of the means for command and control'.<sup>29</sup> Colonel Edward Mann offers an interesting distinction between information and knowledge. He considers that 'information is passive and always exists ... whether anyone pays attention to it or not. Among other things it can be collected, collated, analysed, "fused", packaged, disseminated, and even managed ... it can be stored, protected, and concealed or suppressed.' He sees knowledge, on the other hand, as being active, since it must be 'possessed if it is to exist - let alone be useful'. At some point, the collected raw material (information) must be processed into a product which decision makers can use (knowledge).<sup>30</sup>

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<sup>27</sup> Campen, Alan D., (ed.), *The First Information War: The Story of Communications, Computers and Intelligence Systems in the Persian Gulf War*, AFCEA International Press, Fairfax, 1992, p. vii.

<sup>28</sup> Toffler, Alvin and Heidi, *War and Anti-War*, Warner Books, London, 1993, p. 74.

<sup>29</sup> Campen, *The First Information War*, pp. ix-xi, 32-33.

<sup>30</sup> Mann, Edward, Colonel, USAF, 'Desert Storm: The First Information War', *The Airpower Journal*, Winter 1994, p. 9.

A key goal of the Desert Storm air campaign was the rapid establishment and exploitation of information dominance over the Iraqis. Among the first Iraqi targets attacked were the leadership; command, control, communications and intelligence nodes; the air defence system; and electricity grids.<sup>31</sup> These targets were given the highest priority because of the effect their destruction or disruption would have on the Iraqis' flow of information and their development of knowledge.

An explanation for the way in which such disruption or destruction influences the course of events is offered by retired USAF Colonel, John Boyd.

### **The OODA Loop**

Boyd developed a concept of manoeuvre warfare which aimed to render an enemy powerless by denying him the time to mentally cope with the rapidly unfolding, and naturally uncertain, circumstances of war.<sup>32</sup> Underlying Boyd's theory was the thesis that all rational human behaviour can be depicted as a continual cycle with four separate activities: observation, orientation, decision, and action. Boyd termed this decision making cycle the 'OODA loop' (Figure 13).<sup>33</sup>

If this concept is applied to conflict, the winner will be the one who can repeatedly observe, orientate, decide and act more quickly and more accurately than the enemy. By achieving a faster loop-time, the enemy is made to respond to a situation that has already changed, thus making his reactions inappropriate. According to Boyd, the OODA loop can be thought of as the command and control loop or, as it is in its latest guise, the Command, Control, Communications, Computers and Intelligence (C<sup>4</sup>I) loop.

During the Gulf War, coalition air strikes operated on a regular cycle, taking three days to identify a target, incorporate it into the air tasking order and finally attack it. Once the Iraqis became aware of this timing, they moved their remaining aircraft every two days, thereby avoiding the air strikes.<sup>34</sup>

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<sup>31</sup> *Conduct of the Persian Gulf War: Final Report to Congress*, Vol. 1, Department of Defense, Washington, April 1992, p. 156.

<sup>32</sup> Boyd, John R., *A Discourse on Winning and Losing*, Air University Library, Document No. M-U 30352-16, No. 7791, p. 2.

<sup>33</sup> Fadok, Major, D.S., USAF, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*, School of Advanced Airpower Studies, Alabama, February 1995.

<sup>34</sup> Gordon, Michael R., and Trainor, Bernard, *The Generals' War*, Little, Brown & Co. (Canada) Ltd, 1995, p. 320.

The importance of Boyd's OODA Loop to the future and its relevance to intelligence is in the concept of increasing the speed of one's own loop while slowing down that of an adversary's. Intelligence, through the collection phase of the intelligence cycle, provides the observation; similarly, through direction and processing, intelligence and the commander provide the orientation, determining what to observe, which observed information is of the greatest value, and how it is to be used in making decisions. Orientation is the critical link between information, which is desirable to have and knowledge, which, when properly considered and acted upon, reduces risk; the commander makes the decisions; and the units under his command carry out the directed actions (and provide observation through de-briefing and post-mission reports, and so the cycle begins again). All these elements are interconnected through the communication and computer elements of C<sup>4</sup>I.

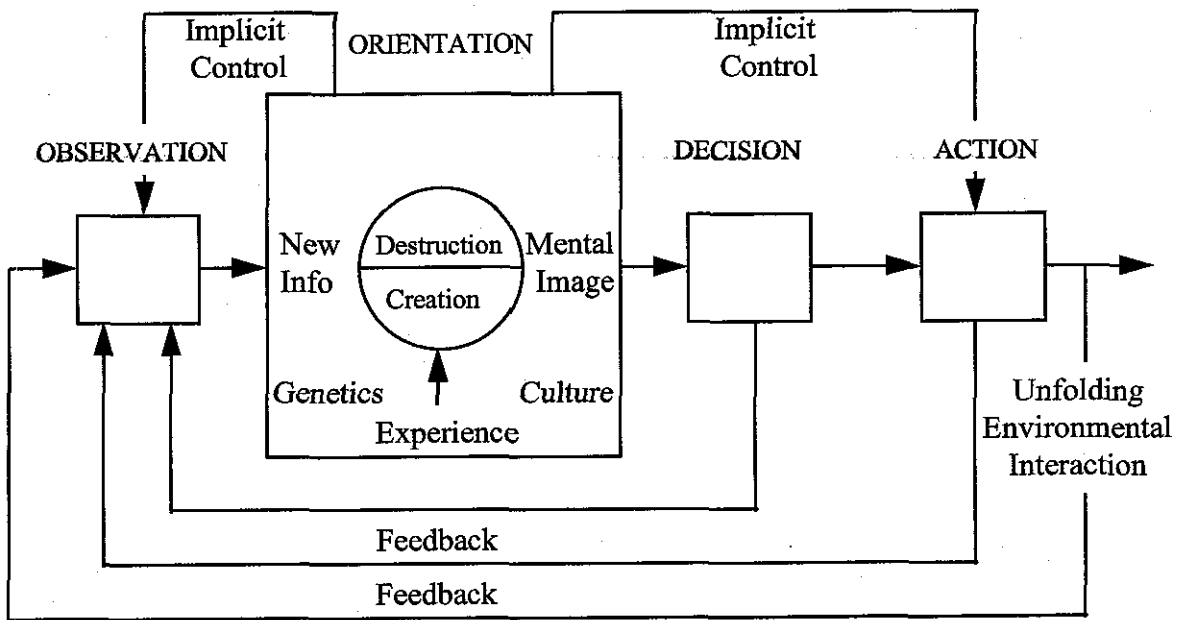
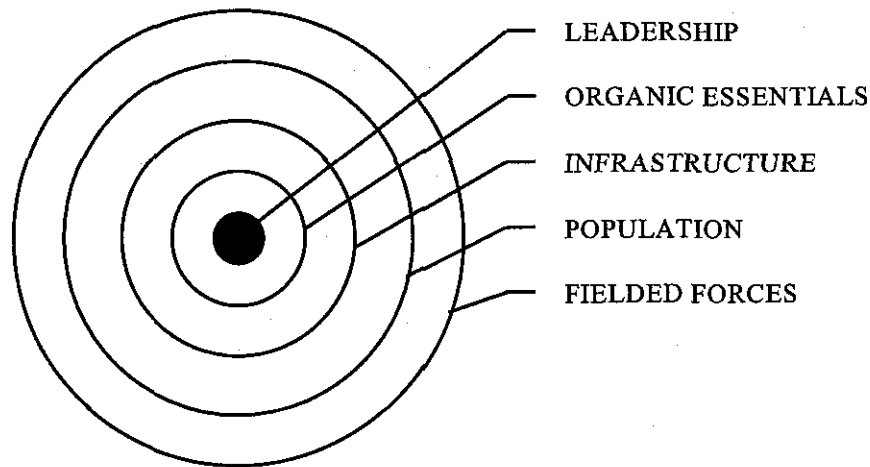


Figure 13 - Boyd's OODA Loop

Intelligence therefore plays a vital role in reducing the OODA loop time of friendly forces by providing the intelligence needed by the commander to assist in the decision making process. In addition, intelligence can assist in extending the loop time of the enemy by identifying targets that, if destroyed or disrupted, extend the time taken to complete each individual segment of the loop. Obvious targets are the sensors used to observe, the commander or leader providing the orientation and making the decisions, the forces carrying out the actions and the C<sup>4</sup>I infrastructure needed to provide

intelligence for decision making and to communicate between elements of the loop.

These targets are the same as those proposed by Colonel John Warden, the architect of the coalition air campaign in the Gulf War. Warden contends that the enemy must be analysed as a complete system, and that all strategic entities can be broken down into five component parts (graphically represented as five concentric rings in Figure 14).



**Figure 14 - Warden's Five Rings**

The most important element of the system, the innermost ring, is the leadership (be it civilians in government or a military commander directing forces, and includes command communications between the leadership and the rest of the system). Extending outward from the leadership centre, in descending order of importance, are the rings of organic essentials, infrastructure, population, and fielded forces.

Organic essentials (in previous examples of the five-ring model, this ring was termed key production) are those facilities or processes without which the system cannot maintain itself in its present state, for example the production and distribution of electricity and petroleum products. The number of organic essential targets is reasonably small and many of the components that make them up are fragile and therefore susceptible to disruption.

The third ring contains the enemy's infrastructure which contains the majority of a state's industry and also the transportation system - which Warden describes as 'the system that moves civil and military goods and services around the state's entire area of operations'. It includes railways, highways, bridges, airlines, airfields, and ports.

The fourth ring is the population. Most nations hold that any direct attack on a civilian population is morally reprehensible, not to mention militarily difficult. However, history has many examples of attacks on civilians (direct and indirect) that have influenced a change in policy. Warden cites the example of North Vietnam raising the level of American casualties higher than the American people would tolerate.

The fifth ring holds the fielded military forces of the state. Before the First World War, there was no easy way to avoid the fielded forces of an enemy. However, with the advent of the aircraft and increasingly with modern technology (cruise missiles, stealthy aircraft, precision guided munitions, and air-to-air refuelling) many options are now available to bypass these forces and so attack the inner rings.<sup>35</sup>

In the Gulf War, the coalition attacked all of the Iraqi strategic rings except for the civilian population. Conversely, the Iraqis were unable to reach any of the coalition's strategic rings until the ground war started. By then, of course, the effects of the air campaign had so reduced Iraqi military capability that the result was inevitable.

Intelligence is vital in the planning of such attacks. From the identification and selection of targets, to pinpointing the threats to attacking forces, their capabilities, and vulnerabilities, and the tactics needed to negate them, to the assessment of the results of the attack, intelligence - transformed into knowledge - is the key.

An important facet of the Gulf War was the sheer volume of information provided by space-based sensors, JSTARS and AWACS, as well as from other dedicated intelligence gathering systems. Two criticisms of the intelligence effort were that 'intelligence delivered "tons" of information as fast as possible, while operations wanted specific "pounds" of it delivered much more quickly than the system was capable of';<sup>36</sup> and the unacceptable time lag involved in processing the information into useable intelligence and disseminating the products to those who needed them. With the increasing quantity of information available from the modern battlefield, intelligence systems and staff are in danger of being swamped. Automation of some intelligence processes offers a possible way to cope with this deluge of information. An example is the US Army's All-Source Analysis System (ASAS) which was fielded in December 1993.

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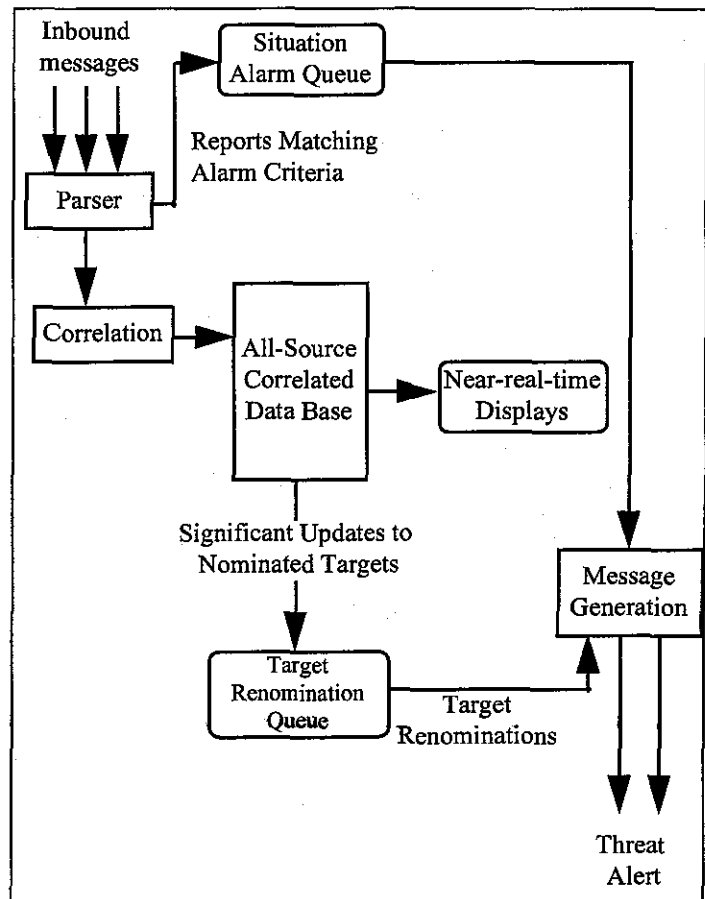
<sup>35</sup> The preceding paragraphs are based on Colonel John Warden's, 'The Enemy as a System', *Airpower Journal*, Spring 1995, pp. 41-55.

<sup>36</sup> Mann, Colonel E., USAF, 'Desert Storm: The First Information War', *Airpower Journal*, Winter 1994, p. 11.

## The All-Source Analysis System

The ASAS is an automated intelligence system that helps an analyst to process hundreds of messages per hour and to more accurately and quickly disseminate intelligence.

The ASAS receives reports from all different intelligence disciplines. The reports are automatically broken down by the ASAS into individual elements of data (parsing). These elements are then checked against pre-set alarm criteria and if a match occurs, ASAS forwards a copy of the appropriate data to an analyst. If the analyst decides to disseminate the information, ASAS automatically generates a threat alert message that contains the pertinent information and releases it to the area communications.



**Figure 15 - All-Source Analysis System**

At the same time, the system determines (again, using pre-set criteria) whether the information concerns a new entity or one already in the correlated data base. ASAS automatically takes the best data from all reports, merges them with the existing record on that entity in the data base and updates the near-real-time displays.

If the entity has previously been designated as a target, the system automatically calculates the significance of the update, and if the entity has changed significantly (eg. a new location is a certain number of kilometres away from its previous position), ASAS alerts the target analyst. If the analyst determines that the target should be re-designated ASAS automatically fills in an outgoing target intelligence data report for the analyst to release.<sup>37</sup>

Thus by automating many of the intelligence functions ASAS can process more data faster and more efficiently than similar automated

<sup>37</sup> Jenson, Mark, 'ASAS Arrives', *Military Intelligence*, January-March 1995.



systems. Analysts are freed from time-consuming, repetitive activities, and can therefore devote more time to cognitive and predictive tasks.

## Information Warfare

The advent of the aircraft moved warfare from two dimensions (land and sea) into three. The space age provided warfare with its fourth dimension, and now information because of its 'ascending and transcending influence - for ... society and ... military forces'<sup>38</sup> is being called the fifth dimension of warfare. Information dominance is the practical expression of this fifth dimension.

In October 1995 the USAF formed the first Information Warfare Squadron as part of the Air Combat Command. It is charged with developing the strategies and tactics needed to protect command, control and communications assets while denying the enemy the use of its own information systems. The Squadron's activities are limited to information systems, leaving other information missions such as reconnaissance, surveillance and communications to specialised units.<sup>39</sup> The need for such a unit was highlighted by the case of a USAF captain who used a personal computer and modem to penetrate the command and control systems of US Navy ships operating in the Atlantic Ocean. The penetration was achieved by using the Internet to connect with a ship through an electronic mail link in one of the ship's networked computers. Once inside the ship's computer network, the 'hacker' - who had Naval permission for the penetration- gained access to the ship's command and control system, revealing 'glaring shortfalls' in the Navy's ability to prevent electronic intrusion.<sup>40</sup>

The aim of information warfare is to gain information dominance over an adversary. The RAND Corporation's John Arquilla and David Ronfeldt defined information dominance as 'knowing everything about an adversary while keeping the adversary from knowing much about oneself'.<sup>41</sup> Arquilla, in a subsequent paper, saw information dominance as important because of its force multiplier effect that

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<sup>38</sup> General Ronald Fogleman, USAF Chief of Staff, in a speech to the Armed Forces Communications-Electronics Association, reported in la Franchi, Peter, 'US Planners Predict Revolution in Military IT', *Australian Defence Magazine*, June, 1995.

<sup>39</sup> Cooper, Pat and Oliveri, Frank, 'Air Force Carves Operational Edge in Info Warfare', *Defense News*, August 21-27, 1995.

<sup>40</sup> Cooper, Pat and Oliveri, Frank, 'Hacker Exposes U.S. Vulnerability', in *Defense News*, October 9-15, 1995, pp. 1, 37.

<sup>41</sup> Arquilla, John and Ronfeldt, David, *Cyberwar is Coming*, RAND Corporation Study P-7791, Air University Library, Document No. M-U 30352-16 No. 7791, pp. 141-165.

would enable military forces to do more with less.<sup>42</sup> He recognised the importance of Warden's systems approach stating that 'the ability to analyse opponents in systemic terms, identifying their key centers of gravity and vulnerabilities, is a *necessary* condition for the successful achievement and exercise of information dominance'.<sup>43</sup> Intelligence is fundamental to the identification of centres of gravity and vulnerabilities and therefore to the achievement of information dominance.

## Conclusion

So what does Information Warfare mean to an Air Force? Modern weapons systems make increasing use of computers and data linking for their basic functions and effectiveness. The weapons employed are increasingly dependant on micro-chips as too are C<sup>3</sup>I systems, be they directly or indirectly through computer controlled telephone, electrical distribution or security systems. The need to connect computers into networks to share data bases and information leaves them vulnerable to attack. It makes little immediate difference if air defence aircraft are not scrambled to intercept the enemy because the electrical distribution to our radar head has been disrupted, or the computer software for our radar or command and control system has 'crashed' because of a virus, or the mission planning computers have programmed the wrong information into the aircraft. The net result is the same. The fact that no enemy asset was placed physically at risk makes this type of attack all the more attractive.

Intelligence must be prepared to meet the challenge of Information Warfare. An examination of the doctrine outlined in chapters one and two, in the light of developments in Information Warfare, reveals that these advances do not change the doctrine, rather they shift the focus and emphasis.

The intelligence cycle remains the cornerstone of intelligence activity. Direction must be more tightly focused and defined to cope with the greatly increased quantity of data available; collection must be equally discerning to focus in on the data required; basic analysis will need to be done automatically to cope with the increase in data volume; and dissemination must take into account the needs of the user for near-real-time intelligence; this will necessitate the use of systems that are vulnerable to attack using the techniques of Information Warfare.

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<sup>42</sup> Arquilla, John, 'The Strategic Implications of Information Dominance', *Strategic Review*, Summer, 1994, p. 30.

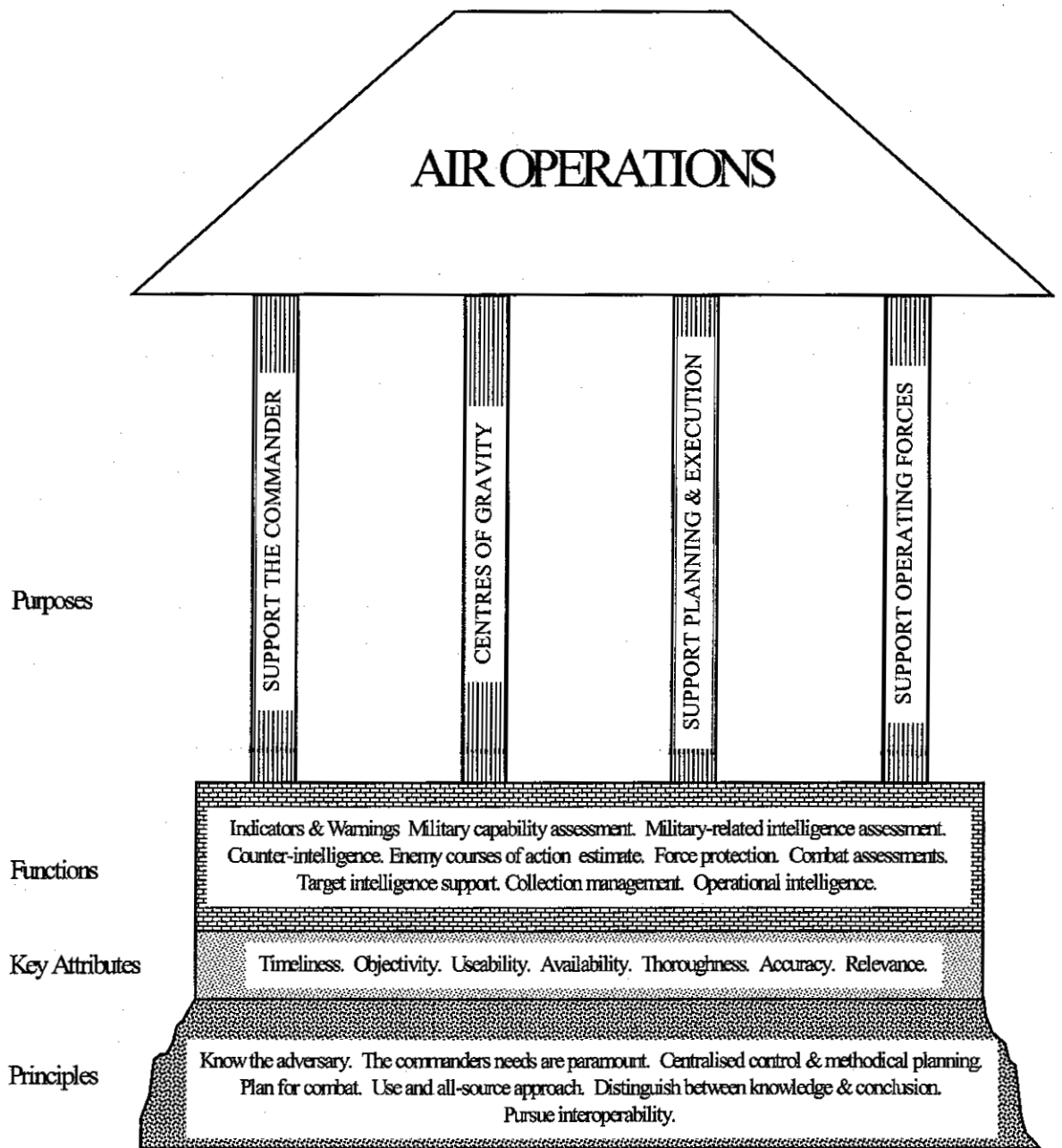
<sup>43</sup> *ibid.*, p. 29.

The scope of intelligence does not change in the light of these new developments. There will continue to be a need for intelligence at all three levels of operations. Increasingly, commanders will want intelligence from all levels to assist in the decision making process.

The purposes of intelligence are not affected except for a shift in emphasis in targeting to identify the targets for Information Warfare attack and in counter-intelligence to identify the vulnerabilities which need protection from enemy attack.

The principles of intelligence remain valid with a shift in emphasis to cater for the availability of intelligence and the access to computer databases. The volume of data available makes it difficult to distinguish the critical pieces. There is a need for vigilance against an enemy with an Information Warfare capability as the precursor to a physical attack may well be an attack against friendly information systems.

In similar fashion, the key attributes and intelligence functions are not changed by the advances in Information Warfare. Because of the danger that this form of warfare represents, it is vital that intelligence meets the key attributes to ensure that the best use can be made of it through the intelligence functions.



**Figure 16 - Intelligence Support**

In conclusion, air operations can be likened to the roof of the building in Figure 16. It helps to protect a country from the inclement elements. The roof is held up by the four pillars that are the purposes of intelligence which are supported by a floor made up of the intelligence functions. This floor is in turn built upon the foundations of intelligence that meets the key attributes. For the foundations to support the whole, they must be built on intelligence that adheres to the principles. This is truly the bedrock of support for air operations. At the risk of carrying the analogy too far, if we wish the structure to

be strong, to be able to conduct effective air operations, we must lay strong foundations on bedrock, build a strong floor and solid pillars. If we neglect any part of the structure, we weaken the protection the roof can give. In short, adhere to the doctrine and be aware of the changes in focus and emphasis required to adapt to the modern battlespace.

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