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**FIREPOWER TO WIN:  
AUSTRALIAN DEFENCE FORCE  
JOINT FIRES IN 2020**

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The Kokoda Foundation

[www.kokodafoundation.org](http://www.kokodafoundation.org)

**Researching Australia's Security Challenges**

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## **PREFACE**

This research project required extensive cooperative efforts on multiple fronts.

First, the three Services in the Australian Defence Force considered the topic to be important and, in consequence, they all contributed senior personnel to the development of the report's logic. All contributions were delivered in a cooperative spirit.

Three closed workshops were conducted in Canberra as part of this project during April-May 2007. Whilst different perspectives were expressed at various stages, a clear consensus emerged about how the ADF should best develop Joint Fires for the 2020 timeframe. This report has been prepared to describe and explain that consensus.

Another joint effort was required to prepare this report. Alan Titheridge was commissioned by the Kokoda Foundation Board to lead the research program and to contribute to the development of the report. Gary Waters helped develop the thinking at the workshops and made a substantial contribution to preparing the report. Ross Babbage played a role in the report's preparation and oversaw the entire project. David Schmidtchen, the Editor of the Kokoda Paper series, carried the load for editing the report and for its detailed preparation for publication.

This report is not intended to be the last word on the subject. Readers who wish to discuss and debate aspects are encouraged to do so by preparing either a short commentary or a longer article for the Kokoda Foundation's professional journal, *Security Challenges*. For details on how this can be done, please visit:

<http://www.kokodafoundation.org/journal/New%20Site/author.html>

## EXECUTIVE SUMMARY

This report discusses how the Australian Defence Force (ADF) should coordinate the delivery of joint military firepower against opposing targets in the 2020 timeframe. Performing this 'Joint Fires' function well will be essential for the ADF's future combat success.

Delivering Joint Fires is a very demanding and complicated task. It is generally needed when Australian forces are in close contact with adversary forces. It requires close inter-service coordination, is often time-sensitive, usually entails the delivery of lethal force and its consequences can be far-reaching.

Australia's Joint Fires capability needs to be developed as an integrated system. Component units and individuals need to be trained and equipped to perform within a highly responsive and flexible team. In order to foster this teamwork an early priority should be the acquisition of a synthetic environment within which military units can be trained and exercised in a wide range of Joint Fires scenarios.

The ADF's integrated Joint Fires System cannot be developed effectively by taking *ad hoc* incremental steps. Hence this report argues that Australia's Joint Fires System needs to be steered by a 'champion', who should be the Vice Chief of the Defence Force (VCDF), the Joint Capability Manager. This report argues that VCDF should carry responsibility for designing, developing and delivering a highly effective and efficient Joint Fires capability by 2020. Effectively VCDF would champion the development of the system that Chief of Joint Operations (CJOPS) would use, as CJOPS is the senior officer responsible, either directly or indirectly, for the execution of Joint Fires.

Significant progress has been made in recent years in developing an integrated system for delivering Joint Fires to support land and maritime operations. An important initiative has been the development of United States and Australian

accredited Joint Terminal Attack Controllers (JTACs) to coordinate joint fires in forward locations.

However, a great deal remains to be done. The technological backbone of the Joint Fires System should be a communications and command network that is highly secure, reliable, robust, has long reach and which can transmit high bandwidth messages rapidly and flexibly to all key parties.

The ADF's sensor network will need to be further developed and better integrated to generate the type of Common Operational Picture and broader range of displays to facilitate timely Joint Fires decisions. The ADF needs to plan for human intelligence to play a more important role within the sensor network, especially in highly urbanised environments and in theatres where the adversary comprises individuals and small groups operating within a much larger population of neutral or friendly people.

The ADF's Joint Fires System needs to be able to deliver a wide range of lethal and non-lethal weaponry with exceptional precision and timeliness. Joint Fires will need to be tailored so as to generate specific coercive effects that, in combination, encourage the adversary leadership to adopt stances compatible with Australia's interests.

The development of a capable Joint Fires System will be a major challenge for the ADF. Highly educated and trained people will be required to creatively plan, develop, execute, evaluate and manage the system. A key need will be people with an exceptional understanding of relevant operating environments, including deep language, cultural, social and political insights. In order to achieve the standards of excellence required, Australia's officer education systems will need to be truly world class.

## **ACKNOWLEDGEMENTS**

This research project would not have been possible without the thoughtful contributions of a range of senior and middle-level ADF officers. They participated in the closed workshops with enthusiasm and contributed their insights in a collegiate and most positive spirit. This report would not have been possible without their generous contributions of time and wisdom.

Several individuals provided deeper assistance of various sorts that contributed substantially to the success of the project. They include Dr Alan Stephens, Tim Robertson, Peter Nicholson, Kate Delaney, David Graham, Group Captain Tony Forestier, Lieutenant Colonel Nick Floyd, Ash Rentmeester and Patrick Carrigy-Ryan. David Schmidtchen did a masterful job in editing the report for publication and Qote produced a quality final volume.

The Kokoda Foundation wishes, in particular, to express its thanks to Jacobs Australia, the Australian Department of Defence and Lockheed Martin for their generous support of this and other projects.



**Australian Government**

**Department of Defence**



## **ABOUT THE AUTHORS**

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Alan Titheridge joined the Royal Australian Air Force in 1965 as a pilot. He has commanded No 77 Squadron, No 81 Wing, Tactical Fighter Group and Air Command. He is a Qualified Flying Instructor and has held a range of senior positions within the Department of Defence, including Director General Joint Operations and Plans, Deputy Chief of Air Force, and Head of Strategic Operations Division.

Alan is a graduate of the Canadian Forces Command and Staff College and the United States Air Force Air War College. He has a Bachelors Degree in Physics from Melbourne University and a Masters Degree in Defence Studies from the ADFA College of the University of NSW.

On leaving the military as an Air Vice Marshal in November 2002, Alan has consulted to a range of organisations in the government, defence industry and private sectors. He was recently appointed Vice President Australia Operations for L3 Communications.

### **GARY WATERS**

Gary Waters retired as an Air Commodore in the RAAF and had a few years as a senior public servant in Defence before joining Jacobs Australia as Head of Strategic Initiatives.

Gary has written ten books on doctrine, strategy and historical aspects associated with the use of military force. His latest book, co-authored with Professor Des Ball, was released in 2005, entitled 'Transforming the Australian Defence Force for Information Superiority'.

He is a Fellow of the Royal Melbourne Institute of Technology (graduating with majors in accounting and economics); an Associate of the Australian Society of CPAs; a graduate of the United Kingdom's Royal Air Force Staff College; a graduate of the University of New South Wales, with an MA (Hons) in history; and a graduate of the Australian

Institute of Company Directors. Gary currently serves as a Board member of the Kokoda Foundation, and is also studying for his PhD at the Australian National University.

## **ROSS BABBAGE**

Professor Ross Babbage is Chairman of The Kokoda Foundation and the Managing Director of Strategy International (ACT) Pty Ltd, a defence consulting and education service delivery organisation. Professor Babbage is a member of the Australian Minister's Defence and National Security Advisory Council.

Professor Babbage has wide-ranging expertise in international security affairs. He has held several senior positions in the Australian Public Service, including Head of Strategic Analysis in the Office of National Assessments, and he led the branch in the Department of Defence responsible for ANZUS policy. Professor Babbage was Assistant Secretary, Force Development in the late 1980s, carrying responsibility for the analysis of all major defence capability proposals and the preparation of recommendations for the senior Defence committees and for Cabinet. From 1986-1990 he was Deputy Head of the Strategic and Defence Studies Centre at the Australian National University. Through the 1990s, Professor Babbage worked with ADI Limited, Australia's largest defence company. In the late 1990s he served as Corporate Executive Strategic Analysis, carrying primary responsibility for the company's longer term thinking and planning. In 2000 he was appointed the inaugural Director of the Centre for International Strategic Analysis in Perth. In 2003 and 2004 he served as Head of the Strategic and Defence Studies Centre at the Australian National University.

Professor Babbage has Bachelor and Masters degrees in economics from the University of Sydney and a PhD in International Relations from the Australian National University. He is author well known for his many books and articles on Australian Defence and National Security. Professor Babbage has also written extensively on Asia-Pacific affairs focusing, in particular, on medium- and long-term regional trends.

## **CONTENTS**

	Page
Preface	i
Executive Summary	ii
Acknowledgements	iv
About the Authors	v
Contents	vii
Introduction	1
Joint Fires in 2020	3
What are Joint Fires?	8
Lessons from the History of Joint Fires	9
Strategic and Operational Imperatives	13
Characteristics of Effective Joint Fires in 2020	18
Essential Pre-Conditions and Enablers of Joint Fires in 2020	23
Key Steps in the Path Ahead	40
Conclusions	51
About the Kokoda Foundation	54



# **FIREPOWER TO WIN: AUSTRALIAN DEFENCE FORCE JOINT FIRES IN 2020**

## **INTRODUCTION**

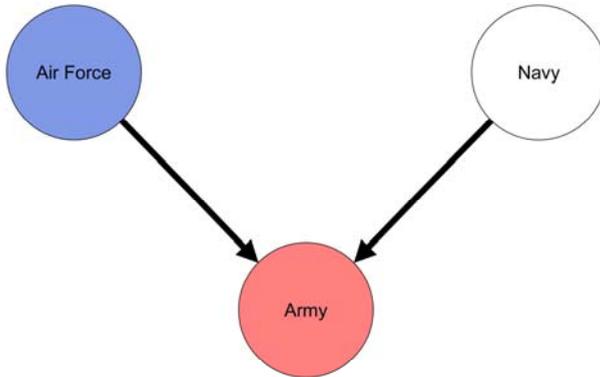
This report addresses a key question for the future battlefield success of the Australian Defence Force (ADF). How can the ADF best coordinate the delivery of joint military firepower against opposing targets?

The delivery of Joint Fires is a very demanding and complicated task. It is generally needed when Australian forces are in close contact with adversary forces. It requires close inter-service coordination, is often time-sensitive, usually entails the delivery of lethal force and the consequences can be far-reaching.

But while the effective delivery of Joint Fires is clearly a critical function for the ADF, the relevant systems and doctrine have not always been clear, or even agreed, between the Services. These weaknesses need to be overcome rapidly.

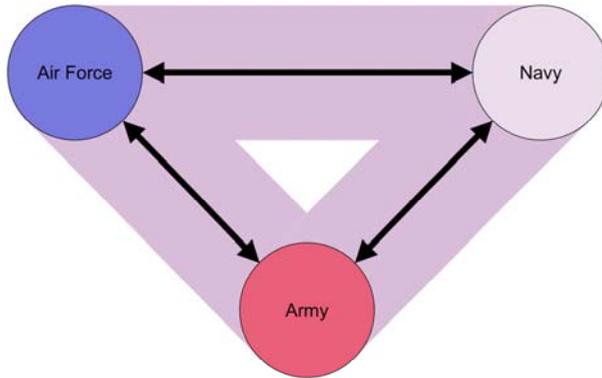
This paper is not about any difficulties the ADF has experienced in developing its approach to Joint Fires in the past. It is rather about how the ADF might best plan to deliver Joint Fires in the diverse operational theatres of the 2020 timeframe and beyond. This certainly requires the application of Joint Fires doctrine to the delivery of air and sea-based fires in support of land operations. This traditional approach to Joint Fires is illustrated in Figure 1.

**Figure 1 – Traditional Joint Fires Model**



However, in the 2020 timeframe it would also be appropriate to broaden the approach to apply Joint Fires doctrine and principles to any situation in which the forces of one Service need to coordinate closely with another in order to deliver lethal or non-lethal fires to greatest effect. This approach is illustrated in Figure 2.

**Figure 2 – Future Joint Fires Model**



This paper argues that if Australian military units can become exceptionally skilled at bringing lethal and non-lethal fires down onto opponents in 2020, they will most likely prevail on most future battlefields. These key skills will also make the ADF exceptionally difficult to defeat and will reduce Australian casualties. Strong joint fires capabilities will, in addition, increase the value that allies and friends place on close cooperation with Australia's forces. In short, mastering joint fires will be a litmus test of the ADF's future combat capability.

### **JOINT FIRES IN 2020**

Why will the mastery of joint fires be so critical to combat outcomes in the 2020 timeframe? The three hypothetical situations below illustrate its importance.

### ***Hypothetical 1:***

It is February 2020. An Australian infantry patrol is operating late one evening in the hills to the west of Tarin Kowt in Afghanistan. On dusk the patrol is surprised by a Taliban ambush. Intense heavy machine gun, rocket-propelled grenade and mortar fire pins the patrol down on a low ridge and two of the twelve soldiers in the patrol are slightly wounded. The patrol leader Lieutenant John Hedge sends a digital radio report to Task Force Headquarters. His rules of engagement permit aggressive counter-assaults to Taliban ambushes. Nevertheless, he scans the ridges to his north-west and south-west from which the Taliban fire is coming through his infra-red binoculars and notes that there are no signs of a civilian presence. He consults Warrant Officer Fred Stuart, a fully-qualified Joint Terminal Attack Controller (JTAC), and they both double-check map and photographic imagery stored on their hand-held computers to verify that there is no housing in the immediate vicinity. Warrant Officer Stuart also requests that video streaming of the patrol's surroundings be transmitted to his computer from a high altitude uninhabited aerial vehicle that is located 60,000 feet above and some 15 km to the west. Lieutenant Hedge then advises Task Force Headquarters that he may need early air support to strike the Taliban positions.

In the Task Force Headquarters, Colonel Robert James alerts the Combined Air Operations Centre that an air support operation may be needed urgently. Warrant Officer Stuart is then connected to two USAF F-35 Joint Strike Fighters that are standing on strip-alert at Kandahar, 10 minutes flying time to the south. They launch immediately.

Five minutes later Lieutenant Hedge notes that some 30-60 Taliban appear to be forming up on the reverse side of the ridge 200 metres to the northwest of his position. He orders Warrant Officer Stuart to request immediate air strikes on the Taliban positions on the ridges to their northwest and southwest. Colonel James and Warrant Officer Stuart now have access to real-time imagery of the scene from the high

altitude uninhabited aerial vehicle and Colonel James authorizes the air strikes.

The pilots of the two F-35s approach within range of the firefight at 15,000 feet altitude and Warrant Officer Stuart passes them the GPS coordinates of the Taliban positions. The pilots identify the locations through their long-range infrared imaging cameras and release four guided cluster bombs onto the Taliban positions. Taliban resistance ceases immediately.

### ***Briefing Box 1***

#### ***Joint Terminal Attack Controllers (JTACs)***

A Joint Terminal Attack Controller (JTAC) is an accredited Service member who, from a forward position, directs the action of combat aircraft engaged in Close Air Support and other offensive air operations. A qualified JTAC is recognised across the US and Australian Departments of Defence as capable and authorized to perform terminal attack control.

### ***Hypothetical 2:***

It is February 2020. The Australian, allied and regional governments are determined to prevent the lodgement of Kamarian<sup>1</sup> forces on the north coast of Papua New Guinea. Despite being warned to respect PNG's sovereignty, two days ago Kamaria deployed a major naval task group to a position only 30km northwest of Lae. This task group comprises three high-capability destroyers, four frigates, two large amphibious ships and three logistic support vessels.

Then, last night, ten of the Kamarian ships moved within 6km of the coast some 25km west of Lae (well within PNG territorial waters) and commenced preparations for an early morning amphibious landing of what appeared to be a 2-3

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<sup>1</sup> Kamaria is a fictional middle-sized country that is periodically used for exercise purposes. Its defence force is broadly comparable to that held by Australia.

battalion mechanised battle group. The Papua New Guinea Government urgently requested Australian military intervention and, in response, the National Security Committee of the Australian Cabinet authorized military action to attack the Kamarian naval force to either destroy it or force it to withdraw.

At 0400 local time, six RAAF F/A-18F *Super Hornets* skimmed over the mountain range 40km inland from Lae and acquired the Kamarian vessels on radar. However, two of the Kamarian destroyers with their new-generation high-powered radars immediately detected most of the RAAF aircraft and established track-lock to direct an anti-aircraft missile launch. Sensing this Kamarian action, the *Super Hornets* turned hard left and took cover behind the coastal range.

65,000 feet above this scene, an uninhabited aerial vehicle beamed real-time imagery *via* satellite to the Joint Force Commander, Air-Vice Marshal Robinson, at Bungendore, near Canberra. AVM Robinson ordered HMAS *Rankin*, an RAN submarine located some 12 km to the northeast of the Kamarian task group, to conduct a joint strike against the Kamarian ships that are within PNG territorial waters.

Commander James Paul, the commanding officer of *Rankin*, acknowledges the order to launch an immediate torpedo strike on two of the Kamarian destroyers as the *Super Hornets* split up to launch stand-off missile attacks on the other ships from the southwest and northwest.

Within three minutes, HMAS *Rankin* launches MK48 long-range wire-guided torpedoes against the two destroyers. Soon thereafter the destroyers and some of the adjacent Kamarian frigates realize that they are under attack, increase speed and attempt to manoeuvre out of the way. However, the torpedoes strike the destroyers eight minutes after launch and 60 seconds thereafter a swarm of intelligent anti-shiping missiles launched from the *Super Hornets* engulf the other Kamarian ships that are within PNG territorial waters. They all sink rapidly. The other two Kamarian ships that are located further offshore immediately leave the scene heading north at full

speed. Australian ships move rapidly into the sanitised area to search for Kamarian survivors.

### ***Hypothetical 3***

It is February 2020. A Kamarian three-battalion special force task group has been lodged on the Gove Peninsula (in Northern Australia) for three weeks to “teach the Australian Government a lesson.” Nearly all the local residents had time to vacate the area before it was occupied. The invading forces have since suffered about 20% casualties, largely as a result of Australian artillery fire, air strikes and special force raids. The Kamarian force has now also been effectively cut off from re-supply by a maritime and air blockade. Yesterday a Kamarian frigate and a supply ship were sunk by an Australian submarine 15km north of Gove Harbour.

An Australian Army task group of four battalions has, in the last few days, taken control of the landward access to the Gove Peninsula and this morning it launched a full-scale assault on the southern flank of the Kamarian force. The Kamarians have been using small and medium-sized uninhabited aerial vehicles (UAVs) to monitor Australian force deployments. At least two of these UAVs have been shot down by RAAF F-35 Joint Strike Fighters but the Australian Task Group Commander, Brigadier Stephen Jones, wishes to attack them and some supporting medium-range surface-to-air missile systems (SAMS) more vigorously over the southern sector. To this end, he develops a joint fire plan within which Australian artillery, ground-based air defences and armed reconnaissance helicopters coordinate action against the Kamarian UAVs and SAMS, and RAAF F-35s and F/A-18F *Super Hornets* focus their electronic attacks and missile strikes on the Kamarian force’s headquarters and logistic supplies 15km to the northeast.

The effects of these joint operations are dramatic with the Kamarians losing all of their remaining UAVs and medium range SAMS within three hours, the Kamarian southern flank

collapsing within four hours and the Kamarian commander surrendering after six hours.

## **WHAT ARE JOINT FIRES?**

In each of the hypothetical operations described above, there was a need for speedy and efficient inter-service and/or inter-agency coordination in order to bring effective fire to bear against opponents. In the past there has been a tendency by some to view Joint Fires solely as the application of air and sea-based fires to support land operations. This narrow view of Joint Fires was illustrated by the situation described in Hypothetical 1, when an Australian Army patrol was supported by USAF F-35 strikes.

However, this paper contends strongly that in the 2020 timeframe a broader approach to Joint Fires will be required. Whilst marshalling air and sea-based firepower to support land operations will still be a valid application of Joint Fires, so will land or air based fires to support maritime operations. In addition, there may be circumstances in which maritime and land-based air defence system fires will need to be coordinated to support Australian air strike operations. This paper contends that in the 2020 timeframe all of these situations will constitute valid applications of Joint Fires and they should all be encompassed by Australian Joint Fires Doctrine.

This broader approach to Joint Fires was illustrated in Hypothetical 2, when a RAAF strike was assisted by a coordinated submarine attack on part of the enemy naval task group. A somewhat different situation was described in Hypothetical 3 when the Australian Task Group Commander coordinated organic Army with RAAF assets to achieve rapid progress in a ground offensive and the early surrender of the Kamarian commander.

Hence, Joint Fires:

- Require coordination beyond the organic capabilities of one Service
- Entail the tactical delivery of force in order to achieve specified effects
- Deliver force that can be either lethal or non-lethal

In consequence, an appropriate definition for Joint Fires is as follows:

Joint Fires are closely coordinated tactical military actions by more than one Service component to deliver either lethal or non-lethal force against an adversary. While these actions are tactical, their effects may be strategic.

This paper argues that mastery of Joint Fires for a wide range of circumstances in many different types of environment will be critical to the ADF's future success in combat. That being the case, the primary thrust of this paper is to consider how the ADF can best master Joint Fires in the 2020 timeframe.

## **LESSONS FROM THE HISTORY OF JOINT FIRES**

Close coordination of air and surface forces has not always come naturally to air forces, armies and navies. From shortly after their establishment early in the twentieth century, air forces generally considered that they should give priority to air defence and strategic bombing. This meant that little effort was accorded to Offensive Air Support and Close Air Support of Army or Navy operations, despite their obvious importance for military outcomes on the ground and at sea.

This reluctance of airmen was exacerbated by the inadequacy of early aircraft for these tasks. There were also special challenges for airmen in supporting surface operations, such as the need to coordinate closely with surface forces and the risks from ground fire.

## **Briefing Box 2**

### **Offensive Air Support and Close Air Support**

The aim of Offensive Air Support is to contain or defeat enemy forces, whether on land or at sea. The skills and weapons required for each environment are different.

For example, Close Air Support is the use of military aircraft in a ground-attack role against targets in close proximity to friendly forces, in direct support of, and requiring detailed integration with, the fire and movement of ground troops.

Battlefield Air Interdiction aims to delay, destroy or deter enemy assets before they can be brought to bear on the battle lines.

The primary concern during Close Air Support missions is the close proximity of friendly forces. Forward Air Control is the link that ensures the attack does not endanger friendly forces. Battlefield Air Interdiction usually strikes pre-planned targets well behind enemy lines but may involve the use of Forward Air Controllers for target identification or the engagement of targets of opportunity.

The term Joint Fires now encompasses Offensive Air Support, Close Air Support and associated descriptors.

These inter-service tensions continued through the Second World War and the conflicts in Korea and Vietnam. However from the 1930s aircraft were designed specifically for the Close Air Support role and tactical air forces did provide extensive support for ground operations in all of these wars. The main point of contention was that some airmen tended to see these roles as an extension of artillery operations. Air forces generally preferred independent operations, largely because they believed that heavy strategic bombing was capable of winning wars largely on its own. Therefore most air forces placed first priority on delivering powerful bombing offensives against enemies and on defending friendly territory

from the adversary's bombing strikes. Armies and navies, for their part, wanted dedicated highly-responsive air assets at their disposal.

The reality was that as each of the major wars of the twentieth century drew on, more resources and effort were devoted to tactical air operations (Offensive Air Support and Close Air Support) and a temporary reinvigoration of air-land operations ensued. However, as soon as these conflicts ended this strong joint focus dissipated.

From the end of the Vietnam War until the late 1980s, the primary support for maintaining an emphasis on Offensive Air Support and Close Air Support in Australia came from the ranks of the Vietnam-era Forward Air Controllers (FACs). Then in the mid-1990s, renewed interest in air-surface operations stimulated development of the Forward Air Controller (Ground) or FAC(G) concept. This initiative was driven primarily by the Army's need for larger numbers of Air Contact Officers (ACOs)<sup>2</sup>, who were trained to operate with Army combat units and liaise with supporting Australian and allied aircraft.

The Australian Army has long required ACOs to provide targeting advice for Close Air Support. However, the training of more ACOs was only a partial solution for Army's needs because ACOs were never trained to the same level as FACs. While ACOs provide valuable targeting advice, they do not have the authority to authorise weapons release. When only an ACO is present in the vicinity of a target, the decision to release weapons is made by the aircrew.

Another problem in recent years has been that the Army developed requirements for many more ACOs than the Royal Australian Air Force (RAAF) had the resources to train. In consequence, Air Force adopted a 'train the trainer' approach that treated the FAC(G) as the building block on which the specific skills of ACOs could be built. Hence, in recent years

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<sup>2</sup> Air Contact Officers (ACOs) are not to be confused with the much broader descriptor, Air Combat Officer.

Air Force has trained Army FAC(G)s and Army, in turn, has used its FAC(G)s to train as many ACOs as it has required.

Further important developments followed in the early 2000s, largely as a consequence of the requirements for exceptionally close air-surface operational coordination in Afghanistan and Iraq. The term Joint Fires was introduced from United States doctrine to encompass Offensive Air Support and Close Air Support in the ADF lexicon. Similarly, the term Forward Air Controller (Ground) or FAC(G) was replaced by the term Joint Terminal Attack Controller (JTAC). Both of these new terms define more appropriately the key Joint Fires tasks and skills.

Modern JTACs have gone through an accreditation process that authorises them to direct, from forward positions, the actions of US and Australian combat aircraft engaged in Close Air Support and other offensive air operations. In 2006, the Royal Australian Air Force became the first foreign air force to receive JTAC training accreditation from the United States Joint Forces Command. A further recent development has been the introduction of the Joint Fires Observer (JFO) qualification to replace the defunct ACO role. The US-accredited JFO enables trained personnel at small combat team level to provide target information to JTAC for specific Close Air Support missions.

This accreditation of the Australian JTAC and JFO training capability puts the ADF at the leading edge of US developments in this field. In order to build on this strength the RAAF announced in mid-2007 that it was forming its first special tactics squadron at Williamstown to provide support to Special Operations Command-Australia. Special Tactics training is now underway to integrate offensive air support (eg. targeting, de-conflicting and controlling air strikes) with Special Force operations.

Once this special tactics capability is proven (initial operational capability is planned for January 2009), this new squadron will be fused with the Forward Air Control

Development Unit (FACDU) at Williamstown to establish No. 4 Squadron, covering the full gamut of JTAC activities for Special Operations Command. Full operational capability is planned for January 2011.

The importance of this progress in developing a strong Joint Fires capability was expressed well by the Chief of Army in the introduction to his 2006 Exercise when he said that: “The intersection of complexity, mission command, and small-team warfare is increasingly occurring where the land and air domains meet”.<sup>3</sup> This devolution of the application of air-delivered and space-enabled fires to targets on the ground is a dramatic empowerment of soldiers who are now able to access Joint Fires that were once the prerogative of battalion commanders.

### **Key Points**

- Offensive Air Support has generally been a lower priority, particularly for Air Force, and has always struggled for resources in competition with other roles.
- The last decade has seen a change in attitude to Offensive Air Support, particularly in the Air Force.
- The advent of accredited Joint Terminal Attack Controllers is a significant step forward.

## **STRATEGIC AND OPERATIONAL IMPERATIVES**

What then will be the strategic circumstances in which the ADF is likely to employ Joint Fires in the 2020 timeframe? The Defence White Paper of 2000 and the subsequent Defence Updates in 2003, 2005 and 2007 have provided guidance on the types of conflicts for which the ADF needs to be prepared during the coming decade and beyond. Key judgments of relevance here are:

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<sup>3</sup> Scott Hopkins (Ed.), *2006 Chief of Army's Exercise Proceedings*, Land Warfare Studies Centre, Canberra, January 2007, p.9.

- Future adversaries may be nation states or, alternatively, terrorist and criminal groups and other non-state actors.
- ADF operations may be required in Australia's closer regions but also in far distant theatres, including in the Middle East.
- Terrain may be urban, forest, jungle, desert or some other type, with operations required in a wide range of weathers.
- The ADF must be developed as a balanced force, ie a force developed both to shape the environment and also to deal with the range of combat challenges that are considered credible priorities.
- The ADF must be able to lead coalitions in the closer region and also to play useful roles under US or other coalition leadership in more distant theatres.

The *Future Warfighting Concept* and the *Joint Operations in the 21<sup>st</sup> Century* papers released by the Chief of the Australian Defence Force emphasize that in conducting the wide range of operations described above the ADF must be a 'seamless force' that excels in joint, inter-agency and coalition operations.

These documents also emphasize that Joint Fires need to be tailored carefully in order to achieve specific effects. In almost all conflicts, the key strategic outcome will be a political resolution favourable to Australia's interests. Hence, Joint Fires and other military operations need to be designed and delivered precisely with these political goals in mind. Put another way, all military operations need to be tailored so as to force the opposing decision-makers to change course in a way that meets Australia's interests.

Capabilities to attack and destroy major installations, ships, aircraft etc., will still be needed but they will usually be employed with great discretion in order to encourage political progress. In most situations Joint Fires will need to be

delivered with exceptional accuracy, with physical effects appropriate to the specific targets, with minimal collateral damage and within appropriate timeframes.

The nature of the Joint Fires will vary greatly. In some situations, such as those described in Scenario 1 above, the appropriate weapons may be GPS or laser-guided cluster bombs. In Scenario 3 some of the fires delivered by Army and Air Force assets may be high-explosive artillery rounds and helicopter and F-35 delivered missiles. However, in this scenario, the F-35s and other air and ground platforms may also jam Kamarian communications and scramble the computers used in the Kamarian Headquarters. These non-kinetic and generally non-lethal fires can, in some situations, be more effective than the delivery of high-explosive ordnance.

In urban environments joint fires may take numerous forms. The delivery of aerial ordnance is still likely to be required but in these types of terrain, accuracy will need to be exceptional and explosive power will need to be calculated precisely for the circumstances. Indeed, in some sorties the best effects are likely to be achieved by the exceptionally precise delivery of bombs filled with concrete. That may be the appropriate choice to destroy a terrorist executive meeting taking place in the back-room of a house in a heavily built-up area. This unusual ordnance could be expected to leave the rest of the house intact and the neighbouring properties unharmed.

Another important characteristic of some Joint Fires is their time-urgency. Some time-sensitive targets (TST) demand immediate attention either because they pose a danger to friendly forces or because they represent a high-value but fleeting target of opportunity. Such targets may be difficult to detect, identify and track because of the adversary's use of mobility, denial and deception. Hence, procedures need to be in place to permit such fleeting targets to be engaged rapidly before positive tracking is broken. In some environments, such as dense urban environments, this may mean that the period

between target identification and weapon launch can be no more than a few seconds.

**Key Points**

- In the 2020 timeframe, the ADF Joint Fires System will need to be capable of operating effectively against state and non-state adversaries, both near and far. The ADF will also need to operate Joint Fires independently or within an allied coalition.
- The ADF's Joint Fires System will need to be tailored precisely to achieve specific effects that, at the strategic level, will generally be expressed in political terms.

### **Briefing Box 3**

#### **Outline of a Joint Fires Process:**

#### **Find, Fix, Track, Engage, Evaluate (F2T2E2)**

A useful way to consider the Joint Fires process is to focus on the following six steps:

The *Find* phase detects or indicates the presence of a target. For fixed targets, this endures over time as the target does not have to be re-found in order to prosecute it, as may be the case for mobile targets.

The *Fix* phase identifies or classifies<sup>4</sup> a target and locates it in three dimensions such that it can be engaged by a weapon. As with the *Find* phase, fixed targets do not need to be re-fixed.

The *Track* phase relates to the reliability of *Fix* over time. While, *Track* confirms that fixed targets have not moved to another location, it is specifically pertinent to mobile and re-locatable targets.

The *Target* phase matches a weapon to an effect within any constraints imposed (such as sensitivity to collateral damage). Targeting requires knowledge of the target and its characteristics, the weapon's characteristics, and the desired weapon's effect (physical, functional or psychological).

The *Engage* phase places a weapon on the target, which requires a release authority that is controlled by the rules of engagement. Any weapon proposed to be used has to be cleared as appropriate given the considerations of humanity, necessity, proportionality and discrimination.

The *Evaluate* phase assesses the extent of the physical, functional or psychological effects achieved against the desired objectives.

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<sup>4</sup> Classify is to assign an identity to a target of friendly, hostile, neutral, or unknown.

## **CHARACTERISTICS OF EFFECTIVE JOINT FIRES IN 2020**

Given the range of operations that the ADF is likely to be called on to conduct in the 2020 timeframe, key characteristics of ADF Joint Fires will need to include:

### **COMMAND AND CONTROL**

Highly educated and trained people will be required to creatively plan, develop, execute, evaluate and manage the entire Joint Fires process so as to achieve desired effects. These command teams will need to be well-practised and very adaptable to changing circumstances. Importantly, they will need to be skilled in assessing questions of humanity, necessity, proportionality and discrimination and making considered weapons release decisions or conveying appropriate weapons release recommendations to higher authorities. Those authorising Joint Fires must also be able to assess accurately and at speed whether proposed actions fall within the government-authorised rules of engagement.

In general, the decision to engage a target should be made at the lowest practical level that carries authority to adjudicate on the allocation of assets and possesses knowledge of the commander's scheme of manoeuvre. Staff at the Combined or Joint Force Headquarters may be given authority to make engagement decisions on the commander's behalf (for instance, in the Combined Air Operations Centre)<sup>5</sup> or the authority may be delegated further down the command chain.

The level at which the decision to fire is made will be commensurate with the level of risk. In other words, the sensitivity of the target and the nature of the proposed Joint

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<sup>5</sup> A Combined Air Operations Centre (CAOC) is the command and control centre for the planning and execution of all air operations over an Area of Operations. A CAOC may also execute peacetime air exercises to practise air operations and maintain combat readiness. During crisis or war time, a CAOC will plan, direct and coordinate tactical air operations, air defence and theatre missile defence, through the direction of the Air Component Commander.

Fire will determine where, on the spectrum from a JTAC in the field to the Prime Minister in Canberra, the responsibility will lie.

### **CAPABILITIES FOR COMBINED OPERATIONS**

Whatever Joint Fires systems and processes are instituted by the ADF, they will need to be fully compatible with those of the forces of close allies and other friendly countries. The reality is that almost seamless combined Joint Fires should be possible with the forces of the United States and possibly with those of Britain. However, with other friendly countries less capable Joint Fires processes and procedures will need to be developed.

### **REACH**

Reach is the capacity to deliver physical, information and cognitive effects over long or short ranges. ADF planning needs to assume that some operational theatres could be on the other side of the globe.

### **KNOWLEDGE**

Knowledge in this context means a detailed understanding of the operational environment. This includes knowing in close to real-time precisely where friendly, enemy and neutral actors are, what they are doing and also what their activities mean. This requires not only exceptional surveillance and intelligence capabilities to find people and objects of importance but also a deep understanding of languages, cultures and patterns of behaviour. These are essential if the ADF is to possess strong capacities to interpret developments, to predict reliably what is about to happen and also to assess the likely effects of alternative Australian and allied actions. Strong intelligence, surveillance and reconnaissance capacities are essential for the delivery of Joint Fires and for the consequent generation of desired effects.

## **A LONG JOINT FIRES MENU**

The ADF will need to have an arsenal of Joint Fire systems that provide appropriate options to government in a very wide range of circumstances. The ADF will need, at one end of the scale, to be able to strike and destroy fleets of warships and other major military targets. However, at the other end of the scale, the ADF will also need to be capable of delivering very subtle effects, such as the planting of special messages on the computer screens of adversaries or the manipulation of the home video systems of opposing leaders. Selecting, acquiring, testing and becoming proficient in the delivery of this wide range of Joint Fires in order to achieve these diverse effects will pose special challenges for the ADF.

## **PRECISION**

The ADF will need to be able to deliver the long menu of joint fires with exceptional precision. This will require weapons and delivery systems that can short-circuit the right computer, blow up the correct meeting of adversary personnel or sink the right ship. However, it will also require outstanding systems to detect, identify and locate the correct targets, to determine acceptable approach routes to them and to ensure that the desired force is delivered precisely where it is needed. JTACs clearly have a vital role to play in directing these Joint Fires. The required level of precision will be very demanding to achieve and maintain.

## **TIMELINESS**

The ADF will need not only to be able to deliver the right Joint Fires with great precision but to do so in the correct timeframe. If the President of Kamaria is to be interrupted as he travels down a freeway, getting the timing right will be essential. Similarly, if Lieutenant John Hedge in Hypothetical 1 receives his fire support fifteen minutes late, his patrol may have been over-run. Delivering appropriate effects in a timely manner is likely to require some kinetic Joint Fire systems being held in close proximity to the operational theatre.

However in the 2020 timeframe, there might be means of delivering some electronic, information and other attacks from high altitude and space-based systems controlled on the other side of the world.

### **OVERMATCH AT DECISIVE POINTS**

In 2020 the ADF will need to be able to deliver more or greater effects than the adversary can counter at key points and times. This will require a tailoring of operations to avoid battle on unfavourable terms. Together with dissimilarity (applying forces in a way that is different to the adversary and which he is not expecting), it will allow the ADF to fight asymmetrically and with disproportionate effects. This will require the application of coercion or direct pressure in unconventional ways, possibly using lethal and non-lethal force, acting in concert with other elements of national power, or acting against critical vulnerabilities that are not usually the focus of military operations. Effects will be produced from the use of both kinetic and non-kinetic weapons.

### **SUSTAINABILITY**

Many future conflicts, especially those involving terrorist and other non-state actors, are likely to require Joint Fire operations sustained over months or even many years. This means that, amongst other things:

- The intelligence, surveillance and reconnaissance systems will need to be capable of being maintained in efficient operation around the clock for years.
- The target tracking and strike planning systems will also need to be able to operate continuously for many months.
- Joint Fires delivery systems will need to be held for extended periods in, or close to, key operating theatres.
- Essential munitions and other materials required for the generation of tailored effects will need to be

maintained in adequate quantities in suitable locations.

## **EVALUATION**

The ADF will need advanced capabilities for assessing rapidly the extent to which the desired physical, informational and psychological effects of Joint Fires have been achieved. This evaluation function will place further demanding requirements on the intelligence, surveillance and reconnaissance systems of Australia and its allies. The success of some physical attacks will be obvious from airborne or spaceborne surveillance. However, monitoring the effects of key actions on the minds of the Kamarian decision-making elite may require exceptional human and other intelligence gathering and assessment capabilities. Special evaluation capabilities of these sorts will not be easy to develop or maintain.

### **Key Points**

The key characteristics of effective ADF Joint Fires in 2020 will be:

- Quality command and control.
- Capabilities for combined operations.
- Reach to distant theatres.
- A detailed knowledge and understanding of operating environments, including cultural aspects.
- A long menu of lethal and non-lethal fire options
- Capacities to fire with great precision.
- A total system capacity, including the authority to deliver fires in appropriate timeframes, very quickly, when required.
- Overmatch at decisive points.
- Sustainability for many months and even years.
- Quality and rapid evaluation of the primary effects – kinetic, information and cognitive.

### **ESSENTIAL PRE-CONDITIONS AND ENABLERS FOR JOINT FIRES IN 2020**

Having identified the key characteristics required of ADF Joint Fires in 2020, it is appropriate to consider the key preconditions and enabling systems that will need to be put in place to get from here to there. A logical development path, or roadmap, might usefully address each of the Fundamental Inputs to Capability (FIC), namely: Organisation, Personnel (which include individual training and education), Collective Training, Major Systems, Supplies, Facilities, Support, and Command and Management.

## **Enabler 1**

### **Organisation**

Since the late 1990s, the higher command arrangements of the ADF have undergone several significant changes, resulting in an operational level of command now titled Headquarters Joint Operations Command (HQJOC). HQJOC is a fully-integrated joint headquarters responsible for conducting operations (under a three-star Chief of Joint Operations (CJOPS) who, until recently, was also the Vice Chief of the Defence Force (VCDF)).<sup>6</sup> The Services each have a two-star environmental commander who is responsible to their respective Service Chief for the raise, train and sustain functions of their single Services.

The command arrangements for ADF joint operations in 2020 are likely to be similar in structure to those currently employed. In the event of major operations a Joint Task Force (JTF), or several JTFs, would be formed whose commander(s) would report to CJOPS. Australian-led combined operations (ie operations with the forces of allies and friends) are likely to be commanded in a similar fashion.

Different command challenges will arise when the ADF forms part of a coalition with another nation in the lead. A prime example would be a US-led Combined Force Headquarters, which would probably be organised along component lines rather than integrated. In this situation each environment (i.e. maritime, land, air and special operations) would have a component commander responsible for the operations of that environment's force elements. Given the Australian Government's focus on having the ADF fight as a part of allied coalition, the ADF must be able to fit into such component organisations. This means that the ADF's organisational arrangements must be sufficiently flexible to

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<sup>6</sup> There are strong reasons for separating out these functions – CJOPS and VCDF – associated with the current tempo of operations and the significant reform being undertaken of the ADF, which makes it difficult for one person to manage both functions.

allow operations as a joint integrated structure or, alternatively, within a US-led component structure.

An important part of preparations for combined Joint Fires operations, particularly with United States forces, will be training for situations in which Australian and United States forces will be operating in close partnership but under different rules of engagement (ROE). Some of these differences may arise from the fact that Australia has signed and ratified some international protocols – most notably protocols of the Geneva Conventions - that have not been signed and ratified by the United States. Other differences may arise from the wording of the written ROE authorised by each government. Situations have arisen in the past in which a United States Combined Force Commander has directed an ADF aircraft to strike a target but the request has been declined by the Australian Theatre Commander, because the proposed attack falls beyond the Australian rules of engagement. This so-called ‘showing the red card’ has not happened frequently but it is likely that Australian governments will always wish to retain the right to veto an act by an ADF unit if it is judged to fall beyond legal authority. ADF and allied training needs to acknowledge these realities and be undertaken in ways that do not seriously disrupt operations in the field.

Organisations involved in Joint Fires in 2020 will need to be very adaptable and agile. The difficulties of finding and tracking future adversaries and the fleeting nature of some types of targets will demand exceptional adaptability, agility and speed of decision at all command levels, from field units to the Prime Minister.

Strategic, operational and tactical headquarters will face tough challenges, particularly in assessing targets quickly and determining the appropriate decision authority for executing Joint Fires. Supporting organisations, particularly those providing data links and imagery, will also need to be fleet of foot. Non-military contractors will need similar characteristics as they are likely to play increasingly important roles in the battlespace by 2020.

The measurement of effects and the feedback mechanisms involved in the joint targeting process will need to be much faster and more effective in 2020. Initial improvements would be facilitated by developing a common language for effects-based operations and effects-based thinking across the ADF.

Another improvement would be to strengthen and make more accessible lessons-learned data bases on Joint Fires issues from current and recent operations. Doctrinal development in this area would be greatly assisted by bringing together the Sea Power Centre, the Land Warfare Studies Centre and the Air Power Development Centre under some form of joint umbrella, while maintaining their individual responsibilities to their respective Service chiefs.

A final but important conclusion on organisation is that in order to plan, guide and nurture the development of these key capabilities, the 'champion' of Joint Fires should be the Vice Chief of the Defence Force (VCDF). He is the Joint Capability Manager and, as such, should carry responsibility for designing, developing and delivering a highly effective and efficient Joint Fires capability by 2020. Effectively VCDF would champion the development of the system that Chief of Joint Operations (CJOPS) would use, as CJOPS is the senior officer responsible, either directly or indirectly, for the execution of Joint Fires.

### **Key Points**

- The ADF's current command organisation is broadly suitable for the demands of the Joint Fires System in 2020.
- The ADF's integrated structure must be able to adapt to a component-based structure for coalition operations.
- Organisations involved in Joint Fires in 2020 will need to be very adaptable and agile.
- A common language for effects-based thinking will facilitate the execution of Joint Fires in 2020, as well as the necessary targeting feedback loops.
- Joint Fires doctrinal development would be assisted by bringing together the individual Service think tanks, while maintaining their individual responsibilities to their respective Service Chiefs.
- Development of the Joint Fires System will need a champion and the most appropriate person is VCDF.

### **Enabler 2**

#### **Personnel (and Individual Education and Training)**

While the organisational and command requirements of the ADF's future Joint Fires system will be demanding, the personnel demands are likely to be even more daunting. Attracting, training, educating and retaining the large numbers of highly skilled people needed to operate the complete Joint Fires system will tax the Australian Defence Organisation.

Two specific personnel challenges in developing an effective ADF Joint Fires capability by 2020 deserve highlighting: first, developing a markedly increased awareness of Joint Fires doctrine and, second, training a cadre of

specialists – mainly JTACs - who can provide essential services to future commanders.

There are several options that would meet the first requirement – that of markedly increasing awareness of Joint Fires doctrine. One possibility would be to establish a new Joint Operations or Joint Warfare School. A second would be to better resource the Australian Defence Force Warfare Centre (ADFWC). If a new school were preferred, it would best be collocated with an existing organisation that teaches Joint Fires doctrine, such as the School of Artillery or the Forward Air Control Development Unit (FACDU). The latter suggestion would have the advantage of being based at Williamstown, the home of the ADF Warfare Centre, a facility already possessing a joint student body. An alternative would be to commission the ADF Warfare Centre to develop a properly resourced specialist course devoted to Joint Fires education.

The second requirement, that of developing a larger number of highly experienced specialist JTACs, will be a more daunting challenge. JTACs will be in high demand in 2020, particularly in situations where operations are continuous and where light forces or force elements are dispersed across the battlespace. They will need to provide a 24/7 capability and be available in sufficient numbers to meet the needs of all subordinate commanders who require Joint Fires support.

In 2020, JTACs will most likely have an operational military background and be sourced from the Services. There may, however, be circumstances when a JTAC for counter-terrorist or counter-insurgency operations has a police or intelligence background. Whatever their background, JTACs will need a good understanding of the commander's intent and the intended scheme of manoeuvre. They will also require the ability to translate a desired effect into the necessary action to achieve that effect. To do that, JTACs will need knowledge of the full menu of available Joint Fires weapons (both lethal and non-lethal) and an in-depth understanding of the targeting cycle.

Another core skill for a JTAC will be the knowledge and experience to manage battlespace deconfliction, particularly when air assets are directly involved in providing support or when air activity is occurring in and around the manoeuvre space. The complexity of this task will depend on the boundaries of that space and the nature of the other elements operating there. Inhabited aircraft (including helicopters), uninhabited aerial vehicles, missiles, artillery and naval gunfire support all present particular challenges for battlespace coordination.

A JTAC also cannot be a force protection liability and must be able to move and survive in the environment in which he or she is operating. This requirement will be particularly important when supporting Special Force operations, given their frequent need for high mobility and their requirements for Joint Fires at short notice.

JTACs in 2020 will need, in addition, an intimate understanding of network-level decision-making and, more broadly, network-centric operations. In particular, future JTACs must be capable of supporting multi-dimensional manoeuvre in much more complex and ambiguous environments than at present.

Given the complexity of the JTAC role, it may not be possible to train sufficient numbers of people to the necessary level without a disproportionate allocation of resources. The ADF is already experiencing difficulties training, graduating and retaining currently required JTAC numbers and significantly more will be needed in 2020.

At present, the Forward Air Control Development Unit (FACDU) carries responsibility for training ADF JTACs. The training cost *per* JTAC is currently \$1.8 million. However, this figure could and should be reduced markedly by making greater use of networked simulation. A potentially attractive approach would be to build on the current JTAC course at FACDU, particularly as that unit develops its operational

capability within No. 4 Squadron. In time it may even be possible to develop FACDU into a school for Joint Fires.

JTAC training needs to address both lateral and vertical skills. Not only must JTACs be trained to cope with the demanding operational environments of 2020, they should also have a (secondary) career path beyond their JTAC 'field' role. JTACs, with their strong operational focus, should be developed into valued staff members of Joint Task Force Headquarters or in Combined Air Operations Centres of US-led coalitions. More broadly, development of a 'personnel roadmap' designed to produce practitioners who can deal with the gamut of Joint Fires roles – from field operations through to doctrinal and educational development - would be of great value to the ADF in 2020.

### **Key Points**

- Attracting, training, educating and retaining the number of quality people required for the Joint Fires System will be a major challenge for the Australian Defence Organisation.
- A focused education program for Joint Fires should be developed at either the Australian Defence Force Warfare Centre or at the Forward Air Control Development Unit.
- The Forward Air Control Development Unit should continue JTAC training but more resources are needed.
- JTACs should have the option of a further career path.

### **Enabler 3**

#### **Collective Training**

The ADF's Joint Fires capability in 2020 will need to be a flexible system with many components that operate together as a well-oiled machine. In order to achieve this type of highly-

effective Joint Fires capability, regular high-quality joint and collective training will be essential. However, there are barriers to such training at present, partly because of the dispersed location of relevant land and air units, especially the major land combat formations and the fast jet squadrons. The exception to this is in the Northern Territory where the Air Force base at Tindal is reasonably close to the Army's northern training areas. Similar barriers exist to effective training by relevant Air Force and Navy units. Large joint exercises contribute useful training but their infrequency, the requirement for such exercises to also satisfy individual unit or ship training outcomes and their high cost inhibits progress.

In order to achieve markedly improved Joint Fires training, there is an urgent need to roll-out a high-quality synthetic environment. This environment should be capable of connecting any single Service training or simulation exercise with similar activities of other units across all three Services. These arrangements would be challenging to implement but should become progressively easier over time. The key would be having a synthetic environment that is transparent to the participants. Realistic training should be possible without individual units noticing whether other 'players' are real or simulated. Moreover, major training cycles should be possible in this synthetic environment most months of the year.

One project likely to help overcome the collective training challenges of 2020 is the new Joint and Combined Training Centre. Importantly, this Centre will offer the opportunity to train within a US-led component-based headquarters for coalition operations.

Fundamental to improving Joint Fires capabilities will be the ability to balance enduring doctrine with flexible, dynamic and up-to-date tactics, techniques and procedures. This requires the fostering of a creative information-sharing culture. Driving these developments forward in a cohesive manner should be a core task for VCDF as the recommended Joint Fires champion.

### **Key Points**

- A high-quality synthetic training environment is needed urgently for Joint Fires collective training and system development.
- Development of the Joint and Combined Training Centre should assist future collective training.
- Developing an information-sharing culture and better understanding one another's requirements is intrinsic to improving Joint Fires.

### **Enabler 4**

#### **Major Systems: Capability Development Implications**

If Australia is to possess a highly effective Joint Fires capability by 2020, the component capabilities will need to be selected, introduced into service and employed as part of a strong, integrated Joint Fires system. This system will need to operate like a football team. Each element will have particular roles and special strengths and, when all elements are properly trained as a total system, the team will be capable of delivering exceptional results in very short timeframes.

The essential backbone of the Joint Fires system will be a very high quality communications network. This network will receive intelligence and surveillance information from multiple sensors spread over wide areas, help to collate and fuse the information into useable formats and display it rapidly for intelligence analysts, commanders and others. The network will generate a Common Operational Picture that can be used in various ways to guide all network elements to achieve the commander's intent in a self-synchronised manner. It will, for instance, need to be seen by the commander of a ground task group that is rapidly advancing through adversary positions, by a naval commander at sea who is setting an ambush for the Kamarian fleet and by the Commander of the Combined Air Operations Centre who is providing strike aircraft to JTACs to

attack Kamarian positions ahead of the ground advance. This Common Operational Picture will, however, also be viewed by the Chief of the Defence Force who, in turn, will use some Common Operational Picture displays to brief the Prime Minister and the other members of the National Security Committee of Cabinet on the progress of the campaign.

In a more detailed sense, the network and the Common Operational Picture it generates will be used by intelligence analysts to comment on the meaning of what is seen and suggest to commanders what might be anticipated next. Commanders will evaluate displayed information in the light of the campaign's strategic and operational objectives and then transmit orders to other elements of the network. Surveillance assets might be tasked to look harder in a particular area, intelligence analysts might be asked to investigate alternative explanations for recent events, combat units might be ordered to shift positions and then deliver fires on particular targets and surveillance assets might be tasked to evaluate the effectiveness of the fires delivered. For this integrated Joint Fires system to work efficiently and with speed, all key elements will need access to a communications and command network that is highly secure, reliable, robust, has long reach and which can transmit high bandwidth messages rapidly and flexibly to all key parties.

While the network will be critical, so will the intelligence and surveillance sensors that will be feeding information into the 'front end' of the system. There will need to be sensors monitoring all relevant frequencies from high frequency communications through to visual frequencies and even frequencies relevant to underwater surveillance. Some of these sensors will best be located on inhabited and uninhabited aircraft, some might be on Australian or allied spacecraft and some will likely be on ground vehicles and at sea. In highly built-up and other cluttered environments, there will be no substitute for human intelligence – people feeding the network with information from forward locations on the ground. Human intelligence will be especially critical when

opposing forces comprise individual people and small groups mixed in amongst much larger numbers of neutral civilians.

Deploying appropriate combinations of sensors and sensor-systems to suit particular environments will pose serious challenges for the ADF. A specially demanding problem will be accessing adequate numbers of people who are well-versed in local languages and cultures and sufficiently comfortable operating in those environments to feed the intelligence network on a real-time basis.

Many defence systems being acquired or planned for acquisition will be extremely important data collectors. Long and short-range uninhabited aircraft of various sorts, the B737 *Wedgetail* Airborne Warning and Control Aircraft, the upgraded Jindalee Over-the-Horizon Radar Network, the AP-3 *Orion* surveillance aircraft and their eventual successors, the *Collins* Class submarines and almost all of the Navy's warships are capable of collecting valuable electronic and other intelligence. Moreover, the F-35 Joint Strike Fighters that are planned for acquisition will possess a remarkable suite of sensors capable of transmitting vast quantities of data back through the network.

Drawing all of these and other digital data streams together, fusing multiple inputs, generating usable operating pictures and then assessing what it all means is not a trivial task. Far more sophisticated data fusion and display systems will be required if intelligence assessment is to be possible in useful timeframes and if commanders are to be given a close-to-real-time operating picture on which to base decisions.

Finding opponents will, however, be only part of the Joint Fires challenge. Opponents must also be fixed in time and space and then tracked if they are moving. This will pose new challenges for the managers of surveillance sensors. Relevant sensors may need to be re-deployed and other sensors might need to be brought into the theatre in order to maintain priority objects under surveillance and potentially available for targeting.

If a commander decides to strike a target that is under surveillance, additional sensor views, higher resolution imagery or other data may be required before he or she is satisfied that the tests of humanity, necessity, proportionality and discrimination are fully met. Future Australian commanders will wish not only to operate with high efficiency and within international law but they will also be acutely aware that their actions will be monitored real-time by senior officers and also, potentially, by members of the Federal Cabinet.

As discussed above, key roles in detecting, identifying, tracking and then targeting adversary elements will be played by JTACs and JFOs. These personnel will frequently travel with ground force or naval task group commanders equipped with night vision systems, laser and GPS designators and other relevant equipments. In some combat environments, JTACs will most appropriately be located in aircraft that can manoeuvre relatively freely over priority areas of the battlefield. By 2020 Australia's JTACs will need access to a more suitable aircraft than the current training-only PC-9/As.

If a decision is taken to strike one or more targets, commanders and governments will want to have a long menu of lethal and non-lethal options available for use. Small diameter and larger diameter guided bombs will be required, with scaleable explosive effects. Specialist bomb warheads will also be required to strike specialised targets. For instance, shaped-charge warheads may be needed for armoured and other hardened targets, cluster bombs may be needed to destroy parking lots of military vehicles and electro-magnetic pulse bombs may be needed to blow the electrical fuses of enemy headquarters.

Several types of stand-off missiles and glide-bombs will also be required. Some of these systems might be GPS-guided, some electro-optically guided (ie day-night TV), some might be anti-radiation weapons designed to home on opposing radars and others are likely to be radar-guided for attacks on ships and other targets with distinct radar signatures.

The ADF will also need a wide range of non-kinetic weapons in its arsenal. For instance, electronic systems will be needed that can seed spurious messages into an opponent's surveillance radars, some might trigger faults in computers and others might take control of radio or television programs in particular towns or cities. Commanders and their staffs will need to have a depth of understanding about the effects likely to be generated by the use of each type of weapon. They will generally choose selectively from the wide range of options in the arsenal so as to optimise not only the tactical effects but also the higher-level operational and strategic consequences.

Once weapons are released, ADF commanders will wish to monitor carefully the effects that have been achieved. If, for instance, a bomb was dropped on a bridge, optical sensors of various types should be able to report almost immediately whether the bridge span has been destroyed. However, the ADF commander may be much more interested in the reaction of the Kamarian President and the issues that he then discusses with his government colleagues and his military commanders. That information is likely to be far more useful in evaluating the strike's effects and judging what follow-up action may be appropriate. Clearly, however, these types of information would need to be gathered and transmitted by markedly different intelligence and surveillance systems to those normally used to monitor bomb damage and those systems would need to be prepared well beforehand.

This brief discussion of the capability development requirements of the ADF's future Joint Fires system highlights several key conclusions:

- First, the Joint Fires system will have to be developed as a flexible, highly integrated network. The communications network itself will have to be robust, secure and capable of transmitting high bandwidth data rapidly in a dispersed manner over long distances. Any ADF elements not intimately connected to the network will be of dubious value.

- Second, there will be a need for a broad range of sensor systems at the 'front-end' of the system that can detect, track and help target priority objects. They will also need to facilitate post-attack evaluation of the physical, information and cognitive effects that Joint Fires have produced.
- Third, there will be a need for commanders to be able to choose knowledgeably from a long menu of lethal and non-lethal fires.
- Fourth, a quality Joint Fires capability will only be achieved if the total system is exercised regularly, tested with alternative operational scenarios, and flexibly adapted to take on-board lessons and improvements over time. Building the Joint Fires system within a capable synthetic environment should facilitate the system's development in a cost-effective manner.
- Despite the above challenges, a quality Joint Fires system has the potential to provide the ADF with an exceptional combat edge that few others will be able to match. In consequence, it deserves priority in ADF capability development.

### **Key Points**

- ADF Joint Fires need to be developed as an integrated system.
- The essential backbone of the Joint Fires System is a high-capacity communications network.
- Multiple sensor inputs need to be fused rapidly and displayed both to provide a Common Operational Picture and also to generate multiple derivative displays for a variety of purposes, eg intelligence assessment, development of detailed targeting plans, etc.
- A key task will be facilitating quality and timely decisions.
- The ADF will need access to a wide range of lethal and non-lethal weapons.

### **Enabler 5**

#### ***Supplies, Facilities and Support***

Although this study acknowledges the importance of supplies, facilities and support in the Joint Fires equation, these issues are considered to be largely system or capability-related and therefore difficult to analyse in the absence of specific capability proposals. They are not discussed further in this report.

### **Key Points**

- Supplies, facilities and support are crucial for Joint Fires.
- They form part of specific capabilities and as such should be catered for as part of major capability proposals.

### **Enabler 6**

#### **Command and Management**

The command and control (C2) of Joint Fires will need to be extremely efficient in order to achieve effective operational outcomes in the battlespace of 2020.

The overall command of Joint Fires is likely to rest with the Combined or Joint Force Commander. Any delegation of C2 or assignment of assets that can deliver Joint Fires will be in accordance with the commander's intent and scheme of manoeuvre. In most instances, the Combined or Joint Force Commander will also be the manoeuvre commander, although there may be times when that role is delegated to a subordinate commander.

If there is only one Area of Operation or only one subordinate commander requiring Joint Fires assets, then control of those assets may be delegated. However, if there are multiple Areas of Operation or several subordinate commanders potentially requiring Joint Fires support, the Combined or Joint Force Commander is likely to retain command of those assets. That commander may assign control of assets to a Combined Air Operations Centre in the Headquarters if one is formed or to the relevant component commander (if there is a component command structure in place).

When Joint Fires authorities are delegated it would preferably be to the lowest practical level but only for finite periods. The assessment of operational priorities and the authority to redeploy or re-allocate scarce or high-value assets would need to be retained at an appropriate level.

These characteristics of C2 delegation are unlikely to change by 2020. A similar philosophy will probably apply to the coordination of three-dimensional battlespace. The subordinate commander with responsibility for outcomes in a particular battlespace should command all activities in that space. A key challenge for the Combined or Joint Force Commander will be to determine battlespace boundaries when many assets are operating across the theatre or, at least, across several Areas of Operation. In many situations the continuous coordination of three dimensional boundaries will be required, especially when operational circumstances are changing rapidly or when views of adversary forces are fleeting.

### **Key Points**

- Control of scarce Joint Fires assets will always be in accordance with the Combined or Joint Force Commander's scheme of manoeuvre and operational priorities.
- Airspace coordination will be delegated more often but the coordination boundaries will need to be clearly delineated.
- ADF forces must be prepared to operate in a component as well as a joint structure.

## **KEY STEPS IN THE PATH AHEAD**

This paper has argued that mastery of Joint Fires will be critical for the ADF's future battlefield success. In consequence, Joint Fires System development needs to be

made a very high priority in Australian defence planning, force structure development and defence budgeting. Failure in this field would cripple the future ADF and render Australia vulnerable.

This paper suggests that eight key steps need to be taken for the ADF to acquire a quality Joint Fires capability for the 2020 timeframe. The eight key steps are, as follows.

### **Step 1**

#### ***Focus on Developing the Joint Fires System***

If the ADF is to achieve a strong Joint Fires Capability by 2020, heavy emphasis will need to be placed on developing this capability as an integrated system. This Joint Fires system should be able to monitor very wide areas, detect and identify adversary elements, track and, where appropriate, fix adversary elements in time and space, facilitate command decisions and, if required, target and engage adversaries with appropriate fires. The Joint Fires system should then be able to evaluate the physical, information and cognitive effects of the fires and re-acquire and re-target adversary elements as may be appropriate. Moreover, this Australian Joint Fires System (AJFS) will need to be capable of completing entire cycles of Joint Fire action very rapidly, in some cases within a few tens of seconds.

Giving priority to the development of a truly joint combat system of this nature will challenge many habits of defence thought and behaviour. Australia's senior Defence leadership will need to accept that the requirements of the Joint Fires System will trump single Service development bids when they conflict. Indeed, it would be appropriate for all major defence capability proposals to be reviewed specifically for their contribution to, and compatibility with, Joint Fires System requirements.

The individual Australian Services will certainly need to continue the development of their respective organic combat fire capabilities. The Army will need surveillance sensors,

more advanced communication systems and also new generation artillery, anti-tank weaponry, heavy machine guns and many other things besides. Similarly, Navy will need advanced ship radars and other surveillance systems, anti-shiping and anti-submarine weaponry, area air defence missiles and capabilities to strike some targets ashore. Air Force will need capacities to monitor very large airspace areas, to communicate reliably across them and also to strike many different types of target in the air, on the land and also on and below the surface of the sea. However, the development and mastery of Joint Fires will require all of these and related capabilities to be evaluated, in the first instance, for their capability to contribute to the power of the total system and their potential to deliver priority physical, information and cognitive effects.

The highly capable Joint Fires System that is envisaged should be evolved through a spiral development process managed by the Joint Fires champion. This senior officer should carry personal responsibility for the design and development of all key elements of the Joint Fires System and for working closely with CJOPS to achieve outstanding Joint Fires System performance.

## **Step 2**

### ***Develop by Doing (Real and Simulated)***

Many components of Australia's Joint Fires System are already in place or are at various stages of acquisition. Indeed wide areas of Australia and its approaches can already be maintained under surveillance and several types of Joint Fire can be planned, organised and delivered by the ADF in the air, sea and land environments. However, few of these elements are yet to be integrated into a highly flexible and speedy Australian Joint Fires System.

In the past most major Australian defence capabilities have been acquired by purchasing the key equipments first, matching appropriate numbers of skilled personnel second

and, third, embarking on an extended process of “working-up” the capability through training and exercises. However, in developing the Australian Joint Fires System, it would seem appropriate to employ a development process in the reverse order.

An urgent priority should be the standing-up of a synthetic environment within which real and fictional units can be trained and exercised as a total Joint Fires System. This synthetic environment would wean current component staffs into a life-like total system environment within which they could learn the basic skills required for Joint Fires System performance and exercise themselves in a wide range of realistic scenarios. An important by-product would be to permit exercise staff to evaluate the relative contributions of all system components to battlefield outcomes – from the broad area and precise surveillance sensors, to the targeting systems and to the explosive, electronic and information weapons, followed by the post-attack evaluation systems and the overall command and control.

This migration of current staffs into Joint Fires training and exercising within an advanced synthetic environment would highlight those current systems which are seriously deficient and a few which may be absent altogether. Lessons from this exercising should be of great assistance to the Defence capability staffs as they specify new systems for acquisition and also recommend acquisition and budget programming priorities.

Then as new major equipments are introduced into service within the Joint Fires System they could be exercised fully within an integrated, practised system that gradually evolves into being more real than synthetic.

### **Step 3**

#### ***Strengthen the Network***

As discussed briefly earlier in this report, the essential skeleton of any effective Joint Fires system is a communications and command network that is highly secure, reliable, robust, has long reach and which can transmit high bandwidth messages rapidly and flexibly to all key parties.

The criticality of the network to future ADF operations has long been recognised within the Australian Department of Defence and, in consequence, network development has received planning attention and a degree of funding priority. However, to provide the level of connectivity that will be required for highly efficient Joint Fires in 2020, there is a need to move on rapidly to a new level of network capability.

An important part of this capability would be the communications links themselves. However, also critical will be the computing power to rapidly fuse data and display it in ways tailored to the specific needs of diverse players – from senior commanders, to fighter pilots, infantry section leaders, JTACs, JFOs, intelligence analysts and a host of others. The human factor interfaces will need to be designed and tailored specifically to meet the needs of all key categories of user.

### **Step 4**

#### ***Strive for Information Superiority***

The ADF has an impressive array of advanced technology sensor systems either already fielded or scheduled for deployment in the coming decade. They include the upgraded *Jindalee* Over-the-Horizon Network (JORN); the *Wedgetail* airborne early warning and control aircraft; high, medium and low altitude uninhabited vehicles of various sorts; the F/A-18F *Super Hornet* and F-35 Joint Strike Fighters; the AP-3C *Orions* and their successors; the Army's *Tiger* armed reconnaissance helicopters; the *Aegis* and related systems on the Air Warfare Destroyers, etc. Then when allied space and other systems

are added, the data streams from theatres of importance could, potentially, be overwhelming.

Effective management of data collection systems, the direction of data flows, the fusing of data into intelligible displays and then the tailoring of the displays to produce useful information for analysis and decision are all complex and demanding functions but they are also critical to the achievement of information superiority. Quality personnel will be needed to master these processes and develop a system that is sufficiently flexible to cope with changing circumstances and can operate around the clock for extended periods. These data gathering, management, fusion and display processes may be back-room functions but their effective performance will be critical to delivery of a high-grade Joint Fires system.

## **Step 5**

### ***Train and Educate for Decision Superiority***

Possessing superior information will be critical but so will be a system that facilitates high-grade decision-making.

Decision superiority requires the highest quality people in all key positions operating as a well-coordinated team. Many steps are required to achieve this goal. They include initial staff selection, the quality and form of training and education, the effectiveness with which key decision-makers can access and understand vital information flows, the availability of appropriate decision aids, the scope for consulting other network players rapidly, the ability of individuals to decide key issues and, finally, the ability to communicate decisions clearly and within appropriate timeframes.

While the capacities of the senior commanders in headquarters complexes are critical, within the Joint Fires System of 2020 many more people will play key roles. Middle-level and junior commanders, the officers commanding key sensor and weapons platforms, JTACs and many others will need to have a clear appreciation of the Joint Force Commander's intent and be able to make frequent, largely

self-synchronised, decisions on subsidiary matters to ensure that the team's overall objectives are achieved. Training a total Joint Fires System to ensure that all decision-makers make optimal decisions in a wide range of circumstances will require frequent exercising, preferably using the synthetic training and exercise environment discussed above.

## **Step 6**

### ***Improve the Adaptability and Flexibility of Command and Control***

As discussed in earlier sections of this report, the ADF already has a command and control structure and processes that are appropriate for the type of Joint Fires System that will be needed in 2020. The Chief of Joint Operations carries command oversight of all operations and, in particular, appoints and monitors all Joint Task Force Commanders operating in the field. When ADF elements operate within a US-led Combined Force Headquarters, rather different arrangements and lines of responsibility would apply.

In most situations in the past, Australian command teams and complete headquarters have operated on an *ad hoc* basis with selected personnel simply thrown together to conduct a particular operation. Moreover, once one of these headquarters is operating in a place like East Timor or the Solomon Islands, the replacement of personnel has normally been undertaken in an incremental manner over time. There are questions about whether this traditional manner of generating and fielding headquarters will be adequate for the future Joint Fires System. There would appear to be considerable advantages in taking a different path – of preparing and developing the key staffs of one or more Joint Task Force Headquarters so that they can be raised, trained and then deployed as a cohesive team. This may require a degree of posting discipline but it should help to generate a higher level of professionalism in command and control and also, probably, a disproportionately positive impact on combat performance.

ADF command teams could also be trained to enhance their capacities to perform well within a US-led Combined Force Headquarters operating under component lines. The strengthening of these capabilities would optimally be achieved through numerous simulations and exercises.

## **Step 7**

### ***Adopt a National Effects-Based Approach***

One of the advantages of Australia developing an integrated Joint Fires System will be that it will help focus all components of the Defence system on the achievement of its core goal – the delivery of selected strategic effects.

In almost every conceivable future conflict the primary purpose of the ADF will not be the destruction of an opposing defence force, the incapacitation of the opposing country's economic infrastructure or the dislocation of an opposing state. Some efforts in all of these areas may be required but only to the extent that they contribute to securing a political outcome on terms favourable to Australia's interests. In the end, the core battlefield objective is to persuade or coerce the opposing leadership to agree to terms and conditions which the Australian Government can fully endorse.

Within this construct, the ADF is one of many 'tools' within the Australian Government's 'tool kit'. All elements of the ADF must focus their tactical actions – including the application of Joint Fires – in such a way that they deliver the persuasive or coercive effects required by the National Security Committee of Cabinet. For instance, when selecting the appropriate form of fire to isolate a particular region of an adversary country, rather than destroying the main access bridge across a wide river it may be considered more appropriate to take the telephone and radio systems in that region off the air through electronic attacks. These actions might be preferred because they are expected to play more effectively on the minds of the national leadership and help to accentuate their sense of vulnerability. Close monitoring of the adversary leadership's

reactions would help determine what Joint Fires or other follow-up actions would be appropriate.

In the past many ADF elements have been content to focus only on the creation of very direct battlefield effects, such as destroying adversary tanks, sinking ships or shooting down aircraft. However, with a national effects-based approach driving the Australian Joint Fires System all participants would have a thorough understanding of the strategic political effects for which they would be striving. Certainly they would be capable of destroying lots of adversary hardware, personnel, infrastructure and much else besides. However, they would also realise that the Australian way of warfare requires the use of force to be crafted with great care in order to have the best chance of achieving carefully selected strategic effects, which will almost always be defined in political rather than military terms.

## **Step 8**

### ***Strive for International Leadership in Education and Training***

The Australian Joint Fires System in 2020 will require large numbers of quality people who are very well educated and trained. It will also need people who have served for periods that are sufficiently long for them to have developed high levels of experience. It is perhaps ironic that while the ADF will require extremely advanced technologies and complex military systems in the 2020 timeframe, it will be the quality of defence personnel that will be of first importance. In consequence, a key question is whether the ADF's current recruitment, education and training systems are adequately structured to meet the requirements of the Joint Fires System.

There is little evidence that Australia's current officer education, training and related systems are receiving the priority or delivering the exceptional quality that will be required. Indeed, there are many indicators that officer and related training needs to be strengthened considerably.

Several remarks have been made earlier in this paper about the specific categories of training that will be required for an effective Joint Fires System to be operated in Australia in 2020. However, there is a broader and somewhat deeper educational challenge that confronts the ADF in this field.

What key officer education issues need to be addressed? First, the current model of officer education could be described as a 'bulk food calorie' model, in which large numbers of students are fed as much moderate nutrition learning as possible, rather than a 'vitamin' model that identifies each student's needs and delivers high-grade content appropriate to those needs.<sup>7</sup> Officer education for the Joint Fires System will need to be conducted in a far more tailored manner, taking full account of individual backgrounds and educational needs.

A second problem is the relatively low priority that has been accorded to Australia's middle and senior officer institutions since the late 1990s. Key positions at these institutions have been reduced in rank, less care has been taken to select well-qualified personnel and many staff have been sent to the Defence College on the way to retirement. In a few cases, staff have been posted to the colleges as a way of holding them temporarily in the system, prior to re-posting to 'higher priority' command and staff positions. Some senior personnel have been posted there in effective part-time capacities so that they can be despatched overseas to undertake their own training programs or to conduct other duties without disrupting command and central policy functions. The result has been declining educational standards and a tendency towards introversion.

There is a clear need to reverse this situation. The senior leadership of the Australian Defence Organisation need to insist on nothing short of the highest standards at the ADF's

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A similar argument is made in Clark A. Murdock, Michele A. Flournoy *et al*, *Beyond Goldwater-Nichols: US Government and Defense Reform for a New Strategic Era* (Phase 2 Report) (Center for Strategic and International Studies, Washington D.C., July 2005), p.116.

officer training institutions, especially at the Australian Defence College.

A third serious problem arises from the system of posting most promising officers to two, year-long, staff college courses during their careers. This means that there are very high opportunity costs entailed in detaching highly skilled individuals for such long blocks of time—lengths that few private corporations would ever contemplate. This rigid system also means that there is little scope for those officers needing some command and staff education and training earlier in their careers to dip into the system and accelerate their skills development appropriately. Nor does it provide ways of refreshing officers in core areas of understanding and skill once they have departed the Defence colleges. Moreover, in an era of continuing high levels of defence operational tempo, when officers are routinely scattered to many parts of the world, it provides no way for them to study key topics in remote locations.

In short, there is a need for major reform of the Australian Defence officer education system. It currently fails to achieve the levels of excellence that will be required to operate a high quality Joint Fires System. It also lacks flexibility and adaptability, and it does a very modest job of inculcating such key characteristics in those sent to participate in its courses.

Remedying these deficiencies would not be excessively costly. They would, however, involve a ruthless determination to strive for the very highest educational standards in all relevant institutions. There can be no excuse for Australia possessing any but the highest quality defence officer education system in the Asia-Pacific region and one of the very best globally. The payoff in operational performance would be marked. Exceptional standards will be essential if Australia's Joint Fires System is to reach its full potential in the 2020 timeframe

## CONCLUSIONS

The primary conclusions of this report are, as follows:

- A highly capable Joint Fires System will be essential for the ADF's battlefield success in 2020.
- Joint Fires may be defined as:  

‘Closely coordinated tactical military actions by more than one Service component to deliver either lethal or non-lethal force against an adversary. While these actions are tactical, their effect may be strategic.’
- In the 2020 timeframe, the ADF Joint Fires System will need to be capable of operating effectively against state and non-state adversaries both near and far. The ADF will also need to be able to deliver Joint Fires independently or within an allied coalition.
- The ADF should develop its Joint Fires capabilities as an integrated *system*.
- Development of the ADF's Joint Fires System needs a champion who is personally responsible for system development and performance. This report recommends that the Vice Chief of the Defence Force, as the Joint Capability Manager, is the most appropriate person for this role.
- The ADF already possesses a command and control structure and process that will be broadly appropriate for the type of Joint Fires System that will be needed in 2020.
- Significant progress has been made in recent years in developing an integrated system for delivering Joint Fires to support land and maritime operations. An important initiative has been the development of US and Australian accredited JTACs to coordinate Joint Fires in forward locations.

- An early priority should be the acquisition of a synthetic environment within which military units can be trained and exercised in a wide range of Joint Fires scenarios.
- The technological backbone of the Joint Fires System should be a communications and command network that is highly secure, reliable, robust, has long reach and which can transmit high bandwidth messages rapidly and flexibly to all key parties.
- The ADF's sensor network will need to be further developed and better integrated in order to generate the type of Common Operational Picture and broader range of displays that facilitate timely Joint Fires decisions. The ADF needs to plan for human intelligence to play an even more important role within the sensor network, especially in highly urbanised environments and in theatres where the adversary comprises individuals and small groups operating within a much larger population of neutral or friendly people.
- The ADF's Joint Fires System will need to be able to deliver a wide range of lethal and non-lethal weapons with exceptional precision and timeliness. Joint Fires will need to be tailored so as to generate specific coercive effects that, in combination, encourage the adversary leadership to adopt stances compatible with Australia's interests.
- Many future conflicts will require Joint Fires capabilities to be sustained over months and maybe several years.
- Very highly educated and trained people will be required to creatively plan, develop, execute, evaluate and manage the Joint Fires System. Key people within the ADF's Joint Fires System will need an exceptional understanding of relevant operating environments, including deep language, cultural, social and political insights.

- There can be no excuse for Australia not possessing the highest quality defence officer education system. Exceptional standards will be essential if Australia's Joint Fires System is to achieve its full potential in the 2020 timeframe.

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The Kokoda Foundation has been established as an independent, not-for-profit think tank to research, and foster innovative thinking on, Australia's future security challenges. The foundation's priorities are:

- To conduct quality research on security issues commissioned by public and private sector organisations.
- To foster innovative thinking on Australia's future security challenges.
- To publish quality papers (The Kokoda Papers) on issues relevant to Australia's security challenges.
- To develop Security Challenges as the leading refereed journal in the field.
- To encourage and, where appropriate, mentor a new generation of advanced strategic thinkers.
- Encourage research contributions by current and retired senior officials, business people and others with relevant expertise.

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