



Tomorrow's Wars

Insights From Our Four Alternative Futures

Peter Layton

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FOREWORD

Traditional planning approaches assume the future of an organisation can be predicted accurately enough so that a clear strategic direction can be readily developed. This conventional strategic planning methodology performs adequately when dealing with incremental change within a stable environment but performs less well with dynamic systems in which unexpected events periodically occur. The international system of states has now become such a dynamic system, being notable for unpredicted events and unforeseen circumstances. Uncertainty is now certain.

The result of basing defence force development on a single anticipated future is that if these specific circumstances do not occur, the force acquired may be less than optimal and suffer serious operational shortcomings. Australia had a stark example of the dangers of creating an armed force for an envisaged future strategic situation that did not eventuate when the nation fought Japanese forces in the grim days of 1942. The inter-war emphasis on acquiring warships to be based in Singapore in support of coalition naval operations proved inappropriate to the actual circumstances eventually pertaining.

A way to address such problems is to consider what might happen, not solely what is expected to happen. This approach is employed in the Future Operating Environment 2035 that suggests four alternative futures that could potentially eventuate and impact the ADF. Dr Layton's paper examines these four possibilities to tease out some broad implications including warfighting styles, operational concepts, air power roles and Fundamental Inputs to Capability issues.

In looking forward two decades, the paper looks beyond short-term imperatives to stimulate the imagination, encouraging creative thinking about our uncertain future. The paper is all about disrupting our preconceptions of what we expect to happen and preparing us for

what may happen. In this, it complements *Beyond the Planned Air Force* that principally delved into technology disrupters.

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*Saw the heavens fill with commerce, argosies of magic sails...
Heard the heavens fill with shouting, and there rain'd a ghastly dew
From the nations' airy navies grappling in the central blue;*

—Alfred, Lord Tennyson, *Locksley Hall*, 1835.

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INTRODUCTION

There is a fundamental problem when developing a modern air force. The future is uncertain but an air force takes decades to build. By the time it is finally available for combat operations it may be completely inappropriate to the contemporary needs. Much effort and significant resources may be expended but it is inherently unknowable today what tomorrow's strategic circumstances will demand. And the longer it takes to build an air force, the more intractable the force-planning problem becomes.

One way around this is through using alternative futures. The Shell Oil Company was an early user of this methodology and is credited with foreseeing in the early 1980s that change might be afoot in the Soviet Union and that Mikhail Gorbachev deserved close attention.¹ Alternative futures gave Shell an inkling of something missed by the large intelligence agencies of the Western defence establishments. Alan Gyngell, head of the Office of National Assessments 2009-2013, wrote of attending a major US conference in 1988 on the future of the Soviet Union:

“the astonishing thing in retrospect was that not one of us came close to predicting that just 12 months later the

1 Angela Wilkinson and Roland Kupers, ‘Living in the Futures,’ *Harvard Business Review*, May 2013, <https://hbr.org/2013/05/living-in-the-futures> [accessed 23 May 2018]; Ian Wylie, ‘There Is No Alternative to...’, *Fast Company*, 30 June 2002, <https://www.fastcompany.com/45027/there-no-alternative> [accessed 23 May 2018].

Berlin Wall would be torn down... and that within three years the Soviet Union itself would cease to exist”²

The key issue in missing the end of the USSR was that the defence agencies dealt in what was *expected* to happen not what *might* happen. Alternative futures allowed Shell to imagine the future may unfold differently to mainstream thinking. Unlike others, Shell was not strategically surprised by developments in the USSR.

Cognisant of this methodological success, the Vice Chief of the Defence Force group has imagined four alternative future worlds and published these in the Future Operating Environment 2035 document.³ The four alternative worlds were derived based on two drivers: firstly, states having more or less power in the international system and secondly, states being cooperative or competitive towards each other.⁴ Each world is quite different although it is possible to imagine how particular current trends when extrapolated might possibly lead to each world in twenty years time.

Importantly, none of these four worlds is necessarily expected to emerge in the future. Instead the hope is that the future that actually occurs is broadly captured somewhere within the wide span of possibilities all four worlds’ cover. Ideally, these four alternative futures will bracket the possible range of future strategic environments Defence in general, and Air Force in particular, may encounter. The four worlds are briefly outlined in Figure 1 below.

2 A. Gyngell, ‘Death of Dualism’, *Griffith Review*, Vol. 1, No. 1, Spring 2003, p. 80.

3 *Future Operating Environment: 2035*, Canberra: Department of Defence, 2016, <https://www.cove.org.au/wp-content/uploads/2017/03/Future-Operating-Environment-2035.pdf> [accessed 23 May 2018].

4 These worlds were originally devised to provide strategic insights for the Netherlands Armed Forces policy development. See: *Future Policy Survey: A new foundation for the Netherlands Armed Forces*, Netherlands Ministry of Defence, 2010.

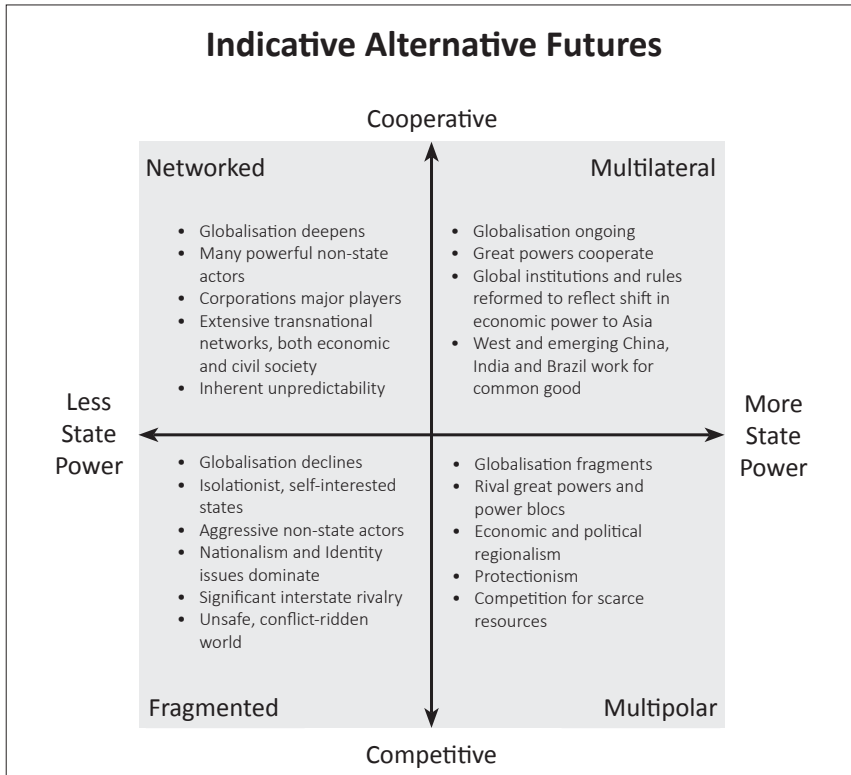


Figure 1: Indicative Alternative Futures

The sequence this paper follows is to initially examine in some depth each of the four alternative futures to ascertain the operational demands they might individually make on Air Force. The four fictional futures - multilateral, networked, multipolar and fragmented – are discussed in terms of strategic context, type of wars prevalent, operational concepts and strategic effects sought.

The paper then builds from this analysis. The operational demands across the four worlds are compared and contrasted to determine both significant issues and common features. This section discusses organisational adjustments that might make Air Force better prepared for the inherently indeterminate future. It concludes with possible changes that might be considered to the Fundamental Inputs to Capability (FIC) and proposes some issues that might be further researched. This process throws up some matters that might surprise. Irregular warfare for example appears important in all future worlds; a possibility that current plans may not necessarily anticipate.

In looking forward twenty years, the paper aims to look beyond short-term imperatives to stimulate the imagination and encourage creative thinking about our shared uncertain future. The paper is all about disrupting our preconceptions of what we *expect* to happen and preparing us for what *may* happen. In this, it complements AF34 *Beyond the Planned Air Force* that principally delved into technology disrupters.⁵

5 *Beyond the Planned Air Force: Thoughts on Future Drivers and Disruptors*, Canberra: Royal Australian Air Force, 2017.

MULTILATERAL ALTERNATIVE FUTURE

STRATEGIC CONTEXT

In the multilateral alternative future, states are the most important actors in the international system and are focussed on making absolute gains through cooperation. States are deeply engaged in strong regional and global multilateral institutions with the United Nations (UN) playing a particularly important role in global governance. There is a growing sense of global community with foreign aid, foreign direct investment and subsidies seen as preferred ways to help less developed countries. The emphasis on cooperation though means that to address problems there is a need to build consensus and this can be both difficult and time-consuming.

Major interstate war is seen as very improbable but there remain problems with transnational non-state actor terrorism and intrastate wars. Both are seen as being best addressed through multilateral cooperation and accordingly, being able to operate effectively as part of diverse 'coalitions of the willing' is a critical capability for all militaries. In addressing intrastate wars, nation-state building by diverse coalitions is preferred even though such intervention may be sometimes ineffectual with variable outcomes. These interventions are generally begun under the Responsibility to Protect (R2P) rubric in response to a sudden humanitarian crisis and as part of a UN peacekeeping force.

The development of new military technology is mostly focused on improving on-going counter-terrorism operations and the periodic interventions in failing states to undertake nation-state building. With deepening globalisation, the latest military technology is readily obtainable in the global marketplace with some concerns over proliferation to undesirable states and non-state actors.

WARFARE STYLES PREVALENT

In the multilateral world dealing with transnational non-state actor terrorism is the responsibility of the states these actors are located within. Weaker states receive active external support to improve their indigenous capabilities to counter such groups. This generally involves suitably equipping and training local security forces.

The R2P interventions usually involve providing air and maritime support to either the government or domestic groups within the affected state. In some cases after the crisis passes, outside forces may be able to withdraw with the local government completing recovery activities. More challenging militarily is when the local government has begun warring on its population. This may require active combat operations mainly by air and maritime forces to assist local groups change the regime.

In such cases, the R2P interventions could evolve into more protracted stability operations that aim to build a functioning, effective governance structure considered by the local population as legitimate and worthy of support. Building such a structure generally requires a broad-based intervention that undertakes comprehensive political, social, economic and military reforms.

Given increasing urbanisation, future nation-building interventions could involve significant urban operations. These can pose difficult challenges in terms of tactical manoeuvre and in resupply. The urban terrain presents many opportunities for adversaries to interdict lines

of communications including using Improvised Explosive Devices. Moreover, the intermingling of hostile forces amongst large non-combatant civilian populations makes force application problematic.

OPERATIONAL CONCEPTS

In the multilateral world ADF involvement in an R2P intervention would generally be as part of a UN peacekeeping force. In this, the ADF's principal role might usually be to command and undertake irregular warfare operations within an assigned limited-size zone or district possibly within a much larger urban area. In such interventions, the initial key strategic effect might be to either support those non-state elements resisting undesired armed groups or government forces intent on causing significant humanitarian harm. In the consequent stability operations the key strategic effect could shift to be to convincing the local population they should support their newly reformed government. This may involve a careful blend of five mutually reinforcing and interdependent lines of operations:

1. joint land combat to defeat any organised resistance and secure the environment;
2. population protection;
3. information actions to both shape the local population perceptions and disrupt any hostile non-state actors;
4. population support to establish, restore, or temporarily replace necessary essential services in affected communities; and
5. indigenous capacity building encompassing improving the local economy, government, police, legal, financial and administrative systems.

These lines of operation would seek success through a cumulative strategy where the effects of many individual small-scale actions occurring across time and space eventually combined to achieve the desired strategic aim. There is not a sequence of steps where major battlefield victories are progressively sought before proceeding further but rather a protracted series of small successes that over time accumulate and lead to winning the local population's support for the new government.⁶

The main core air power roles employed might be ISR, air mobility and strike (close air support, air interdiction and possibly maritime strike—both to prevent adversary access—electronic warfare and information operations). In some circumstances, during the initial stage of a R2P intervention control of the air (offensive counterair) may be useful if hostile state military forces are encountered. All enabling air power roles might be important to varying levels as the context requires.

Away from periodic R2P activities, there remain counter-terrorism operations. These mainly involve supporting a foreign government within whose state there are terrorist groups located. This support would be principally training local security forces but may possibly also encompass intelligence, mobility and *in extremis* air attack. The main air power roles might be strike (information operations), ISR, air mobility and possibly strike (close air support and strategic attack). The terrorist groups though may have links to individuals in

6 This draws on the distinction made between cumulative and sequential strategies by USN Rear Admiral Wylie. He writes: "there are actually two very different kinds of strategies that may be used in war. One is the sequential, the series of visible, discrete steps, each dependent on the one that preceded it. The other is the cumulative, the less perceptible minute accumulation of little items piling one on top of the other until at some unknown point the mass of cumulated actions may be large enough to be critical." J.C. Wylie, *Military Strategy: A General Theory of Power Control*, Sydney: Australian Naval Institute Press, 1967, pp. 26

Australia making also supporting Australian national security agencies important.

STRATEGIC EFFECTS SOUGHT

From Australia's perspective, actively supporting and further entrenching the multilateral rules-based order is important. This helps reduce the likelihood of major wars, keeps conflicts distant and contained, and crucially delivers higher economic growth.

In this world, cooperation dominates. The key strategic effect generally sought is helping other states who support the rules-based order succeed. In this, conforming to agreed legal norms would be important to convincing others that ADF actions were legitimate and necessary. Moreover, during all operations there would be considerable external scrutiny to ascertain if appropriate laws of armed conflict were being followed. This may be especially so in the protracted stability operations consequent to an R2P intervention.

NETWORKED ALTERNATIVE FUTURE

STRATEGIC CONTEXT

In the networked alternative future, non-state actors and states work together to make absolute gains. There are strong regional and global multilateral institutions including a powerful UN however the participants are diverse and dissimilar including states, large commercial organisations, civil society groups and non-government organisations. There is a broadly based global governance regime, a strong sense of global community and a desire to solve problems through consensus.

Major interstate war is seen as very improbable but there remain problems with antagonistic transnational non-state actors. These are broken into two main types: well-equipped organised crime groups and violent politically motivated groups based on identity differences (rather than nation-state, ethnic or territorial disputes). These hostile, dispersed groups are seen as being best addressed through multilateral cooperation involving a complex blend of state and non-state actors. Many activities are out-sourced to commercial companies and civil society groups with states and the UN providing a coordinating function and some resources. In this, many non-state actors often have the necessary capabilities, capacities and funding sources to address agreed problems without direct state assistance. This independence introduces a certain level of unpredictability in their actions.

The development of new military technology is mostly focused on improving the efficiency of these often-commercial military operations; shareholder dividends remain important. With deepening globalisation, the latest military technology is readily obtainable in global marketplace and there is considerable innovation as the many firms involved seek to gain and retain market share.

WARFARE STYLES PREVALENT

In this world, external interventions are mainly whole-of-government with only limited military support. These interventions are undertaken to support the existing state and governmental structures and make them more effective rather than to replace them. Under-contract and free-lance non-state companies and organisations mainly conduct these interventions, often staying and becoming deeply involved with and within the local government structure. Infrequently, such interventions in their initial phases require the warfighting capabilities of national armed forces to make peace between rival groups. Private companies then take over at a suitable time when the adversaries have been defeated or have been sufficiently degraded. This means that protracted interventions are readily sustainable especially as the private actors involved can sub-contract for personnel, materiel and services globally. This approach though leads at times to the governance of the weak states intervened in being commercialised for private gains.

The rise of for-hire private military groups has made undertaking armed interventions easier and more appealing for governments particularly for R2P scenarios. The cooperative nature of this world means there are few concerns about rogue private military groups with operations undertaken for perceived good causes under UN or other multilateral authorisations. Private military companies are respected, legitimate actors widely seen as a force for good.

This growth of the private organisations means governments now have alternatives to using their national military forces. Moreover, these commercial alternatives when employed have lower political costs albeit still being financially expensive. The larger private military companies in lobbying for government support sometimes actively advocate having some funding redirected to them from the national armed forces budget given their role and usefulness is seen as declining.

On the other hand, the ADF has become deeply involved in national security in providing specialist counter-crime and counter-terrorism services to all levels of Australian government and at times large companies. The distinction between undertaking domestic and international operations has become considerably eroded with significant overlap in this highly globalised, deeply integrated future world.

OPERATIONAL CONCEPTS

In this networked world, the ADF's main role is working as a coalition partner of a multilateral force in conjunction with the private military companies and non-state organisations involved.

The ADF has become a two-level force. One focuses on domestic security within Australia, its surrounding seas and associated airspace. This part of the ADF has a paramilitary flavour with the safety and security of Australians paramount. It mainly supports other government agencies, providing additional capabilities as home affairs operations and activities require. The main core air power roles employed might be ISR, air mobility and strike (electronic warfare and information operations). All enabling air power roles might be important at varying levels over time.

The other part of the ADF focuses on being able to undertake an initial external intervention phase. Such interventions normally involve working with large multilateral coalitions albeit many nations may be only lightly represented. Direct ADF involvement is normally

short-term and mostly against bandits and thugs or at worst remnants of collapsed national military forces. There is a premium placed on time. Success is sought quickly through using high-quality forces that out-match the adversary on the battlefield. The ADF and its coalition military partners aim to set the conditions to quickly hand over to the private companies and civilian organisations following closely behind the lead national military units. The main core air power roles employed might be ISR, air mobility and strike (close air support, electronic warfare and information operations). All enabling air power roles might be important depending on the context.

STRATEGIC EFFECTS SOUGHT

In this world, risk management dominates. Criminal gangs and violent, politically motivated non-state groups can never be completely eradicated as new gangs and groups keep emerging over time. Similarly, the need to undertake R2P-type interventions at some time in the future can never be completely discounted. The key strategic effect sought is accordingly to keep the damage transnational non-state groups or misbehaving governments can do to a tolerable level. The intent is to limit the losses populations suffer, both domestically and internationally.

Given the antagonists are continually innovating to devise solutions to overcome security force measures, the ADF needs to maintain a broad suite of capabilities as which is appropriate to the situation varies over time. However, these capabilities do not need to be large-scale.

MULTIPOLAR ALTERNATIVE FUTURE

STRATEGIC CONTEXT

The multipolar world is characterised by intense great power competition. Seeking security, small states and middle powers now group around these great powers in various types of blocs and alliance structures. The great powers are focussed on improving their bloc's relative power, strength and influence. The great powers may then at times offer military, economic and diplomatic inducements to attract lesser states to leave existing blocs and join theirs.

In such a world, peace between the several blocs depends on maintaining a stable balance of power. This involves strengthening one's own bloc capabilities by having large, well-equipped, competent national defence forces demonstrably able to fight major wars in coalition. However, it also makes attractive, approaches to weaken the other blocs' capabilities. For this, proxy wars might be fought in unstable, weak states that lie politically outside but geographically near adversary blocs. In aiming to weaken others, there is a stress in proxy warfighting on only undertaking smaller scale involvements. These give the greatest relative impact on the adversary blocs for the least cost to one's own bloc.

In the multipolar world, major wars would be unlikely but if they did occur might be wide-ranging and protracted. Given Australia's strategic situation, the principal kind of ADF operations in such wars would be maritime warfare within a US-led coalition in areas

potentially across the Indo-Pacific region ranging from NE Asia to the Arabian Gulf. Proxy wars would be more likely and more frequent with the most worrying case for Australia, an increased possibility of such conflicts in South Pacific countries.

Given the intense political rivalry of the multipolar world, there would be a strong demand by all states for advanced military technology that gave a clear warfighting edge in major or proxy wars. The blocs would tend towards being autarkic in military technology and accordingly closely control arms exports outside their own bloc. The global diffusion of military technology would slow with each bloc trying to gain an advantage relative to others and to keep it. There would be a renewed interest in WMD to deter major wars and allow escalation dominance in any proxy wars that threatened to escape control.

WARFARE STYLES PREVALENT

Major Wars. In this world, major wars would involve robust battle networks extending well beyond each bloc's territory and intersecting with the networks of other states, creating highly contested no-go zones. The battle networks of the ADF, the bloc overall and the adversary bloc would be complex competing socio-technical structures fought by military commanders. Such networks would use kinetic and non-kinetic weapons to target fixed and mobile targets at extended, sometimes global, ranges.

The battle networks would be complex and diverse featuring mobile, relocatable and fixed sensors, unmanned C4ISR and strike platforms, space-based low-earth orbit systems and continual electronic surveillance. Given the competitive focus with each state striving for superiority, each network would be unique in their blends of sensors, precision guided munitions, delivery platforms, basing, support and command and control systems.

Proxy Wars. In the multipolar world, proxy wars may be defensive or offensive. In both types the intent is to let others do the majority

of the fighting. In defensive proxy wars the approach is to bolster those fighting by training and equipping them as necessary to win at the lowest political and financial cost to the bloc. Own-bloc military involvement would be limited in scale to avoid being dragged into a quagmire that exhausts bloc resources for little gain. The duration of the conflict is less important than minimising overall costs.

In offensive proxy wars the approach reverses to try to impose high costs on the adversary bloc. Behind this ambition though it's essential to keep the proxy war controlled so as to avoid escalation into major war. This brings with it a need to maintain plausible deniability for most actions thus constraining the use of regular bloc forces or supplying specialised equipment easily traceable.

OPERATIONAL CONCEPTS

Major Wars. The broad employment concept would involve distributed attacks using network-enabled long-range precision weapons and unmanned weapon systems operating in swarms. Some great powers would be introducing hypersonic cruise missiles and directed energy weapons effective against aircraft, with electromagnetic rail guns offering limited intermediate range ballistic missile terminal defence capability. All blocs would have a broad defensive and offensive cyber warfare capability.

In fighting a hostile battle network a cumulative strategy would seek to degrade, disrupt, fragment and shatter the opposing network through a series of diverse and varied tactical actions that were themselves independent events. The combined cumulative effect of these multiple actions occurring in time and space would ultimately defeat the opposing network. Gaining decision superiority would enhance the likelihood of the success of each tactical action, as the opposing network would have difficulty responding in a timely manner.

Decision superiority would allow commanders to make best use of their own network but not in itself guarantee the network's survival wholly or in part in the face of hostile action. Continued operation over the course of a conflict would require the technical systems and organisations that comprise the network being able to readily evolve and adapt in a timely manner. Understanding the capabilities available to both the friendly and hostile networks as these continually change across the sea, land, air, cyber and space domains would be important to success. Given the uniqueness of each network, these capabilities would vary based on their technical characteristics but will also be impacted by local governmental, economic, societal and cultural factors.

Even so, battle networks have several intrinsic vulnerabilities that may be exploited through kinetic or non-kinetic attack. These include sensors that may be directly or indirectly attacked, intelligence deception, limited missile holdings hard to quickly restock, and command and control systems that can be degraded or deceived. The effects of attacks on some of these vulnerabilities however may be limited in time and space as the networks repair, work-arounds are implemented and the organisations involved learn.

The ADF's principal major war role within a US-led coalition would be sea-denial operations in pre-assigned operational areas. The secondary role might be contributing to short-duration sea control operations to enable periodic high-value resupply missions of important forward bases to be undertaken. In both roles the focus would be on countering the adversary's network while optimally using the ADF's network. In this, the important air power roles would be control of the air (OCA and DCA), strike (strategic attack, anti-surface warfare, anti-submarine warfare, electronic warfare and information operations), air mobility (resupply forward bases) and ISR. All enabling air power roles would be important albeit to varying levels depending on the context.

There appears an alternative operational path: separating the core adversary leadership from their battle network whether physically or virtually. This approach, though, may mean the war continues for some

time as various lower-level battle network elements fight on albeit in a fragmented, non-cohesive manner. In some circumstances the separation effect might be achieved by a lesser subset of air power roles, perhaps principally strike (strategic attack, electronic warfare and information operations). The defeat of the remaining elements, though, might require all air power roles.

Proxy Wars. ADF capabilities might be used to support both proxy war types. Involvement in the defensive type would be easier given that conventional warfighting units and equipment may be able to be used albeit with doctrinal and other changes. Own bloc battle networks would be useful in proxy wars if the threatened state lay within the network's coverage. The network could provide background surveillance and reconnaissance support, communication services and cyber assistance. The main core air power roles might be ISR, air mobility and strike (close air support, air interdiction and anti-surface warfare—to prevent adversary access)—electronic warfare and information operations). All enabling air power roles might be important to varying levels as the context determined.

Offensive proxy wars however might be more problematic given that specialist units and equipment with little utility in a major war might need to be fielded. To allow plausible deniability, special forces might be the main force element committed with tailored backup using cyber measures. The special forces would generally provide training but might also undertake specific command and advisory roles including in the field. While such involvement may be small scale, an offensive proxy war could be protracted and make challenging demands on a force structure mainly devised for major wars. The main air power roles might be strike (information operations), ISR, air mobility and force protection (defensive cyber operations) as an adversary cyber response could be expected.

STRATEGIC EFFECTS SOUGHT

Major Wars. In this world, the maintenance of a stable balance of power is central. This makes deterrence the key strategic effect required. The extensive battle networks defending all blocs suggest deterrence by punishment is unlikely to be practical for conventionally armed forces, making deterrence by denial the preferred option.

Given this, the key strategic effect can be elaborated further in terms of needing to be able to deny the adversary leadership group the ability to use their battle network to achieve their objectives. This implies gaining an operational effect that renders the battle network functionally inoperative in terms of being used to apply military power, either kinetic or non-kinetic.

Proxy Wars. In considering both types of proxy wars, victory is not vital to Australia's future. In the offensive war proxy case the strategic effect sought is to cause as much damage as sensible and appropriate to the adversary bloc – not to the state within whose territory the operation takes place. The strategic effect sought is not to change the adversary bloc's behaviour or thinking but instead to attrit their particular capabilities that might be useful in a major war so as to change the relative balance of power in our favour. The crucial constraint is achieving the desired effect while retaining escalation control and avoiding major war

In the defensive war proxy case, the primary strategic effect sought is to ensure the state being supported does not join the other adversary bloc. The secondary strategic effect is that our bloc remains able to access the supported state's territory as needed. Both effects require the supported state's leadership remaining favourably disposed towards our bloc.

FRAGMENTED ALTERNATIVE FUTURE

STRATEGIC CONTEXT

In the fragmented alternative future, conflict is persistent and widespread with non-state actors and states actively competing against other non-state actors and states. All see advantage in working with other states and non-state actors to advance their aims. The catchcry is ‘the enemy of my enemy is my friend’ with short-term, continually shifting alliances of convenience common.

Conflict is endemic in a future where anarchy rules and national economies are in decline with globalisation’s demise and worsening climate change. States are increasingly striving to be autarkic and so less sensitive and vulnerable to the actions of others. There is progressively less money for all government services including defence. Autarky and declining national economies drive military forces towards making greater use of hybrid warfare to try to maximise their war fighting capabilities.

Given the intense political rivalry at all levels there is a strong demand by all for advanced military technology that gives a clear warfighting edge. The demand, though, is not just from states for interstate warfare, but also from non-state actors who are adept at militarising commercial technology for intrastate conflict. The decline of the global defence marketplace, however, means the costs of acquiring and supporting advanced technology is now high.

In this world, two matters are of some import. First, there is increasing interest by states in acquiring WMD even though they themselves may be fragile with internal difficulties. There may be weakly governed states with nuclear arms under only limited control. Second, the fragmented nature of the international system may be replicated by a balkanisation of the Internet. Some countries may have walled themselves off from external Internet contact or have very restrictive Internet linkages.

For Australia the regions of concern are twofold: the nearer region for state threats but for non-state actor threats from almost anywhere worldwide.

WARFARE STYLES PREVALENT

In this world, states are faced with external state and non-state actor threats and domestic non-state actor threats all combining in varying forms of hybrid warfare. These threats can be multiple and diverse with different groups seeking different objectives simultaneously. The aim of hybrid warfare is to weaken other states to make more likely success in any forthcoming interstate conventional war that erupts.

The hybrid war approach for most states initially involves trying to maintain a reasonable deniability of involvement. In this, they covertly give useful non-state actors sanctuary, intelligence, transport support, training and arms. The equipment provided is often lightweight but technically sophisticated and advanced. In the early stages, the non-state actors actions are scattered, episodic and short duration although of a persistent, protracted nature. This subversion is generally accompanied by destabilising social media influence, battling narratives and disruptive cyber attacks, but attempts to avoid the involvement of recognisable national armed forces making overt violations of international borders.

As the situation develops special forces, clandestine elements or 'volunteers' begin to work more closely with the domestic dissent groups being supported. The actions and activities of the various non-state and state actors involved are then integrated and may occur in broad areas across the country being attacked. Such wars feature small sporadic skirmishes with occasional periods of more frequent conflict. At this stage, the deniability of involvement may evolve into limited open support. This may include the use of air defence assets and systems to protect hybrid land forces from air attack and the use of naval assets to prevent sea resupply.

OPERATIONAL CONCEPTS

Importantly, in fighting hybrid wars of either type it is necessary to gain and maintain escalation dominance. In this world adversaries are less constrained by other factors to keep conflicts limited; they may suddenly escalate to all out war to overwhelm others and win quickly. To avoid this means of hybrid war termination, the ADF would need to be able to convincingly defend Australian territory from attack.

Some form of national battle network similar to those discussed in the multipolar world would be essential, albeit an independent network, not one that was part of a large coalition. This world's battle network's capabilities and capacities would be significantly influenced by the world's autarkic nature and the possibility of a WMD threat that needed to be countered alone, without today's US extended nuclear deterrence. The national battle network might fight using an active defence strategy. To maintain escalation dominance, the important air power roles are control of the air, strike (strategic attack, anti-surface warfare, anti-submarine warfare, electronic warfare and information operations), air mobility and ISR. All enabling air power roles would be important, albeit the severity of the potential threats might be limited given Australia's geographic location.

In the fragmented alternative future, the ADF could participate in defensive or offensive hybrid wars.

In defensive hybrid wars, the ADF might be involved onshore within Australia or offshore supporting another or, in the worst case, undertake both activities simultaneously. Within Australia, security would be maintained by significantly expanded and better-equipped domestic security agencies with the ADF providing aid to the civil power as necessary. The matter might be made more difficult in that the battling narratives on cyberspace would probably attempt to delegitimise the domestic security forces and the ADF, discourage recruitment and encourage passive and active resistance. Offshore, the ADF would be supporting another state in an insurgency campaign most likely through providing as appropriate special forces, specialist training units, air and naval support. There would be some level of choice in the offshore involvement whereas the domestic security problem would be a necessity.

Both offshore and onshore, a cumulative strategy might be employed where many multiple small-scale actions occurring across time and space eventually achieve the desired strategic aim. A protracted series of small successes would be sought that over time accumulated and led to eliminating or winning over those hostile elements within the population. The main core air power roles employed might be ISR, air mobility and strike (close air support, air interdiction and anti-surface warfare—to prevent adversary access—electronic warfare and information operations). All enabling air power roles might be important to varying levels as the context required.

Beyond this, Australia might also engage in offensive hybrid war or at least be prepared to wage such conflicts alone or in concert with close allies. The emphasis would be on developing and maintaining irregular warfare capabilities and capacities across the air, naval, land and cyber domains. In this fragmented alternative future, the key to operational success might be being able to ascertain the critical groups

within a foreign country most able to advance Australian aims, and then being able to support them covertly for a protracted period.

In offensive hybrid war, the overall strategy employed might be a blend of sequential and cumulative strategies. Against other states a series of discrete phases might be fought with succeeding phases dependent on the success of the previous one. This planned sequential strategy might be integrated with a cumulative strategy that seeks to wear the adversary down over time, progressively attrit hostile forces and cause psychological distraction and diversion. Neither the sequential or cumulative strategies might be sufficient in themselves to achieve the strategic aims but astutely combined might achieve success. The main core air power roles employed might be ISR, control of the air (defensive counterair), air mobility and strike (close air support, electronic warfare and information operations). All enabling air power roles might be important to varying levels as the context required.

STRATEGIC EFFECTS SOUGHT

In this world, survival is the primary aim. Given there are no permanent friends, survival requires maintaining sufficient relative power to continually deter and if needs be counter multiple potential state and non-state hybrid warfare threats. Undertaking a large-scale war to defeat one adversary might mean a weakening of our power compared to others and thus make us more vulnerable than was the case before the conflict. In the fragmented alternative future, economy of force is a key force employment criteria. On-going small-scale actions to 'bait and bleed' others seem more likely than waging a major conventional war.

Accordingly, the key strategic effect is to be able to deter others through being manifestly able to defeat any hybrid attack they may mount and by being able to respond in kind. A denial deterrence using

active defence seems necessary. This implies being able to undertake defensive on-shore and offensive off-shore hybrid war. Implicit in this, though, is having escalation dominance that keeps an ongoing conflict at the level of hybrid war.

The special circumstance of WMD proliferation by weak states further suggests denial deterrence with active defence. This may be provided by employing a combination of both Integrated Air and Missile Defence to engage hostile WMD delivery systems in flight, and rapid offensive strike able to destroy adversary WMD delivery systems before launch.

COMMON ASPECTS AND FIC ISSUES

The four alternative futures taken individually present a complex and perhaps confusing picture. To be useful to an organisation in avoiding strategic surprise, the four worlds need to be considered as a whole rather than separately. When this is done certain common aspects become evident but also some noticeable differences.

The major difference is in the key strategic effects. In broad terms, the key strategic effects across the four alternative futures sought may be summarised as follows:

1. two worlds feature deterrence by denial, implying adopting a defence strategy that aims to stop others achieving their objectives through balancing against them;
2. one world highlights helping other states who support the rules-based order, indicating adopting an engagement strategy that works with and through others to achieve commonly desired objectives; and
3. one world requires keeping the damage that antagonistic non-state actors may inflict to a tolerable level, suggesting adopting a risk management approach that reacts to events.

While two worlds appear alike, in the discussion of both these worlds the differences are more apparent than the similarities. Cross-world analysis indicates the strategic effects sought tend to be specific to each particular alternative future. Strategic effects are, it seems,

context dependent. However, this appears the only major instance of a unique attribute in comparing and contrasting the four worlds.

In delving further and examining warfare styles and air power roles there are some specific aspects usefully common across the four worlds. Investment in common areas can be valuable in terms of addressing multiple possible futures, not just one. Indeed, those warfare styles and air power roles common to all four worlds may be especially worthy of investment as they give a return almost irrespective of which alternative future ultimately eventuates. In considering the prevalent warfare styles:

1. in three worlds irregular warfare capabilities were essential while in the fourth world such capabilities were important;
2. in three worlds being able to undertake coalition operations was essential: in one of these worlds with the US and in the other two with other states and non-state actors on an ad hoc basis;
3. in two worlds conventional force capabilities were essential: in one world as part of a US-led coalition battle network and in the other world for independent national defence; and
4. in two worlds capabilities to undertake short-duration interventions in multilateral coalitions against weak state or non-state forces were important.

Common aspects were also evident in the air power roles. The enabling roles were required in all worlds while the core roles were clustered as follows:

1. in all four worlds ISR, air mobility (air logistics and aeromedical) and strike (electronic warfare and information operations) were essential while strike (close air support) was important;

2. in three worlds air mobility (airborne operations) was essential and useful in a fourth;
3. in two worlds counter-air and strike was essential and useful in a third; and
4. in two worlds air mobility (air-to-air refuelling) was essential and useful in another.

The key air power roles in each of the four alternative futures are noted in Table 1 on page 30.

In probing deeper, applying the FIC construct across the four alternative futures is a useful way to highlight pertinent issues. The four annexes examine FIC issues in each world in some detail. When these four separate analyses are compared and contrasted, significant FIC matters become evident as discussed below.

Some of the significant FIC issues found are particularly noteworthy. These are areas where further examination might be especially useful as they appear of consequence almost irrespective of how the future develops. This deeper analysis can be assisted by formulating the issues as research questions, potentially able to be addressed through various techniques including experimentation, analytical modelling and simulation, risk analysis, historical comparison and structured consultation. The significant FIC issues and associated research questions follow.

Alternative Future	Multilateral		Networked		Multipolar			Fragmented		
Warfare Style	R2P, Stability Operations, Counter-terrorism		Limited military, Big Corporations, Private Security Companies		Major Wars, Proxy Wars			Hybrid warfare		
Air power Role/Mission	R2P	CT	domestic security	external intervention	Major wars	def proxy wars	off proxy wars	Escalation dominance	def hybrid wars	off hybrid wars
Control of the Air	*				***			***		*** (DCA)
Strike					***			***		
Strategic Attack		*								
Close Air Support	***	*		***		***			***	***
Air Interdiction	***					***			***	
Anti-surface Warfare	*				***	***		***	***	
Anti-submarine Warfare					***			***		
Electronic Warfare	***		***	***	***	***		***	***	***
Information Operations	***	***	***	***	***	***	***	***	***	***
Air Mobility	***	***	***	***	***	***	***	***	***	***
ISR	***	***	***	***	***	***	***	***	***	***

*** main role/mission * some circumstances/possibly

Table 1: Alternative Worlds' Air Power Roles

FIC ISSUES

Personnel. In all four worlds the importance of irregular warfare was evident. Individual training including education at staff colleges may need to incorporate irregular warfare to keep personnel cognisant of the appropriate strategies and doctrines.

In two worlds (the multipolar and fragmented) most personnel might fight conflicts from their homebase or at least from Australia. In normal circumstances, permanent military staff supplemented by contractors may be sufficient. In times of crisis or war, though, when the operational tempo increased there might be a need for a sharp increase in manning. Reservists may be well suited to be in place to allow a timely switch to 24/7 operations. Moreover, as facilities in Australia may be attacked, being able to replace skilled personnel losses quickly may be crucial. The Reserves in these two worlds might then shift from today's function as an operational reserve back to being a strategic reserve optimised for the 'big' war.

At present, there is a one-way flow from Air Force into commercial companies. One world (the networked) highlighted that Air Force might have a two-way flow where personnel continually moved backwards and forward between Air Force and private military companies. There might then be increased demand for initial training as more personnel passed through Air Force en route to the private military companies and also for refresher training as such personnel rejoined Air Force at individually unique points in their career paths. A more individually tailored refresher training approach might be required.

One world (the fragmented) highlighted that in some circumstances the trustworthiness of personnel may be of concern. In this world, there were worries that some recruits to Air Force may actively or passively support hostile state or non-state actors. This may also be concerns with contractor staff as well. Personnel policies and systems may need adjustment to verify trustworthiness.

The personnel research questions are as follows:

1. How can individual training and education best incorporate teaching and retaining irregular warfare expertise?
2. How could Air Force most effectively and efficiently use a two-way flow of personnel between Air Force and Defence industry/ private military companies?
3. What would be the additional training burdens of having a two-way flow of personnel between Air Force and Defence industry/ private military companies?
4. How can the trustworthiness of personnel joining Air Force and of contractor staff be verified with a high degree of certainty?

Organisations. In three of the worlds (multipolar, multilateral and networked) organisations needed to be designed to be able to operate effectively with external agencies including coalition command and control structures, interagency groups, commercial companies and non-government organisations. The level of integration with these external agencies varied across the three worlds, however two issues were noteworthy. First, it was necessary to have a level of on-going organisational adaptability as external groups linked with the organisation, evolved and left. Second, the need for considering the internal security of organisations when closely integrating with external groups might be important.

The organisational research questions are as follows:

1. How could Air Force organisations be best designed to ensure being able to undertake effective complex operations (including warfighting) in conjunction with diverse, dissimilar and multiple external agencies including multilateral forces, the UN, interagency

groups, private military companies, commercial entities and non-government organisations.

2. How could Air Force organisations be best designed to ensure timely organisational adaptability as external groups connected with the organisations, evolved and left?
3. How could Air Force organisations be best designed to ensure their internal security in the presence of integrated external groups?

Collective Training. In all four worlds the need for irregular warfare capabilities was evident. Collective training may need to incorporate exercises that develops expertise and retains competencies in such operations.

In three worlds (multipolar, multilateral and networked) operating with external actors was important, albeit the particular actors varied. In all three working with non-state actors/ non-governmental organisations was important, however in two worlds (multilateral and networked) working within multilateral command structures (including the UN) also featured. Collective training might need adjusting to include working operationally with a diverse and dissimilar range of parties.

In all four worlds by 2035 average global temperatures are expected to be almost 2° C warmer than earlier times. The principal operational impact is anticipated to be a greater demand for Humanitarian Assistance and Disaster Relief (HADR) compared to the historical norm, however the quantum of this additional HADR is inferred rather than proven. Given larger and/or more frequent HADR operations could adversely impact collective training for warfighting tasks, this issue may be usefully studied further.

The collective training research questions are:

1. How can collective training best incorporate developing expertise and retaining competencies in irregular warfare operations?
2. How could present collective training approaches be best adjusted to ensure the future force's personnel, units and groups are able to work on operations in an integrated manner with a diverse range of parties including multilateral forces, the UN, interagency groups, commercial companies, private military companies and non-government organisations?
3. As climate change continues, what increased level, intensity and frequency of HADR operations is likely in 2035?

Major Systems. In each world, major systems might be usefully modified or upgraded to better fit the specific circumstances encountered. This suggests planning in the needs phase of the capability life cycle to have an ability to modify the particular major systems that are acquired. In one world (the fragmented) it seems important to have such a modification capability onshore.

In one world (multipolar) the emphasis was on battle networks rather than on specific individual major platforms. In this world, the ability to modify individual major systems may be less important. The focus could then be more usefully placed on being able to modify the network to better meet extant circumstances. This approach would move away from individual platform performance and instead stress overall network capabilities and capacities. The most appropriate way to maintain an ability to modify networks over their life, and as individual elements of the network are replaced, might be usefully determined.

The major systems research questions are as follows:

1. What is the optimum approach to ensuring that when major systems are acquired they are able to be adapted to meet emerging situations in a timely manner?
2. When considering how best to achieve timely joint force adaptability to emerging situations, are there gains in taking an overall network approach versus focusing instead on individual major systems?

Supply. In all worlds the timeliness of supply though local and global supply chains was important. In this, there seemed a possible differentiation between achieving supply timeliness by holding large, just-in-case stocks in Australia versus using a just-in-time delivery model. Given that the balance to be struck appeared to vary across each world, the overall approach given this uncertainty might be best determined by analysing supply demands across the four worlds and sensibly blending.

The supply research question is: under what strategic and operational circumstances is a just-in-time supply approach preferred to a just-in-case supply approach?

Facilities. In three worlds (multipolar, multilateral and fragmented), the ability of facilities to survive physical and/or cyber attack was important. In two worlds (multipolar and fragmented) homebase facilities were vulnerable, while in one world (multilateral) the forward, offshore facilities might be at risk. In all three circumstances facility resilience and redundancy appeared important and may be usefully analysed further.

As noted earlier, climate change is similar across all worlds with the principal impact being with facilities. Whereas at present facilities planning is based on historical data, this is becoming less relevant as the atmosphere's chemical composition changes, suggesting instead using predicted climate data for planning.

The facilities research questions are as follows:

1. Given the possible likely future threats that the multi-polar and fragmented worlds noted, should the emphasis in facilities development be on resilience or redundancy?
2. How could forward operating bases (multilateral world) established within a hostile urban environment be made less vulnerable and more survivable in the face of likely threats?
3. Given climate change, should facilities planning be undertaken on the basis of climate predictions rather than on historical data?

Support. In two worlds (networked and fragmented) the possibility of changes in the Australian defence industry base were highlighted. These involved the possible development of either Australian private military companies able to offer logistic support, combat support and security capabilities worldwide or instead a significant expansion of Australian private security companies in terms of offering greatly enhanced domestic capabilities and capacities. In both worlds, Australian defence companies offered services in more hostile environments than currently.

The support research questions are as follows:

1. What would be the benefits to Air Force of encouraging the development of Australian private military companies able to offer logistic support, combat support and security capabilities worldwide including in hostile environments?
2. What would be the benefits to Air Force of encouraging the expansion of Australian private security companies in terms of offering greatly enhanced domestic capabilities and capacities?

Command and Management. In two worlds (multi-lateral and networked) it was important to have open command structures into which a diverse array of external and domestic state and non-state entities could 'plug and play'. In the networked one this included working closely with private military companies both domestically and internationally. In these two worlds ADF commanders would often operate within large networked structures that were rather fluid and that featured diverse formal and informal command arrangements.

In the other two worlds (multi-polar and fragmented) the command structures would be much more closed. In the multi-polar world it was only necessary to be able to work with close allies, albeit this included being able to exchange classified data electronically. In the fragmented world, the command structures were dominated by national considerations with working with others of only minor concern. In these two worlds ADF commanders would function within formal, hierarchical structures that were long-standing and fixed.

In all worlds doctrine would need to include irregular war although the specific types varied. In two worlds (networked and fragmented) doctrine would need to include domestic security aspects.

The command and management research questions are as follows:

1. What command structures would best fit operating within large dynamic networks with diverse formal and informal command arrangements?
2. What doctrinal changes will be necessary to allow successful irregular warfare and domestic security operations?

Industry. In three worlds (networked, multipolar and fragmented) having a capability and capacity within Australia to support and maintain Air Force equipment was important. There were variations though concerning using commercial companies versus military personnel depending on the criticality of their functions and the

danger of airbase attack. Accordingly, it may be advantageous to have contractors employed under some form of inactive Reserve status able to be activated if necessary.

In two worlds (multipolar and fragmented) timely access to overseas supplies may be problematic depending on operational circumstances. In a third world (networked) that used Australian defence industry for global service support, a similar problem may arise if foreign service support companies are favoured by the foreign OEM when resupplying scarce maintenance items. Accordingly, in all three worlds it would be advantageous to have sufficiently large stockholding levels in Australia of critical items to allow Australian defence industry support to Air Force to continue if resupply was delayed.

The support research questions are as follows:

1. What advantages are there in having contractor staff employed in an inactive Reserve status?
2. What level of stockholdings should be maintained to avoid constraining Australian defence industry support to Air Force if resupply from foreign sources is delayed?

CONCLUSION

In some respects the alternative futures methodology is a complicated one in requiring a careful progression through a defined sequence. This complexity, though, is necessary to understand how particular determinations were made and to give confidence in these findings. A clear logic path is doubly necessary as some aspects found and issues revealed might be unexpected and initially doubtful.

The four worlds were surprisingly different given they are variations along only two dimensions. The major difference that was readily apparent was in the key strategic effects. Two worlds (multipolar and fragmented) emphasized deterrence by denial suggesting a defence strategy of balancing to stop others achieving their objectives. A third world (multilateral) highlighted helping states who support the rules-based order suggesting an engagement strategy of working with and through others to achieve commonly desired objectives. The final world (networking) required keeping the damage that antagonistic non-state actors could cause to a tolerable level, suggesting a risk management approach of reacting to events.

While there were these stark differences, one warfare style was useful regardless of which world eventuated. Irregular warfare capabilities were essential in three worlds and important in a fourth. Following closely in being useful in three of the four worlds was the ability to undertake coalition operations - in one world (multi-polar) with the US and in two worlds (multilateral and networked) with other states and non-state actors on an ad hoc basis. The warfare styles only useful in one or two worlds were discussed in the paper's second section.

In considering airpower roles, some stood out as useful in all future worlds. In all four worlds ISR, air mobility (air logistics and aeromedical) and strike (electronic warfare and information operations) were essential while strike (close air support) was important. A close second was air mobility (airborne operations), which was essential in three worlds and useful in a fourth. Air power roles useful in only one or two worlds are again discussed in the paper's second section.

In working through the alternative futures methodology an important shortcoming became evident. While the approach is suitable to ascertain key strategic effects it lacks the detail and level of granularity to adequately address the question of what joint air power effects must be created? For this, each world would need to be described in much greater depth, in particular the geographic location and the anticipated adversary capabilities. The joint air power effects required are particularly context specific.

Moreover, a deep understanding of the 2035 force structure would be necessary but this is inherently imprecise. Instead the best that could be used for analysis would be a range of capabilities and possible force structures. Determining the joint air power effects required in 2035 would require deeper study and agreeing multiple assumptions. In this, the results derived might have a certain fragility and while being seemingly precise lack robustness.

This paper's examination of tomorrow's wars is by design generic. The alternative futures methodology is only a tool to try to be better prepared mentally for the future that actually occurs, and so avoid strategic surprise. In thinking about 2035 in this manner, the paper forces us to envisage worlds quite different to today, disrupting our preconceptions. The methodology makes us both cognizant of, and question, our underlying assumptions about future warfighting and the use of air power. It causes us to accept that the future may indeed be uncertain and that we need to plan on that basis.

Annexes:

- A. FIC Issues in the Multilateral World
- B. FIC Issues in the Networked World
- C. FIC Issues in the Multipolar World
- D. FIC Issues in the Fragmented World

FIC ISSUES IN THE MULTILATERAL WORLD

The envisaged R2P intervention operations in the multilateral world have several implications for FIC as follows:

1. **Personnel.** Such protracted operations impose particular demands on personnel who may deploy frequently for long periods. Personnel policies and systems may need to address this issue in a holistic manner that best ensures adequate manning and skilling levels can be sustained. Furthermore, undertaking such nation-building operations would benefit from being able to draw from Australia's diverse population in a timely, practical and useful manner appropriate for the circumstances encountered.
2. **Organisations.** These may need to be designed to be adaptable to operate effectively within diverse and continually shifting multilateral command and control structures. Organisations will also need to be designed to readily interact and work closely with a wide array of interagency and non-government organisations.
3. **Collective training.** Such training may need adjusting to include a greater focus on urban warfare including for a protracted period requiring resupply over threatened lines of communication. Such training could include littoral urban operations where naval units might be involved in the joint force. There would be also be a greater focus on working within a multilateral command structure (including the UN) and with partner nations and non-government organisations.
4. **Major Systems.** Some major systems may need to be modified or upgraded for urban operations. Intelligence and GIS capabilities may need to be improved to meet the demands of urban warfare.

To survive, fight and win in such environments will require a deep understanding of the design and functioning of the particular cities and urban areas within which the conflict is being waged and within which many non-combatant civilians live.

5. **Supplies.** In being protracted operations, there may need to be a greater emphasis on much better exploiting both local and global supply chains to obtain required items and stocks in a timely and efficient manner in a hostile environment. A capability that allows deeper and more comprehensive use of commercial sources and resupply services might be important.
6. **Facilities.** Facilities at forward locations within the urban area are likely to be subject to physical attack and need some form of hardening while at more distant locations cyber attack can be expected. Given this, key facility resilience and redundancy may be crucial.
7. **Support.** Support may become more important in terms of maintaining a continuing capability to be able to respond quickly to changing operational demands. However, such a capability is only likely to be required periodically. It may be more cost-effective to contract major equipment offshore support companies to retain a resident support capability able to be readily accessed by Air Force when occasionally required.
8. **Command and Management.** Command structures would need to be designed to allow external entities of any type or scale to readily and easily plug into and work effectively with. Such entities might include Australian domestic agencies, diverse multilateral forces, UN agencies and transnational non-government organisations. Doctrine would need to focus on urban operations and peace enforcement.

9. ***Industry.*** The focus would be on the ADF acquiring military-off-the-shelf equipment with Australian defence used only when cost-effective. There would be little operational imperative to develop in-country industrial capabilities beyond that required for on-going maintenance and support. Out-sourcing to the best-value-for-money foreign or local contractor would be the primary support strategy.

FIC ISSUES IN THE NETWORKED WORLD

The envisaged operations in the networked world have several implications for FIC as follows:

1. **Personnel.** Given the role played by private military companies, Air Force would suffer high personnel turnover, in effect training people to go into these companies. Personnel policies and systems may need to address a continuing high flow-through of people in a holistic manner that best ensures adequate manning and skilling levels can be sustained. Given the kind of short duration warfighting involved, the role of Reserves appears greatly diminished to simply some specialist services in particular medical support. The place of private military companies, though, suggests staff could be hired from them quickly to fill short duration needs. Air Force might not need to retain certain skill sets and rely instead on deep contract support.
2. **Organisations.** These may need to be designed to be adaptable to operate effectively within diverse and continually shifting multilateral command and control structures. Organisations will also need to be designed to readily interact and work closely with a wide array of commercial companies and non-government organisations.
3. **Collective Training.** Such training may need adjusting to include a greater focus on working closely with private military companies and non-government organisations during combat operations.
4. **Major Systems.** Some may need to be modified or upgraded to be interoperable at varying levels with diverse coalitions (including

the UN), private military companies and non-government organisations.

5. **Supplies.** The short duration expected of most combat operations and their optional nature suggests a greater stress on just-in-time supply with less on just-in-case supply. With commercial companies so deeply involved in the follow-on post-combat phase, companies may develop much more comprehensive supply systems able to provide more services globally to military organisations.
6. **Facilities.** There may be much greater use of joint civil-military facilities; the distinction between the two may lessen significantly.
7. **Support.** Support might bifurcate. There may be a part that provides the support for the Air Force's major warfighting capabilities albeit only for short duration combat. On the other hand, Australian private military companies may grow significantly and offer considerable capabilities able to be employed worldwide. In some circumstances, Air Force might then be required to support Australian private military companies. The whole concept of a national support base therefore might be dramatically reversed, particularly if private companies are perceived as more effective and efficient than Air Force in the conflicts encountered.
8. **Command and Management.** Command structures would need to be designed to allow external and domestic state and non-state entities of any type or scale to readily and easily plug into and work effectively with. A particular focus would be the ability to work closely with private security companies both domestically and internationally. Doctrine would need to include an emphasis on domestic security aspects.
9. **Industry.** In this world, the ADF would make significant use of commercial sources for equipment, operational and deep level maintenance and on-going support. Australian defence industry

would expand to be able to provide the ADF with services and support globally including during combat operations. Australian industry development would focus on service provision activities, not equipment manufacturing. Military equipment would only be acquired if strictly operationally essential and in that favour off-the-shelf purchases. Such equipment acquisitions would favour suppliers who could help build Australian defence industry service providers.

Annex C

FIC ISSUES IN THE MULTIPOLAR WORLD

Importantly, the FIC aspects detailed in this Annex are for the principal type of operations envisaged not the lesser proxy war type. The envisaged major war operations involving battle networks in the multi-polar world have FIC implications as follows:

1. ***Personnel.*** The focus would be on having small numbers of personnel but these being highly skilled. Moreover, most staff might fight the war from their homebase or at least from Australia. In this, an issue would be having sufficient personnel to move seamlessly to 24/7 operations when necessary. There may be a role for Reserve personnel available and trained to quickly supplement permanent staff. Moreover, overall Air Force personnel demands may also be lessened through using more contract-provided staff and services given the home-basing emphasis.
2. ***Organisations.*** These may need to be designed to be adaptable to quickly respond to changes in capabilities as these are degraded, destroyed, repaired and added. Organisations may need to be more continually aware of their own state than currently. Rapid organisational learning is likely to become an imperative.
3. ***Collective training.*** Such training may need adjusting to include using cumulative strategies in warfighting and practising networks fighting networks on a regular basis. Given the uniqueness of each network, such collective training may need to include flexible simulation approaches.
4. ***Major systems.*** Some major systems may need to be modified or upgraded to adequately counter directed energy and railgun defensive systems.

5. **Supplies.** Supplies of important precision-guided weapons may need careful consideration. The level of stockholdings may need to consider the possibility that some missiles may be deceived and be ineffective if the opposing network gains temporary success. Moreover, the time to resupply forward operating base and platforms may need to be shortened if high usage rates appear likely.
6. **Facilities.** Facilities at some forward locations may be vulnerable to physical attack and need some form of hardening while at more distant locations cyber attack can be expected. Given this, key facility resilience and redundancy may be crucial.
7. **Support.** Support may become more important in terms of network adaptability. Deeper level support is geared mainly to long-term maintenance however counter-network operations might require much faster paced activities. Some commercial support activities and expertise might become operationally important in counter-network operations.
8. **Command and Management.** Command structures would need to be designed to work seamlessly with a small set of particular alliance partners. Command and control structures would need close integration including classified data exchange. These structures would need to be resilient to allow continued operation even if some command and control centres are destroyed. Doctrine would need to be compatible with other allies and include multi-domain operations.
9. **Industry.** The main equipment driver would be the need to be deeply interoperable with a complex battle network dominated by the US. Some industry sectors would be built around supporting US-sourced equipment but others may develop able to repackage US equipment to be more appropriate to Australian conditions. Given that supply during conflict may be problematic, though,

Australian defence industry would need to have the capability and capacity to independently keep Air Force operating for an extended period. Airbases would probably be attacked, suggesting that industry may be restricted to rear areas with Air Force personnel only deployed to the forward bases.

Annex D

FIC ISSUES IN THE FRAGMENTED WORLD

The operations envisaged in the fragmented world have several FIC implications as follows:

1. ***Personnel.*** Air Force might have real difficulties in recruitment including the possibility there may be some volunteers who may actively or passively support hostile non-state actor groups. Personnel policies and systems may need adjustment to retain skilled, trusted people as well as to protect them.
2. ***Organisations.*** These may need to be designed to include a greater emphasis on internal security including being able to work in an integrated manner with domestic security agencies.
3. ***Collective Training.*** Such training may need adjusting to include a greater focus on irregular warfare. There would be a greater focus on working with external non-state actors in irregular warfare operations and with working closely with partner nations in off-shore counterinsurgency operations. There would be a sharply increased need for improved domestic security training.
4. ***Major Systems.*** Some may need modifying for the demands of irregular warfare.
5. ***Supplies.*** The supply chain might be occasionally subject to interference by physical or cyber means. The hybrid way of war suggests relatively limited supply demands in both quantity and time. There may, however, be some challenges in providing small stocks of the specific military and commercial equipment some deniable operations might require.

6. **Facilities.** Facilities might require greater security measures against both physical and cyber attack. There may be greater use by Air Force of domestic security agency facilities and vice versa; the military-civilian distinction may sharply lessen.
7. **Support.** Support might be impacted in two ways. Firstly, there would be an increased focus on the trustworthiness and reliability of the staff working for companies contracted to provide support. Secondly, the increased demands for domestic security might lead to a significant expansion of Australian private security companies in terms of capabilities and capacities.
8. **Command and Management:** Command structures would be designed to work internally within the ADF and other domestic government agencies. National considerations would dominate. In the event coalition operations were undertaken command structures would adopt some ad hoc arrangement that would terminate on completion of the operation. Doctrine would need to include an emphasis on offensive and defensive hybrid war.
9. **Industry.** Given the autarkic nature of this world, Australian defence industry is particularly important. Where practical, indigenous design and manufacture of equipment would be favoured. Where impractical, efforts would be made to assemble foreign-sourced equipment in Australia and develop an in-country capability to be able to modify this as required. Some Australian defence companies would be private but certain sectors considered vital may feature mainly government-owned enterprises. In general, most support and maintenance activities would be undertaken with Air Force although, some specific deeper level maintenance tasks may be undertaken by private companies.

Tomorrow's Wars

Insights From Our Four Alternative Futures

The development of modern air power, mainly resident in air forces, is faced with a fundamental challenge, since the future is uncertain and air forces need a long lead-time to build. Much effort and significant resources could be expended, with no assurance that an air force so built will be fit for purpose because of the uncertain strategic circumstance of the future. The alternative futures methodology offers a way around this issue.

The ADF's *Future Operating Environment 2035* imagines four alternative future worlds. This monograph examines each of these four worlds to determine the operational demands they might make on the Air Force. These demands are then examined to determine significant issues, potential organisational adjustments and possible changes to Fundamental Inputs to Capability that could make Air Force better prepared for the future.

In looking forward twenty years, the monograph looks beyond short-term imperatives to stimulate the imagination and encourage creative thinking about the uncertain future.

This monograph disrupts our preconceptions of what we *expect* to happen and prepares us for what *might* happen."

